An Integrated Theory for the Accumulation of Mentally Ill Offenders and the Effect of Realignment in California

Part 1 of 2

Yin Jien Lee

Thesis for the Degree of Philosophiae Doctor (PhD)
University of Bergen, Norway
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Abstract

High mental illness prevalence in California state prisons has drawn much attention of scholars and policymakers in the past three decades. Various studies suggest that the mental illness prevalence in prison has increased from 0.14 to 0.3 from 1987 to 2014. The problem with a high concentration of mentally ill prisoners culminated when the California Department of Corrections and Rehabilitation (CDCR) was sued for the violation of inmates' rights under the Eighth Amendment in the early 1990s. Consequently, CDCR's health care was placed under Federal receivership to reform prison health care. Receivership is an uncommon remedy adopts by a federal court when other court orders have failed to remedy an institutional violation. The Receiver is tasked with the responsibility to upgrade CDCR's health care system to the constitutional level and ensure the sustainability of the reformed health care system. In 2011, the State government introduced the Realignment policy to reduce the prison population in order to make room for prison health care reform.

Our study aims to understand the pathways through which the mentally ill individuals end up and remain in prison, investigate the effect of the Realignment policy, and identify the high impact leverage points to sustainably reduce the mental illness prevalence in prison. We develop a simulation model to integrate theories from the criminology, criminal justice, and public health literature to advance our understanding about the problem from a holistic perspective. We also use the model to evaluate the effectiveness of the Realignment policy and suggest additional policy to reduce the number of prisoners with mental illness.

The Realignment policy, with its focus on diverting the inflow of first time or reoffending prisoners from prison to jail, is a drastic intervention to the correctional system. Under Realignment policy, prisoners without mental illness progress through the system at a faster rate and more of them become desisting ex-convicts. This is because the pathway for prisoners who are placed on county parole supervision to desistance is shorter and the deterioration of social capital of this population is less severe. Hence, this population has a higher probability of reintegrating into the society. However, prisoners with mental illness benefit little from this reform because some of them are ineligible for county parole supervision. Thus, they have to serve parole under CDCR, which takes longer time. Additionally, the lack of community services for parolees with mental illness increases the difficulty to rehabilitate this group of individuals. Consequently, the burden of rehabilitating parolees with mental illness is shifted back to the prison system when these parolees reoffend. Eventually, offenders with mental illness are recycling in and between the criminal justice system and community.

In order to sustainably reduce the prevalence of mental illness in prison and the criminal justice system, the Realignment policy alone is insufficient. Instead, the policy needs to be complemented with additional policy, most notably by diverting the severe mentally ill prisoners to an alternative setting where they serve their sentence and receive treatment for their illness. The criteria for discharging these prisoners is contingent upon their recovery and ability to lead normal social lives. At the same time, we propose a feedback structure in correctional resource distribution and community service planning to meet the needs of parolee with mental illness. This additional feedback structure links the expected needs for mental health care and community services to resource and capacity planning. Lastly, we recommend the inclusion of natural depreciation rates in prison and jail capacity planning to avoid steady state error. Prison and jail facilities wear down due to the natural wear-and-tear. This expected loss of capacity is added to the additional new capacity to be built.

The contribution of this study is threefold. First, it develops an alternative explanation for the increase in mental illness prevalence in prison. The prevailing theories attribute the increase in mentally ill

prisoners to the poorly planned deinstitutionalization movement when the large-scale reduction of mental health hospital took place from the 1960s to 1970s and “war on drugs” policy in the 1980s. Second, the model-based analysis reveals that the Realignment policy is ineffective in reducing the mentally ill prisoner. Third, this study offers insight into how the Realignment policy could be revised to assist mentally ill prisoners and ex-convicts to the path of desistance. Furthermore, the simulation model that integrates and formalizes theories from various disciplines can be used as decision-making tool to guide stakeholders in identifying areas for further research and conduct experiments for policy scenario testing.

Keywords: Realignment, prison mental illness, mass incarceration, decarceration, Public Safety AB 109, prison health care reform, prison mental health care, shifting burden, model-based policy evaluation and analysis, theory integration

Contents

Figures

1 Background

This chapter provides an overview of the recent history and overall development of the mental illness prevalencve in prisons in California. High mental illness (MI) prevalence[1] in California prisons is considered a major problem and has drawn much attention from scholars and policymakers in the past three decades. MI prevalence in the state prisons is a widely accepted indicator of the magnitude of this problem.

Figure 1 presents the MI prevalence data points in California prisons and the general population. As MI only started gaining attention three decades ago, there were no large-scale reliable population-level prevalence study (both the prison and general population) prior to 1987. Even though consistent efforts in collecting MI prevalence information in the general population started since 2001, the definition of MI in these studies changes over time[2].

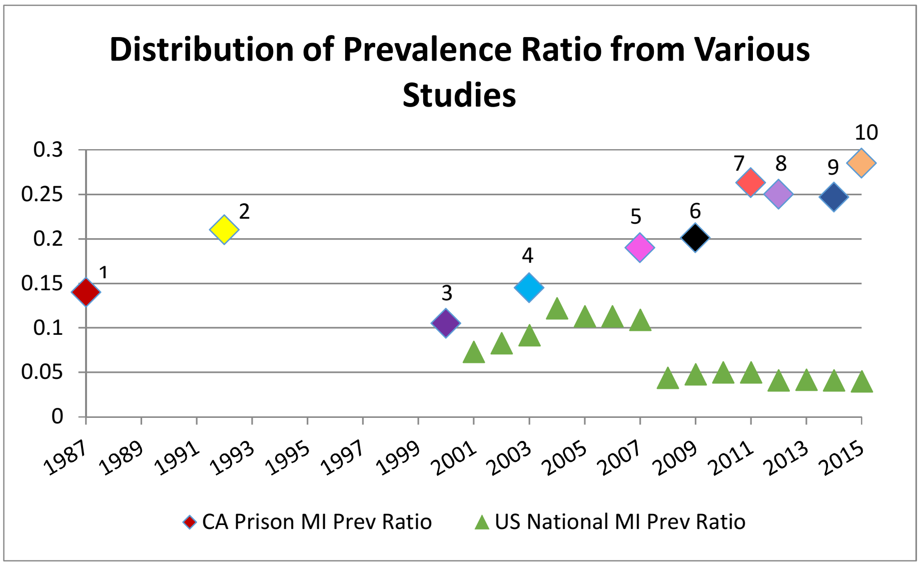

Figure 1 Historical Data: Mental Illness Prevalence in California's state prisons and in the U.S. general population

Sources:
CA Prison MI Prevalence
(1) 1987—From the Sterling Report published at the request of California state government in 1986 for the *Coleman v. Wilson* lawsuit. This ratio represents serious mental disorder prevalence.
(2) 1992—The Scarlett Carp Report published at the request of California state government in 1992 for the *Coleman v. Wilson* lawsuit. The reported prevalence were: male SMI (0.1107), male MMI (0.0947); female SMI (0.1521); female MMI (0.0903). We average these ratios to 0.21. See Appendix B for calculation.
(3) 2000—Allen J. Beck & Laura M. Maruschak, Bureau of Justice Statistics, U.S. Dept. of Justice, Mental Health Treatment in State Prisons (2001) (reporting 2000 data). These figures are for enrollment in programs, not overall demand. Given the staffing problems in California prisons, the figures are likely to underestimate demand.

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[1] MI prevalence in this study refers to a ratio to be consistent with other cited studies, unless other units, such as percentage, is specified.
[2] For example, when Diagnostic and Statistical Manual of Mental Disorders Criteria (DSM-1) was first published in 1952, there were only 106 mental disorders being defined. Nevertheless, the diagnoses have grown to 265 in DSM-5[2] published in 2013. Refer to Appendix C for the timeline of Diagnostic and Statistical Manual of Mental Disorders Criteria (DSM) development. Published by the American Psychology Association (APA) in 1951 to provide a common language and standard criteria for the classification of mental disorders. The latest edition, DSM-5, was published in 2013.

(4) 2003—Human Rights Watch states the population of California state prisoners with mental illness at 23,439 as of 2003. Human Rights Watch, Ill-Equipped: U.S. Prisons and Offenders with Mental Illness 18 (2003).
(5) 2007—California Department of Corrections and Rehabilitation (CDCR)
(6) 2009—Opinion and Order by the Three-Judge Court on *Plata v. Schwarzenegger* court case (p. 22)
(7) 2011—The Future of California Corrections (2012) by CDCR (p. 29 – 30)
(8) 2012—An Update to the Future of California Corrections (2016) by CDCR (p.12-13)
(9) 2014—CA Governor's Budget Report: Entire Corrections and Rehab Budget; MH Program-The pop of inmates requiring MH treatment is projected to be 33480 in 2013-2014 and 34,118 in 2014-2015
(10) 2015— An Update to the Future of California Corrections (2016) by CDCR (p.12-13)

U.S. National MI Prevalence
The National Surveys on Drug Use and Health (NSDUH) sponsored by Substance Abuse and Mental Health Services Administration (SAMHSA) is the largest scale and most comprehensive survey conducted at the national level to date. However, the measured variable—mental illness prevalence—has been modified several times from 2001 to 2013.

The data sources for the ten MI prevalence in California prisons varies. The data point in 1987 is obtained from a report published at the request of California state government for the *Coleman v. Wilson* lawsuit. This data point represents serious mental disorder prevalence. The second data point for 1992 is the average of the reported severe MI and moderate MI for male and female prisoners. The data point for 2000 represents the prisoners enrolled in mental health related programs in the prison. Thus, this number is likely to be underestimated given that those mentally ill prisoners who were not enrolled in mental health related programs due to a variety of reasons were not considered to be mentally ill. The estimate of the MI prevalence for 2003 is derived from in-person or on-site interviews with prisoners and staff. Hence, the reported prevalence is self-reported by a selected sample prison population. Data points for 2007, 2011, 2011, and 2015 are reported by California Department of Corrections and Rehabilitation (CDCR). The methodology used to estimate these data points are unknown. Data point for 2009 is reported in the Opinion and Order by the Three-judge Court on *Plata v. Schwarzenegger* court case by experts' testimonies. Data point for 2014 is derived from the projection of demand for mental health treatment. Considering the diversity in data sources, estimation techniques, methodologies, and sample population, we play down the weight of these data points except for the first and last data points. As the data point for 1987 is the only earliest MI prevalence reported, we use this data as the initial value for the model. This value will be tested in the validation section. We also assign more weight to the data points after 2011 because these are reported by California state agency.

The U.S. MI prevalence is collected through the National Surveys on Drug Use and Health (NSDUH) administered by Substance Abuse and Mental Health Admininstration (SAMHSA). Between 2001 and 2003, only serious mental disorders (SMI) prevalence were measured. At that time, SMI was defined as "having at some time during the past year a diagnosable mental, behavioral, or emotional disorder that met the criteria specified in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV)". From 2004 to 2007, serious psychological distress (SPD) was measured instead of SMI. SPD indicates that a respondent recently experienced "heightened distress symptomatology that may be affecting health and behavior". In 2008, the US national MI prevalence only reported SMI prevalence. From 2009 to 2015, both SMI and AMI (Any Mental Illness) are reported. To maintain consistency, SMI is used in the graph whenever data are reported. Otherwise, SPD is shown.

The comparison between MI prevalence in California prison and in the population at large provides some insight into the severity of the problem. Before 2007, the MI prevalence data points are collected from literature that applied a variety of diagnostic criteria, samples, and collection mechanisms. After 2007, time series data emerge from more consistent empirical studies. In 1987, the MI prevalence in California prison was 0.14. MI prevalence among Californian prisoners has always been higher than that of the general population. The MI prevalence of the general population has been less than 0.15 while the MI prevalence among prisoners rose from 0.1 in 2000 to 0.26 in eleven years. After 2011, the MI prevalence among prisoners dropped by 2% over the subsequent two years. The prevalence for 2012 and 2014 were similar, i.e. about 0.25. Nevertheless, the prevalence surged 4% in 2015. This suggests that a larger fraction of prisoners with MI remains in or enters the prison than before.

The prevailing theories attribute the increase in mentally ill prisoners to the poorly planned deinstitutionalization movement, causing a large-scale reduction of mental health hospital to take place during 1960s and 1970s (Torrey et al., 2010) and "war on drugs" policy in the 1980s (Bandow, 1991). There are other institutional-level, behavioral, or public health theories stemming from a variety of other disciplines, attempting at explaining the same problem. There may be a certain level of explanatory power associated with each theories. However, testing various theories separately to understand the cause to the increase in MI prevalence in prison is challenging for two reasons: First, these studies arrive at the conclusion based on observed data without a systematic approach to trace causal effect; second, data representing the state of mental prevalence in California prisons is scarce and fragmented (Petersilia, 2006). The difficulty in measuring the size of mentally ill prisoner population is made even harder due to the lack of uniform definition of mentally ill offenders (Davis, 2012). First and foremost, the major source of confusion originates from the broad definition of mental illnesses, which leads to different definitions among various agents and actors, such as the corrections, state, counties, in-custody personnel, health care personnel, and post-imprisonment personnel (Davis, 2012).

The problem gained the most attention when the California Department of Corrections and Rehabilitation (CDCR)[3] began to engage in a series of lawsuits for the violation of inmates'[4] rights under the Eighth Amendment[5]. In 1991, a civil lawsuit was filed by a prisoner, Coleman, alleging the State be liable for the violation of his rights to receive mental health care (MHC) during imprisonment ("Coleman v. Wilson," 1994). This class-action lawsuit[6] became the "vehicle for a constitutional challenge under the cruel and unusual punishment clause of the Eighth Amendment to the entire California prison mental health care system" (Specter, 1994, p. 110). Together with another lawsuit, *Plata v. Schwarzenegger*[7], these legal actions resulted in an order from the Three-Judge-Courts ("Plata v. Schwarzenegger," 2009) requiring CDCR to develop and implement remedial plans to upgrade mental health care and medical care in prison to the constitutional standard. Yet, CDCR persistently fell short in implementing the reforms. The primary reason cited for the failure was prison overcrowding ("Coleman v. Wilson," 1994). This led to another intervention by the federal court: capping and reducing the prison population in order to make room for a medical care reform ("Coleman v. Wilson," 1994). A receiver was appointed to supervise, report, and oversee the implementation of necessary remedial efforts to meet constitutionally accepted medical care in the prison. Consequently, the Federal court's intervention led to the birth of the "Realignment Policy[8]" in the end of 2011.

The prevalence of mentally ill prisoners receives much attention by the policymakers because prisons are obliged to provide appropriate health care under the constitution. Treatment provision in prison is more costly than treatment in the community because local governments do not need to provide security to ex-convicts who are released from prisons. On one hand, CDCR needs to maintain a

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[3] Before 2005, California's adult prisons were managed by the California Department of Corrections (CDC), a department under the state's Youth and Corrections Agency. After 2005, California Department of Corrections was reorganized and renamed as the California Department of Corrections and Rehabilitation (CDCR). For consistency purpose, CDCR is used through this study.

[4] Inmate refers to someone confined to an institution such as hospital or prison. In this study, "inmate" refers to an individual who are incarcerated. "Offender" refers to an individual who have committed crime. "Convict" refers to an offender who has been sentenced. "Prisoner" refers to a convict who are incarcerated in prison. "Jail offender refers to a convict who are incarcerated in jail.

[5] "The Eighth Amendment prohibits the infliction of cruel and unusual punishment on convicted prisoners and applies to the 'the treatment a prisoner receives in prison and the conditions under which he is confined'". *Helling v. McKinney*, U.S. 25, 113 S. Ct. 2475, 2480, 125 L.Ed.2d 22 (1993).

[6] A type of lawsuit where a group of people who are represented collectively by a member of the group. Source: https://www.law.cornell.edu/wex/class_action

[7] *Plata*, filed on April 5, 2001, involves the state prison system's unconstitutional medical care provided to the inmates.

[8] There were two Realignment Policies in California in the past two decades. The first Realignment took place in 1991 with the purpose to delegate the responsibility for MH treatment from the state government to local counties through fund appropriation. The most recent one was implemented in October 2011. It is also referred as "Public Safety Realignment Act of 2011" with the purpose to deter the inflow of offenders to state prisons and release certain groups of offenders to parole under the custody of local counties.

treatment capacity that is sufficient for the expanding prison population; on the other hand, CDCR is under pressure to reduce spending in order to curb the increasing correctional facility budget. In order to achieve the first goal, policymakers need to have an effective prison treatment capacity-planning tool. However, tackling the second goal will require the understanding of the causal structures that lead mentally ill individuals into the prison. Through this understanding, policymakers are able to identify areas to reduce the inflow of mentally ill prisoners. Hence, the first objective of this study is to identify the causal structures that lead to the increasing prevalence of mentally ill prisoners. Oxford dictionary[9] defines "structure" as the "arrangement of and relations between the parts or elements of something complex". The second objective is to investigate the effects of Realignment policy on the mentally prisoners. The third objective is to identify sustainable levers to reduce the MI prevalence in the prisons.

This study is particularly timely and useful now as the incumbent Attonery General, Jefferson Sessions, has widely expressed his intention to introduce tough-on-crimes policy (Ruiz, 2017). The attorney general is especially interested in toughening rules to prosecute drugs or drug-related crimes vigorously in every case during the time when the country has first seen the decline in federal prison population.

[9] Oxford Online Dictionary (https://en.oxforddictionaries.com/definition/us/structure)

2 Conceptual Framework

This chapter presents the conceptual framework of our study. A conceptual framework represents a way of how and why the issue at hand is investigated for a well-defined purpose. This framework links all the elements of the research process, researcher disposition, interest, literature, and method. This framework also shapes research design, refines the study objectives, carves appropriate research questions, selects appropriate research method, and justifies the findings (Maxwell, 2013).

A body of literature on issues pertinent to mentally ill prisoners may be grouped into three broad categories: (1) MI prevalence and characteristics (such as demographics and bio-psycho-social status) of the prison population ; (2) causes of the underlying and impacts of the increasing number of mentally ill prisoners; and (3) recommendations aimed at reducing the mentally ill prison population. Prevalence and prisoner characteristics studies are useful in forming an understanding of the severity of the problem. Overtime, this kind of studies also contributes to policy design and evaluations (Sarteschi, 2013). However, in order to design effective and sustainable policies, an adequate understanding of the dynamics of MI prevalence is required. In the literature, the frequently cited causes of a persistently high MI prevalence in prisons include the confinement conditions (Human Rights Watch, 2003; Sarteschi, 2013), the lack of community services (Council of State Governments, 2002; Lamb et al.; Lamb et al., 1998; Lurigio et al., 2004; The Sentencing Project, 2002), sentencing and corrections policies (James et al., 2006; Sarteschi, 2013; The Sentencing Project, 2002; Torrey et al., 2010), and lifestyles and behaviors of ex-convicts (Baillargeon et al., 2010; Ball, 2007). Studies that center on confinement conditions, lifestyles and behavior are grounded on human behavior or psychological perspectives. On the other hand, literature based on sentencing and correction policy arguments take on legal and criminal justice policy perspectives. Finally, studies attribute causes to the lack of community supports root their arguments on the sociological and public health theories.

In the recent years, criminal justice issues have been viewed by some researchers as public health problems (Akers et al., 2009; Drucker, 2015; Potter et al., 2012) by researchers who propose a collective view on the causes of the problem instead of considering the causes as isolated occurrences and treating them individually. Researchers in the public health domain have turned to adopting systemic views on public health issues by connecting the issues to a broader context instead of investigating the issues as an isolated phenomenon (Berben et al., 2012). Mittelmark (2012) even acknowledges that the recognition that public health issues are embedded in an environment where multiple agents are involved may avoid that specific sectors or agents are being blamed.

Akers et al. (2009) promote the integration of criminology and epidemiology. Criminology involves the "systematic study of the nature, extent, cause, and control of law-breaking behavior (p. 398)" while epidemiology is the study of population illnesses to introduce interventions and preventions in the interest of the public. Social epidemiology emerges from the recognition that societal characteristics affect the disease pattern. The attempt to understand the causality of high MI prevalence in prison will invite questions such as "What are the impacts of social factors on prisoners with MI once they return to the community?" Criminal justice and epidemiology also share some commonalities, one of which is the stage-dependent intervention focus. Criminal justice refers to the crime control practices, philosophies, and policies used by police, courts, and corrections. These two disciplines deal with prevention and immunization (or crime prevention), treatment and rehabilitation (or punishment and correction), and reinfection (or recidivism). In public health terms, these efforts correspond to primary, secondary, and tertiary interventions. In the case of the mentally ill prisoners, the primary intervention characterizes efforts in preventing the vulnerable individuals with MI from falling into the criminal pathways--committing crime and remaining criminal. These include measures to protect and avert this high-risk group from engaging in criminal behaviors in the first place. Hence, one of the prerequisites for primary intervention is a deep understanding of factors that lead to criminal behaviors. The secondary intervention relates to implementing policies to handle individuals who have already committed crimes. Rehabilitative programs provided in prison is an example of secondary intervention. Instead of imposing the same punishment for mentally ill offenders, which may be ineffective, it is essential to discern other effective ways to handle this group. For mentally ill offenders who are already imprisoned, tertiary intervention through education and rehabilitation to deter future recommitment is crucial.

Drucker (2013) delves a level deeper to map the effect of criminal justice polices on the public in the United States. He conceptualizes mass incarceration as an epidemic[10], which is determined by the rapid growth of the incarcerated population and its impact of large magnitude in the society. In conjunction with the persistence and self-sustaining capabilities to reproduce itself by creating new cases and by keeping individuals in the loop, epidemic[11] occurs. With this conceptualization, Drucker presents a model that spans across sectors, such as criminal justice, public health, and social welfare. His work implies that a comprehensive cross-sectoral collaboration is needed to keep potential and existing offenders out of the criminal pathways. This collective view of events differs from the contemporary and dominant criminal justice practice, which usually considers events as isolated

[10] P.37-49

[11] Centers for Disease Control and Prevention (CDC) defines epidemic as "*an increase, often sudden, in the number of cases of a disease above what is normally expected in that population*". Retrieved from CDC's website https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section11.html , on January 16, 2017.

occurrences and treat them individually (Akers et al., 2009; Auerhahn, 2008; Drucker, 2013; Jeffrey, 1959)[12].

Davis et al. (2009) embrace the public health perspective in dealing with ex-convicts' reentry. The researchers go as far as to construct a map to identify areas with high concentration of parolees, the proximity to various kinds of community services, and the capacity of these services. They find that the parolees in their study have a larger need for mental health care and substance abuse treatment than physical health needs.

From the theoretical analysis perspective, criminology theories are divided into the macro-, meso-, and micro-levels. Macro-level analysis studies structures and policies of criminal justice; meso-level analysis is about the influence of family, group, organization, and community on criminal behaviors. The micro-level analysis scrutinizes individual behavior patterns. Although criminology is seen as a multidisciplinary discipline, the level of analysis and underlying theories that criminologists base their studies upon is heavily influenced by their core discipline, i.e. criminology or criminal justice, in which the researchers are trained (Potter et al., 2012). Very often, researchers in criminology rarely venture outside of their field so as to adopt alternative or supplementing methods, approaches, and theories to study problems at hands (Auerhahn, 2008; Jeffrey, 1959). On the contrary, Potter et al. (2012) acknowledge the limitation of discipline-specific or single-theory solutions to tackle criminal justice problems. The authors underscore the importance of understanding the dynamics of the criminal justice system. Their research suggests that the criminal justice problem is a systemic problem. Systemic problems refers to the problem behavior arises from within systems characterized by nonlinear feedback processes where cause and effect span across space and time. In this case, the macro-, meso- and micro-level factors are interacting to produce the unintended problem behavior. The legislative organization at the macro-level (national, state, and local) affects the development of formal social control, such as laws, which defines and differentiates criminal and non-criminal behaviors. This, in turn, influences the informal social control, an inherited value and belief system, formed through social networks. Family, groups, organizations, and communities form these social networks (meso-level). The informal social control influences individual behaviors. Eventually the individual value and belief system that are changing feed back to the legislative envinronment macro-level (i.e. the criminal justices structures and policies).

Nevertheless, this systemic perspective seemed to be lacking when the Federal Court ordered CDCR to reduce the prison population. The goal of the order was to increase the per capita health care resources required by reducing the prison population. While the state declares success in reducing

[12] Drucker (2013), p. 68

prison population through the Realignment policy, the expenditures of the state correctional facilities remain high and recidivism rates remain unchanged (Loftstrom et al., 2013). Six months after the introduction of the Realignment policy, the jail population surges and more counties report higher percentage of early release of pretrial detainees or sentence offenders to free up jail capacity (Loftstrom et al., 2013). The annual State Corrections savings exceeds $1 billion, but it is offset by the increase in facility expenditures in counties after the local governments shoulder additional inmates and parolees (California Budget Project, 2013). Despite the high awareness of MI prevalence and economic burden of the disease, communities have yet to prioritize resources to increase access to mental health services, let alone addressing the ex-convicts' mental health service needs (Council of State Governments, 2002). At the same time, counties fail to capitalize on the extra funding from the state government to reduce incarceration through community services (CURB, 2015). Instead, the number of new jails is on the rise. In a social system, goals of subsystems frequently contradict the well-being of the broader system (Forrester, 1975). The consequences resulted from the court order show that well-intended policy may lead to other unintended negative results. Focusing the court order on per capita health care resources, other unintended consequences arise from other parts of the system may be easily overlooked.

The persistently high MI prevalence in prisons is a criminal justice and public health problem. The attempt at understanding the cause of the high prevalence of mentally ill prisoners in California requires a "shift of mind" (Senge, 1994). Therefore, a "shift of mind" enables stakeholders from "seeing parts to seeing wholes". The "shift of mind" prompts the stakeholders to study the structure that generates the problem behavior. Developing an in-depth knowledge about the process that causes structure to affect behavior empowers stakeholders in their search for high impact leverage point, with which a small change of action produces a significant change in the system behavior (Meadows, 1999). Taking a single perspective and considering the observed development without relating the problem to a broader context will merely produce sub-optimal solutions to temporarily relief symptoms. Therefore, a platform that enables the integration of theories from the criminology, criminal justice, and public health will advance our thinking about the problem. Seeing the problem from a new perspective may also lead to additional inquiries and methods that help us understand our mental models.

The following diagram summarizes our conceptual framework (Figure 2).

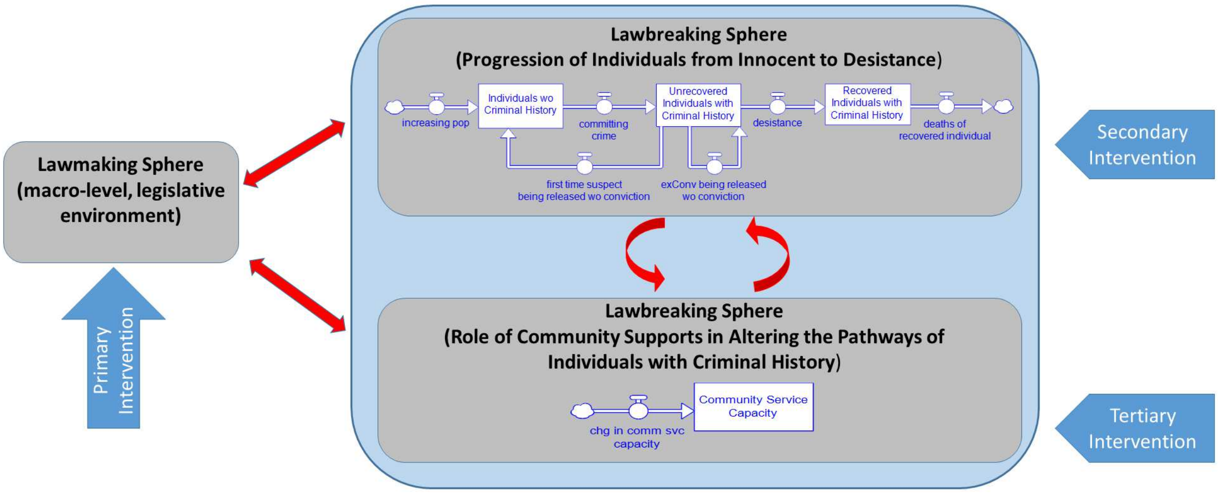

Figure 2 Conceptual Framework

When an individual commits crime, the act is considered a lawbreaking behavior. The legislative environment (macro-level), and individual behavior affect the individuals' lawbreaking behaviors. Initially, the legislation attempts to deter individuals from taking part in the lawbreaking behaviors (micro-level). But once these individuals have become involved, the lawbreaking behavior prompts actions from law enforcement, judiciary, correctional institutions, and community (meso-level). These responses have determining effects on the mentally ill offenders' future path; whether they remain in the lawbreaking path, characterized by the first and second stocks in the upper "law-breaking sphere" box in Figure 2, or they manage to leave this path and move on to the "Recovered Individuals with Criminal History" box to the right. In our study, we treat the lawmaking environment as an exogenous input and focus on the progress of lawbreaking individuals and their interactions with the community. This implies that we limit our consideration to the feedback structure between the secondary and tertiary interventions (in public health discipline's terms or the meso- and micro-level factors).

The progression of individuals from innocent to desistance can be further categorized in the following relationship (Figure 3)

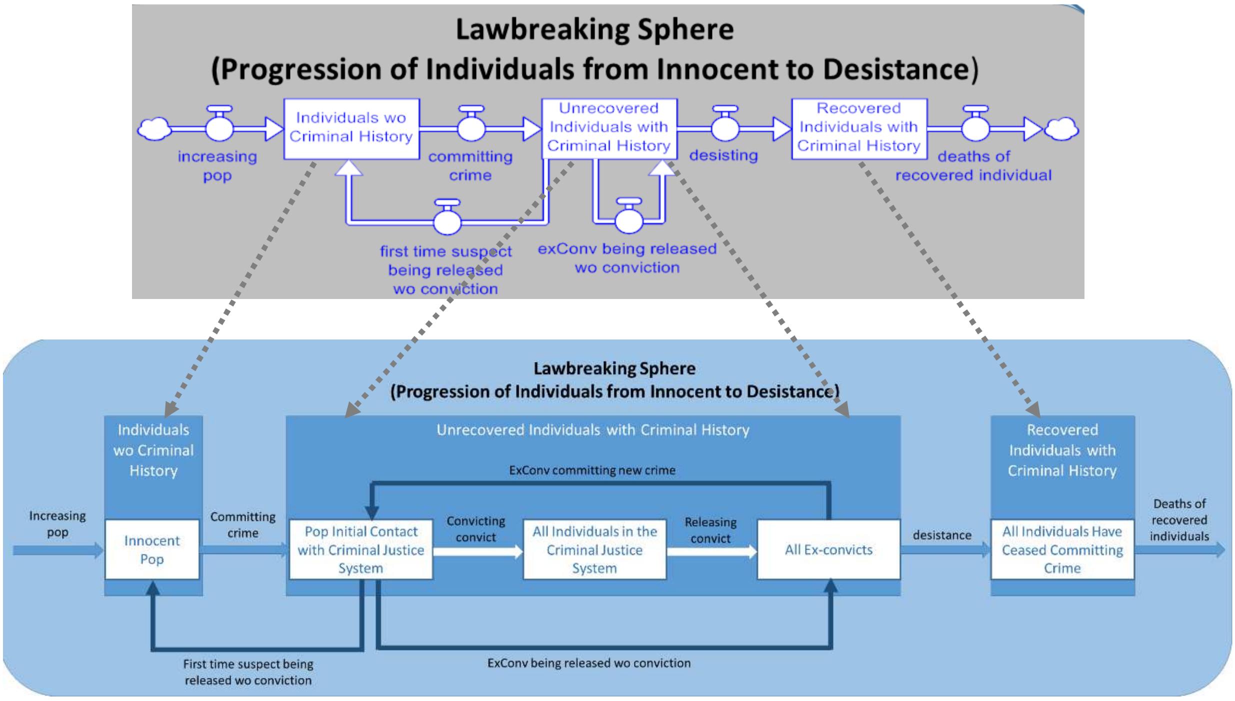

Figure 3 A Detailed Progression of Individuals in the Lawbreaking Sphere

The stock named "Innocent Pop" constitutes individuals who do not have criminal history or have not been engaged in criminal activities. This stock is also the only stock in the "Individuals wo Criminal History" subsector. However, some of them may be vulnerable due to their history and social environments. Once these individuals commit crimes, they flow into the adjacent stock named "Pop Initial Contact with Criminal Justice System" in the "Unrecovered Individuals with Criminal History" subsector. The "Pop Initial Contact with Criminal Justice System" comprises arrestees and suspects. If the first-time arrestees from the "Innocent Pop" stock are not charged, they will be released and returned to the "Innocent Pop" stock. If they are charged with a conviction, they move on to the "All Individuals in the Criminal Justice System" stock in the "Unrecovered Individuals with Criminal History" subsector. Recidivists who are not charged return to the All ExConvicts stock. Individuals in the criminal justice system includes those who are detained in the jails waiting for trials or those who receive prison sentence and waiting to be transferred to the prisons, those who are waiting for trials in the community, those who are in the prisons, those who are on probation, and those who are serving parole. Once the individuals in the criminal justice system are released, they move on to the "All Ex-Convicts" stock. Individuals depart from the "Unrecovered Individuals with Criminal History" subsector through one of the three outflows: desisting, being released without conviction, and deaths (omitted from Figure 3). Note that ex-convicts who recidivate return to the "All Individuals in the Criminal Justice System" stock. Hence, they still remain in the "Unrecovered Individuals with Criminal History" subsector The "desisting" outflow refers to the situation which the ex-convicts act as law-abiding citizens and permanently cease engaging in criminal activities. These individuals enter the stock named "All Individuals Have Ceased Committing Crime", which is the only stock in the "Recovered Individuals with Criminal History" subsector. The progression of prisoners with MI is a subset of the progression in Figure 3.

The meso-level concerns the capacity of the community support aimed at facilitating smooth reentry transitions for the mentally ill offenders (the lower box in Figure 2). Identifying the support required by this population and planning for sufficient community service capacity (meso-level) for the ex-convicts are crucial in keeping them from reoffending.

Our conceptual framework demonstrates that the understanding of how mentally ill prisoners engage in the progression from innocence to recovery and their interactions with the community requires explanations with theories beyond a single discipline. These interactions are part of a complex dynamic problem. A single-perspective discipline is insufficient to provide an indepth explanation of the causes underlying the increasing prevalence of MI in prison. In the subsequent sections, we present our research questions and research design.

2.1 Research Questions

The purpose of this study is to investigate the causal structures underlying the dynamics of mental illness prevalence in the prisons and to identify high impact leverage points to sustainably reduce the that prevalence. As such, we specifically seek answers for the following questions:

- How has mental illness (MI) prevalence in prison evolved over time?
- What is the underlying social structure that governs the MI prevalence in prisons and how does the underlying system structure affect the dynamics of that prevalence?
- What policy may sustainably reduce mental illness prevalence in prisons?
    - How does the implementation of the Realignment Policy contribute in reducing mental illness prevalence in prisons?
    - What adjustments to the policy are needed to sustainably reduce MI prevalence in prisons?

2.2 Research Design

This section explains the epistemological perspective, philosophical worldview, strategies of inquiry, and research methods of our study. These four elements form the framework of our research design. Research design unfolds plans and procedures for the study from the broad assumptions the study is based upon to detailed methods for data collection, analysis, and interpretation.

2.3 Epistemological Perspective

Epistemology is the theory of knowledge upon which the theoretical perspective of our study is based on. As prior knowledge informs our research,we believe knowledge building relies on discoveries guided by theories. The development of theories requires observations. However, observation is guided by theories as well. Therefore, initial theories (tentative theories or hypotheses) guide observations and observations contribute to the improvement of those initial theories.

Scientific knowledge is not absolute truth. Scientific knowledge contains conjunctures. In other words, scientific knowledge development is based on incomplete information (Popper, 1963). Therefore, it is possible that our initial theory is erraneous. Rigorous testing may reveal flaws in our initial theory. When errors have been uncovered, we continue to investigate empirical evidence with the intent to refute our initial theory. If unsuccessful, we consider the initial theory corroborated or validated. That theory may then stand as long as no evidence is produced that raises questions about its validity. Even in the case of refutation, we will still improve our knowledge about the real world. "Refutationism" was made popular by Karl Popper and his followers in the early 1930s. The supporters of refutationism believe that an improved theory explains the empirical world in ways where the predecessor failed. As Bell et al. (1980) posit:

> "*The more points for testing and the greater variety of test points, the more potential a causal explanation has to explain a variety of phenomena. A causal explanation will explain a variety of phenomena if it is subsequently tested and corroborated at those points. Furthermore, the more points for testing the greater the potential for new insights and unforeseen connections* (p.19-20)."

Hence, this study serves two purposes: first, we aim at developing a "corroborated" alternative theory to explain the increase in MI prevalence in prisons; second, we establish a "boundary object" (Black, 2013) or representation to help advance future conversations between individuals with different background, training, and objectives by encouraging a focused, meaningful, and structured discussion. Structured discussions contribute to learning and improve understanding of the system.

2.3.1 Philosophical Worldview

This study is influenced by the pragmatic paradigm. The pragmatic worldview emphasizes actions, situations, and consequences instead of fixed principles and non-experimential reasoning. Pragmatists advocate the use of various approaches to derive knowledge about problems, such as the adoption of a suitable system of philosophy and reality, multiple methods (quantitative as well as qualitative ones), different paradigms (positivism, constructivism, transformative, etc.), and a combination forms of data collection and analysis (Cresswell, 2014). The advantages of the pragmatic approach lie in its emphasis on abductive reasoning[13], inter-subjectivity[14], and transferability (Morgan, 2007). Abductive reasoning contributes to this study by hypothesizing that the initial condition of the state of a system gives rise to the problematic behavior. A system is an "assembledge of objects united by some form of regular interaction or interdependence" (Mele et al., 2010). From a broader perspective, mental illness prevalence in prison is socially constructed. The organizational structure of social institutions influences the development of the prevalence of mentally ill prisoners. These social institutions are assigned with structures of roles, associated roles, and authority that affect the decision-making processes that govern the flow of mentally ill criminals. With the number and variety of actors in social institutions contributing to complex social problems and solutions, the inter-subjectivity emphasis of the pragmatic approach allows us to collect, analyze, and compare results obtained with using both quantitative and qualitative methods. As the pragmatic approach rejects the need to choose a specific set of methods, we can be engaged in an iterative process of data collection, analysis, comparison, and interpretation employing quantitative and qualitative methods. Thus, the pragmatic approach increases the likelihood for the alternative theory developed from this study to be transferred and generalized to other settings or social problems.

[13] Or termed as the "inference to the best evidence", is a method of reasoning in which a one chooses the best available evidence to establish a hypothesis. Deduction reasoning refers to the determining of the *conclusion* while the induction reasoning refers to the determining of the *rule* that leads to a particular observation. However, abduction reasoning refers to the adoption of *conclusion* and *rule* to assume the *precondition* that could be used to explain the *conclusion* (refer to Harman, 1965).

[14] Refers to shared understanding, agreement, or common sense between people that helps people to related one situation to another (Gillespie et al., 2009).

2.3.2 Strategy of Inquiry

Strategy of inquiry refers to a guideline that provide a specific direction to procedures in research design. To align with the pragmaticism worldview, this study will be undertaken as a mixed method research. Mixed method research is an inquiry approach that combines quantitative and qualitative data to increase the overall strength of the study (Cresswell, 2014). We establish a synthesis between quantitative and qualitative data whenever it is necessary to provide a comprehensive analysis.

We find that system dynamics (SD) is a suitable methodology by which we may integrate and test theories. SD is a modeling and simulation methodology to study the relationship between the dynamic behavior of complex systems and the underlying structure causing that behavior. The methodology originates from control theory and servomechanism. The dominant assumption of the SD paradigm is that persistent dynamics of complex systems originate from the causal structure of the systems. These causal structures in turn prompt people to conform to the system, which they are embedded in. These behaviors lead to the cumulative dominant dynamic tendencies of the total system (Meadows, 1980). A complex system characterizes an environment where relevant actors interrelate to generate a certain behavior pattern over time. The structure of complex systems is characterized by accumulation (causing delays), circular causality, and non-linearlity (Forrester, 1961; Sterman, 2000). SD models comprises mathematical equations to express the causal relationships embedded in the system structure. These equations typicall "endogenize" such relationships in closed feedback loops. Each feedback relationship contains stocks, rates, and often auxiliaries and constants. A stock can preserve material or information. A rate characterizes a flow of material or information that changes the value in a stock. The rate represents decision, action, or change. Am auxiliary variable contains an equation that involves stocks or flows. It represents a relationship. Auxiliary variables are typically located in the information flow channels between stocks and particular decision functions that influence rates. Auxiliary variables can also be part of the algebraic equations in rates. Constants represent unchanged numerical values that describe the characteristics of a system.

A system dynamics model is a learning vehicle, which also functions as a repository of knowledge. The model is built with real world structural information and data. Simulation and analysis inspired by the model provide direction for further empirical research. As the model integrate empirical research, simulation and analysis enable us to collect and store empirical data, and to refine model structure in order to better represent the system in which the problem we study is originated. Because the model integrates real world information and data, we can also use the model for testing and refuting existing or tentative theories. Tentative theory is a set of logically interrelated proposition that expresses a testable concept; more specifically, a tentative theory refers to a preliminary structure plan that efficiently consolidates diverse groups of observations and expectations (Decker, 2016). After going through the simulation, analysis, and refutation stages, an alternative or corroborated theory may be generated until new evidence is produced and integrated into the model for further testing and refutation. Integrating new evidence into the model also updates the model. Thus, new knowledge is stored in the model even if the new tentative theory is refuted. Hence, a new knowledge can be stored and integrated in a system dynamics model continuously and perpetually.

Our model integrates the theories from criminology, criminal justice and public health to probe how individuals with MI who engage in criminal activities progress through, and, out of the criminal justice system. Integrated theories refer to the combination of concepts and central propositions from two or more theories into a single set of integrated concepts and propositions (Elliot, 2012). Proponents argue that theory integration is an alternative strategy for theory development and testing because this approach increases the levels of explanatory power compared to that of a single theory. A good theory does not only provide explanation of the occurrence of certain actions, structures, and events (Sutton et al., 1995), it also serves as a classifying framework to help predict and test the proposition, and suggest future direction for research and intervention (Decker, 2016). Theories may be represented in models, simplified representations of the world as expressed in the propositions that constitute the theory. These propositions are assumptions that require further testing. By subjecting our model to simulation, we analyze the structural (endogenous) causes underlying the dynamics, i.e. the increasing number of mentally ill prisoners. Based on such analyses, we run experiments with our model by varying certain structures or parameters to identify high impact policy levers. Since SD is a methodology to study causal relationship between structures of systems and behaviors, we need to monitor the system over time constantly. Discrepancy between the prediction produced by the model and reality warrant revisit and revision of the assumptions built in the model.

Simulation, which means " 'running' the model forward through (simulated) time and watching what happens (Gilbert et al., 2005, p. 16) ", has been gaining popularity as a methodological approach in social science studies since 1990s. What interests social scientists most is the potential for simulation to assist in the interpretation, the formalization, and the operationalization of textual theories into a specification that can be tested for validity using a computer. Simulation introduces a new way of thinking about complex social processes in which complexity arises from the mutual interactions between relatively simple structures. Simulation with a system dynamics model allows us to analyze the simulated results by studying the underlying structure that produces the behavior by varying certain structures or parameters in the model. We may also trace the causal structure of the simulated results. Such analysis improves our understanding of complex and dynamics systems. With this understanding, we design policy that modify the underlying structure that causes the problematic behavior. Some of the advantages of using of computer simulation in social problems are:

1. The opportunity to obtain a better understanding of the underlying structure of the real world that generates problematic behavior;
2. Projection (if the model developed replicates the dynamics of some behavior in the past, then we can use the model to project what would happen should the structure or system remains unchanged);
3. Serving as an experimental vehicle where a simulation model can be used to conduct scenario analysis;
4. Serving as tool to improve human judgment, strategy development, policy design, and decision-making.

The explicit presentation of feedback loops and the relationship between state variables in system dynamics models help forming theories to explain behavior of systems over time. Therefore, system dynamics model validity focuses on the consistency between the model structure and the structure of the reality it represents and on the fitness between model behavior and dynamics of reality. The fitness is not defined by point-by-point matching, but rather a model-generated behavior that matches the real world behavior. Hence, structure-oriented tests, such as extreme condition tests, parameter sensitivity, modified-behavior test, and qualitative feature analysis, will be conducted to reveal critical model structure flaws (Barlas, 1996).

2.3.3 Research Methods

Research methods encompass the forms of data collection, analysis, and interpretation employed in our study. Relevant data, both qualitative and quantitative, will be used to populate the model. Quantitative data are obtained from various sources, including data on prisoner from California Department of Corrections and Rehabilitation (CDCR), California Department of Finance, Legislative Analyst Office (LAO), California State Controller, California State Auditor and data on MI prevalence from United States Department of Justice and various national studies (refer to Appendix K for data sources). In the case of lacking or incomplete data, we cross check data obtained from various literatures. We extract qualitative data to build confidence in our model from other relevant literature when deemed necessary.

System dynamic model building process is iterative: Every step will typically be repeated until the model adequately and reasonably generates the past behavior of the problem studied. Even so, the model is “always in a continuous state of evolution (Forrester, 1985, p. 133)” because every new input, question, reaction, and vagueness may lead to modification, clarification, and expansion. Through numerous simulation and modification of the model, the output will be more valid and thus the tentative theory will be refined (Gilbert et al., 2005).

Figure 4 presents the stages in system dynamics modeling process (Randers, 1980) and the contribution points of quantitative and qualitative data in each stage.

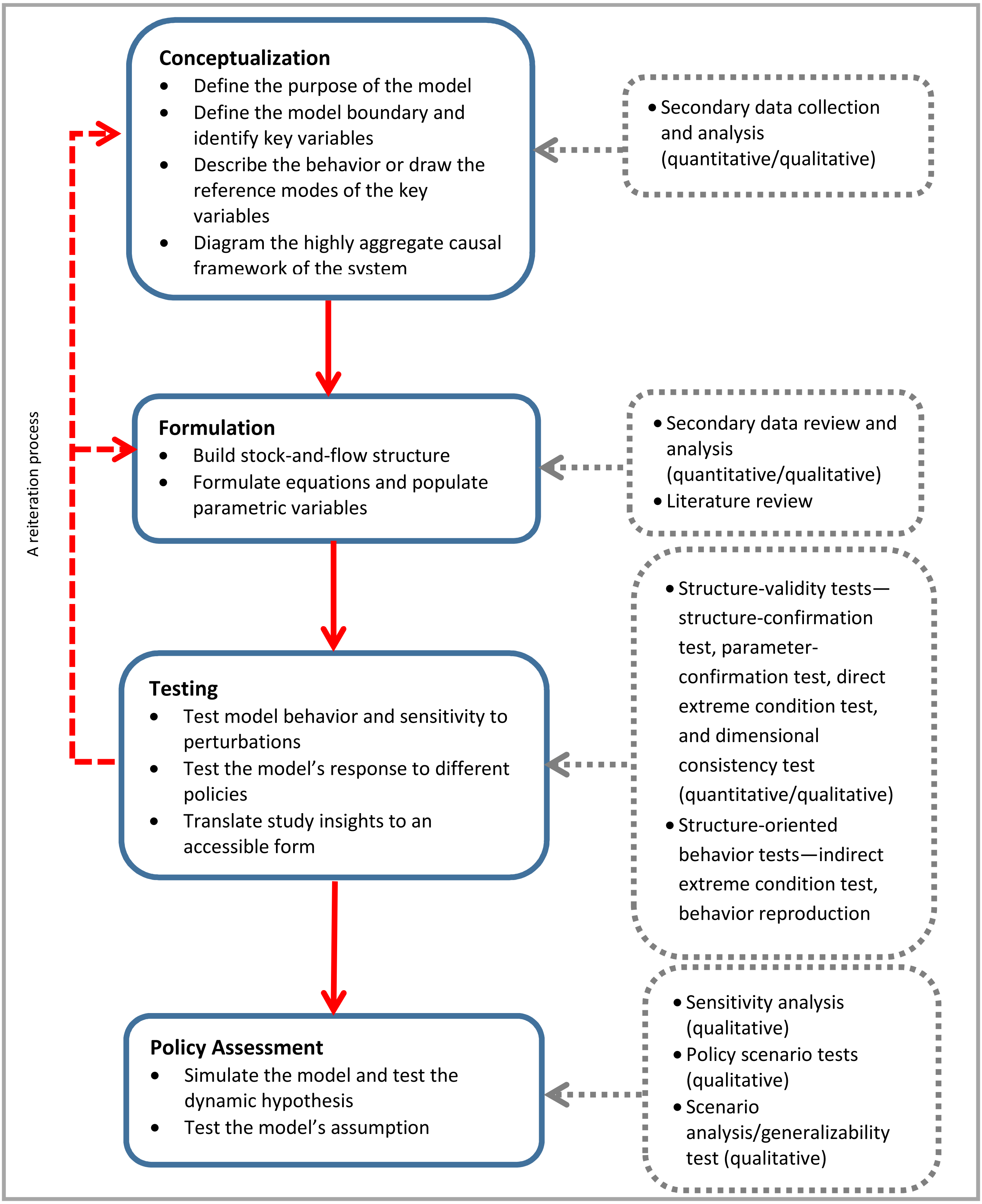

Figure 4 System Dyanamics Modeling Process and the Contribution of Quantitative and Qualitative Data in Each Stage

Note: Adapted from Randers (1980)

Not all desired data for the model is available in reality. In the absence of data, we resort to qualitative methods to gather data or infer causal structures. Hence, a mixed methods research with multiphase and sequential design accommodates the system dynamics modeling process appropriately. Table 1 illustrates the stages in SD modeling and the contribution points of mixed methods approach in detail.

Modeling Stage	Task	Contribution Points
1.Conceptualization		
a. Secondary data collection and analysis (qualitative)	Describe the behavior or draw the reference modes of the key variables; collect parametric values for the model; develop a highly-aggregate causal framework	Data collection and analysis
b. Secondary data collection and analysis (quantitative)	If the secondary data collected is contradictory, unreasonable or simply unavailable, qualitative data analysis will be conducted to determine the relevance and suitability of data; develop a highly-aggregate causal framework	Supplementary to the secondary data collection in the previous step
c. Literature Review (qualitative)	Review and assess relevant literature including peer-reviewed papers, reports, white papers, books, news articles and other reliable sources, followed by a synthesis process to document the findings pertaining to the research questions; develop a highly-aggregate causal framework	Data collection and analysis; compare and relate to the secondary data; interpret the findings to infer key variables and highly aggregate causal relationships as the basis for subsequent model building process
2.Formulation		
a. Model building (quantitative)	Formulate the stock-and-flow structure of the model by adding structures to the highly-aggregate causal framework developed previously	Develop the causal structure of the model with the information and data interpreted in stage 1; repeat 1(a) – (d) when necessary
b. Populate the model (quantitative)	Formulate equations and populate parametric variables	Populate the model with data obtained in stage 1; repeat 1(a) – (c) when necessary
3.Testing [15]		
a. Direct structure test (quantitative & qualitative)	Assess the validity of the model structure through direct comparison to the knowledge about the real system	No interface
b. Structure-oriented behavior tests (quantitative & qualitative)	Assess the validity of model structure through certain behavior tests to uncover flaws.	Compare model-generated data to real world data, especially the reference data/modes of key variables
4.Policy Assessment		
a. Policy testing (qualitative)	Test and evaluate existing policy; propose new policy	Compare model-generated data to real world data, especially the reference data/modes of key variables
b. Document and present insights	Present the findings and insights from policy testing in an accessible format	No interface

Table 1 System Dynamics Modeling and the Contribution Points of Mixed Methods Approach

[15] Refer to "*Formal aspects of model validity and validation in system dynamics*" (Barlas, 1996)

3 Model Documentation

This chapter presents an overview of major feedback loops and model structures. The major feedback loops will be presented and explained first. Then, followed by the the stock-and-flow structure[16] of the model.

3.1 Overview of Major Feedback Loops

"Causal loop diagrams[17] provide a language for articulating our understanding of the dynamic, interconnected nature of our world (p.5)" (Kim, 1992). CLDs explain the behavior of a system by identifying the interconnected elements in the system through feedback process. A feedback process is the circular causality of interconnected and interdependence variables in a system. A feedback process is characterized by symbol B or R. The symbol with a combination of the alphabet "B" and a numerical value represents a negative feedback loop, which is also called a "balancing" feedback loop. A negative loop means that the as the cause increases, the effect will decrease below what it otherwise would have been, or if the cause increases, the effect will decrease. Thus, the cause and effect has an inverse relationship. The symbol with a combination of the alphabet "R" and a numerical value represents a positive feedback loop. A positive feedback loop has a reinforcing effect. Thus, a positive feedback loop is also called a "reinforcing" feedback loop. A positive feedback loop means that when the cause increases, the effect will increase above what it otherwise would have been, or if the cause decreases, the effect will decrease below what it otherwise would have been (Sterman, 2000).

[16] Stock-and-flow structure is presented in the form of stock-and-flow diagram. SFD is the acronym refers to stock-and-flow diagram throughout the text.
[17] CLD will be used as the acronym for causal-loop diagram throughout the text.

The presentation of CLDs of this section starts with the stock of Parolees (with mental illness) from which the problem arises (Figure 5). This stock characterizes the newly released prisoners (with mental illness) who are placed on parole. Almost all of the prisoners are supervised for some time after their release. Ideally, the parolees stay in the stock for the designated parole duration before they are discharged. The discharge rate is determined by the number of prisoners on parole and the average duration of that parole. Upon discharge, the stock of parolees reduces. Thus the balancing loop B1 (Figure 5) constitutes the mechanism by which parolees should be discharged and return to a regular life in society.

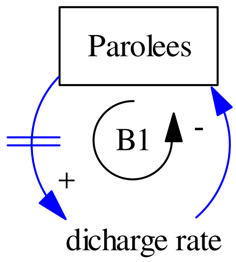

Figure 5 The Feedback Loop of the Parolees Stock and Discharge Rate (B1)

Alternatively, prison parolees with mental illness may break the terms of parole and recidivate, i.e. return to prison. The rate of recidivism is determined by the number of parolees and the probability that a parolee recidivates (Figure 6). That is the rate of parolees returning to prison that, consequently, drains the stock of parolees. Thus, a second balancing loop, B2, is formed. B2 portrays the recidivating-mechanism. The probability that a parolee re-offends (recidivates) is, so far, considered constant and characterizes the strength of that loop.

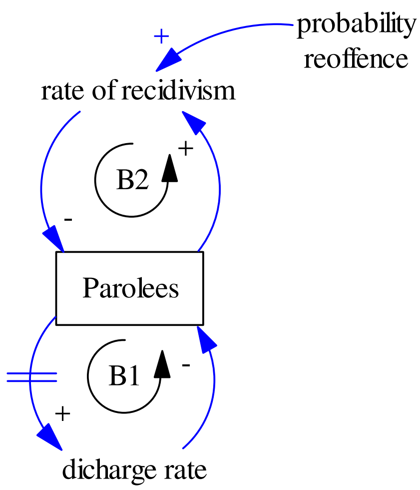

Figure 6 The Feedback Relationship between the Parolees Stock, Discharge Rate, and Rate of Recidivism (B1 & B2)

As we shall see, that probability may change and cause a change in the strength of loop B2. The probability of a re-offence is determined by the balance/imbalance between the demand for and supply (capacity) of community services offered to the parolees with mental illness, - characterized by the adequacy of that service. The mechanism that governs the probability of re-offending, and thus the strength of loop B2, is portrayed in loop B3 (Figure7). If the community service capacity is adequate, i.e. meets the demand (sufficient capacity is allocated to service parolees with mental illness in need of assistance), then the fraction of parolees that re-offend is zero and B1 is in complete control of the dynamics, causing a discharge of all parolees after the parole time. In that case, B2 plays no role. If the community service capacity is inadequate, i.e. does not meet the demand, then there is a fraction of the parolees that re-offend, activating B2. The less adequate the service is, the more active the role that B2 is playing.

If community service adequacy stabilizes at some value, so does the fraction of parolees that reoffend. In that case, a balance of power has been established between the loops B1 and B2 with B3 as the governor of that balancing act.

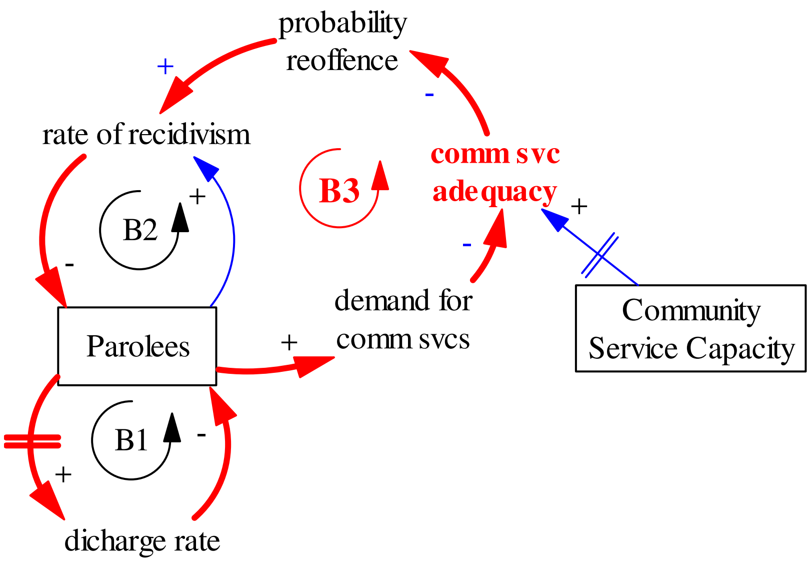

Figure 7 The Influence of the Parolees Stock on Rate of Recidivism through Community Service Adequacy (B3)

When parolees with mental illness re-commit crimes (become re-offenders), they return to prison to become prisoners with mental illness (Prisoners in Figure 8). So the more parolees who re-offend, the larger the number of prisoners with mental illness will be.

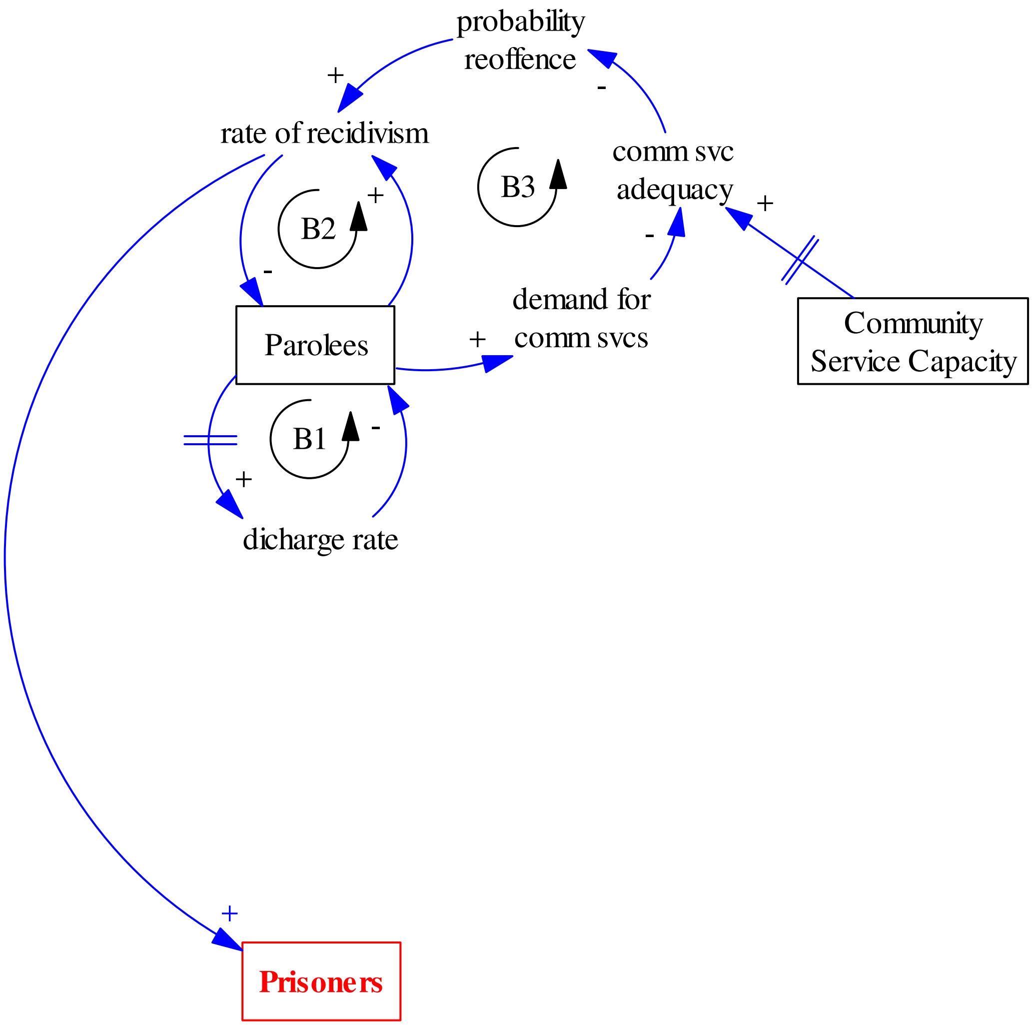

Figure 8 The Positive Relationship between the Rate of Recidivism and the Prisoners Stock

When the number of prisoners grow in response to the return of parolees, then, after an average prison time, the release rate will increase (B4 in eFigure 9), draining the stock of prisoners and feeding the stock of parolees more effectively.

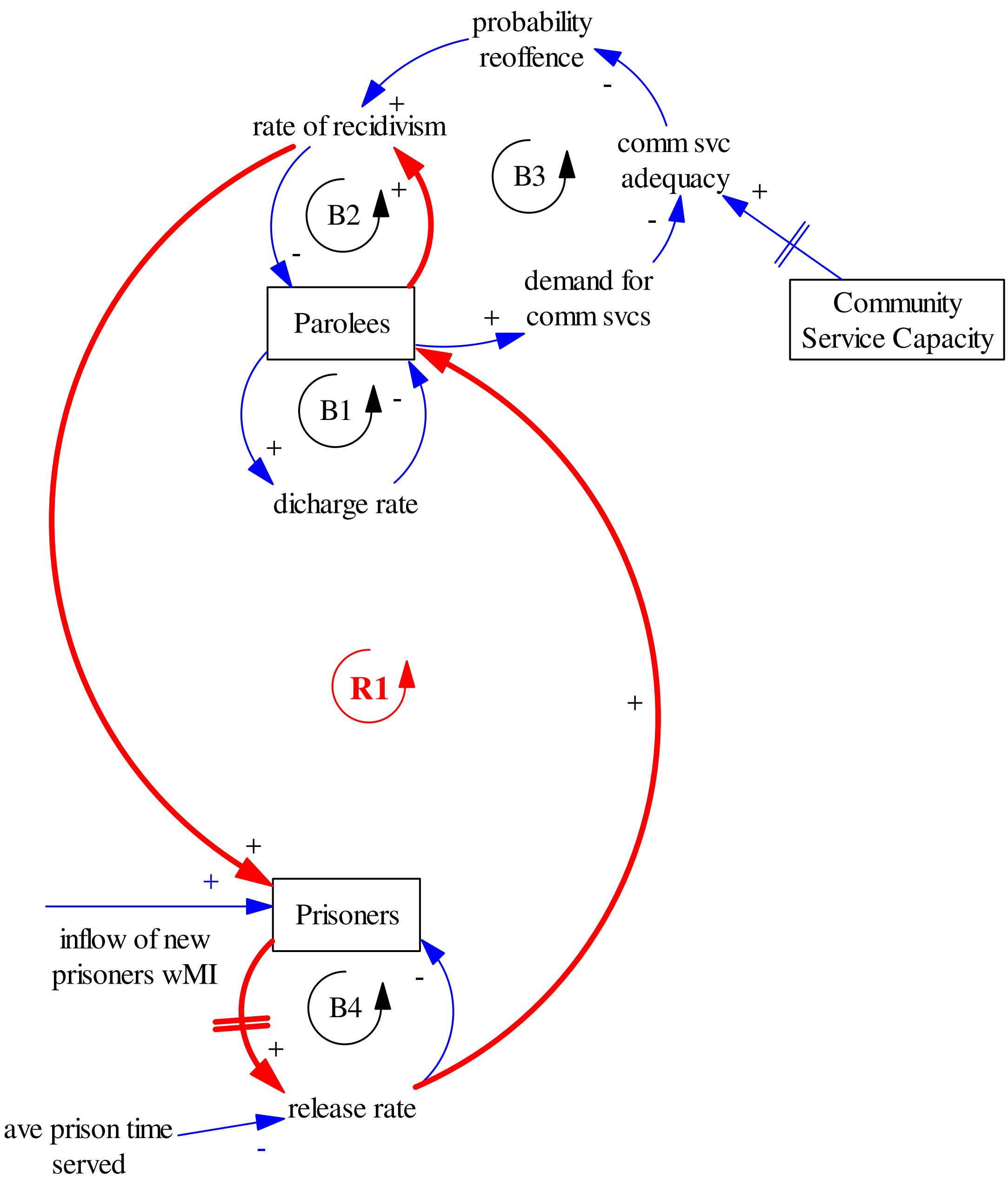

Figure 9 The Reinforcing Relationship between the Prisoner Release Rate and the Rate of Recidivism (R1)

To see the nature of this mechanism, portrayed by the loop R1, consider the following scenario: The probability of a parolee re-offending is assumed constant (say, because the service capacity adjusts instantaneously to keep the service adequacy constant). Then assume there is a sudden (exogenously induced) increase in the inflow, and thus the number, of prisoners. Then, after some prison time, the release rate increases and so does the stock of parolees. After a certain time, those parolees who do not re-offend are discharged while as the remaining ones are returned through the "rate of recidivism" to prison. As a consequence of the balancing nature of loops B1, B2 and B4, equilibrium is attained. The equilibrium state constitutes a balance between the stock of prisoners and the stock of parolees. The negative feedback loops, B1, B2, and B4, contribute to this stabilization:

> *The inflow of new parolees matches the discharges and the return of parolees to prison. And the release rate of prisoners matches the recruitment of new prisoners and the rate of committing new crimes (inflow of new prisoners with mental illness).*

As a result of this stabilization, the number of parolees will tend to decrease from its initial high, and so will the service inadequacy and the fraction of parolees re-offending (B3). B2 will thus loose strength and the drop in the number of parolees will thus be dampened, allowing B1 to gain more control so as to cause the discharge rate to, eventually, catch up with the inflow of new prisoners.

By the release of prisoners to parole, two positive loops are being created: First, the R1 that facilitates the transportation of prisoners between a confinement state (in prison) and a parole state. This loop does not have any dynamic consequences, but contributes to the definition of the steady state balance between the number of prisoners and parolees.

Then there is another positive loop, R2 (Figure 10), that plays an entirely different role: When a larger number of prisoners (resulting from the sudden increase in the inflow of prisoners) eventually are being released, they cause an increase in the number of parolees and, thus, the increase in demand for community services for parolees. If the service capacity remains unchanged, the service adequacy decreases and the probability of a re-offence increases. This increases the relative strength of the B2 loop at the expense of the R1 loop: Relatively more parolees recidivate and return to prison while relatively fewer parolees are being discharged. Having served their prison time, prisoners return to the community as parolees and continue to put pressure on the service capacity. So we experience a temporary lock-in as the shift of the burden back to the prison system is strengthened, leaving fewer parolees discharged. In the meantime, the discharge rate increases to match the increased inflow of prisoners.

The steady state attained is characterized by the adequacy of the services offered parolees at that stage: If the services offered is relatively adequate, then the rate of recidivism is relatively low, and the number of parolees is relatively large (the number of prisoners is relatively small), - contributing to a relatively large discharge rate. If, on the other hand, the services offered are relatively inadequate, then the rate of recidivism is relatively large, returning parolees to prison prematurely, rather than discharge them at some later stage. Thus the prison population is relatively large (i.e. the number of parolees relatively small).

So far, we have assumed that the community service capacity remains constant. With a larger inflow of prisoners, the steady state condition will be characterized by a large number of parolees (so as to, eventually, cause the discharge rate to match the inflow of new prisoners). This is what lifts, on a permanent basis, the probability of re-offending to a higher level and thus shifts the strength of loop B2 relative to that of B1. If, over some time, the service capacity is being adjusted to match the increased demand, then the service adequacy is increased, the probability of re-offending is reduced and B2 looses strength at the benefit of B1: Relatively more parolees are being discharged, relatively fewer return to prison.

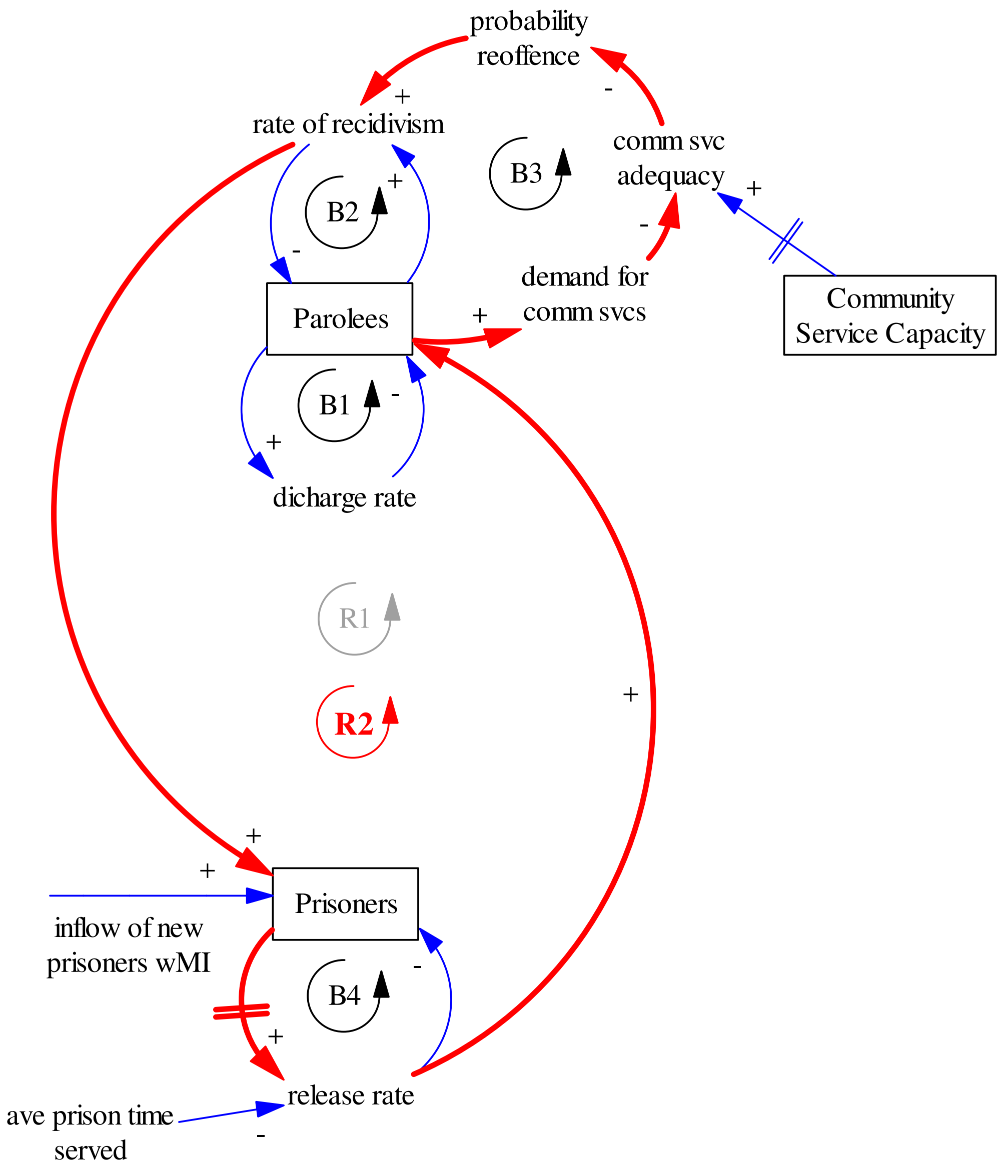

Figure 10 The Reinforcing Relationship between the Prisoner Release Rate and the Rate of Recidivism Through Community Service Adequacy (R2)

In summary, with an increased inflow of prisoners, loop R2 shifts the burden from loop B1 to loop B2, i.e. from discharges to return to prison. So the prison system becomes the intervener that takes on the burden of handling criminals. Prison becomes a temporary holding place for parolees while awaiting their return to the state of parole.

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The demand for social services among parolees and treatment among prisoners, characterized by sub-standard mental functions, does not merely depend on the number of parolees and prisoners, respectively. The less mental functions they possess, the more services and treatment are needed. So, with decreasing average mental functions among parolees and prisoners, the service and treatment adequacy falls, - unless the capacity is adjusted in response to that need. So we need to consider the cumulative and the average mental functions of parolees and prisoners when investigating their dynamic effects.

To do so, we observe that the average mental functions of the prisoners (defined by the cumulative mental functions through the number of prisoners) accompany them (in the form of a co-flow) when they are released on parole. Upon the prisoners' release, therefore, that average contributes to the cumulative mental functions of the parolees (Figure 11).

Similarly, we observe the average mental functions of parolees (defined by the cumulative mental functions through the number of parolees) accompany them (in the form of a second co-flow) whether they are discharged or return to prison as reoffenders. Upon the parolees' return to prison, therefore, that average contributes to the cumulative mental functions of the prisoners.

Consequently, the parolees and the prisoners "carries" the mental functions around as they flow through the system (constituting the main flow). So the contribution by all prisoners released on parole, in terms of mental functions among parolees, is the number of prisoners released times their average mental functions. And, correspondingly, the contribution by all parolees, recidivating and returning to prison, in terms of mental functions among prisoners, is the number of parolees returning times their average mental functions.

The circular flow of average mental functions between prisoners and parolees is thus conditioned by the flow of prisoners, the carriers of these mental functions. As a result, we now have a loop, R3, that corresponds to the loop R1, carrying the mental state of the prisoners to parolees upon their release and the mental state of the parolees to prisoners upon their return to prison. And, as in the case of R1, this loop does not affect the dynamics of the system, merely the distribution of mental functions among prisoners and parolees in steady state.

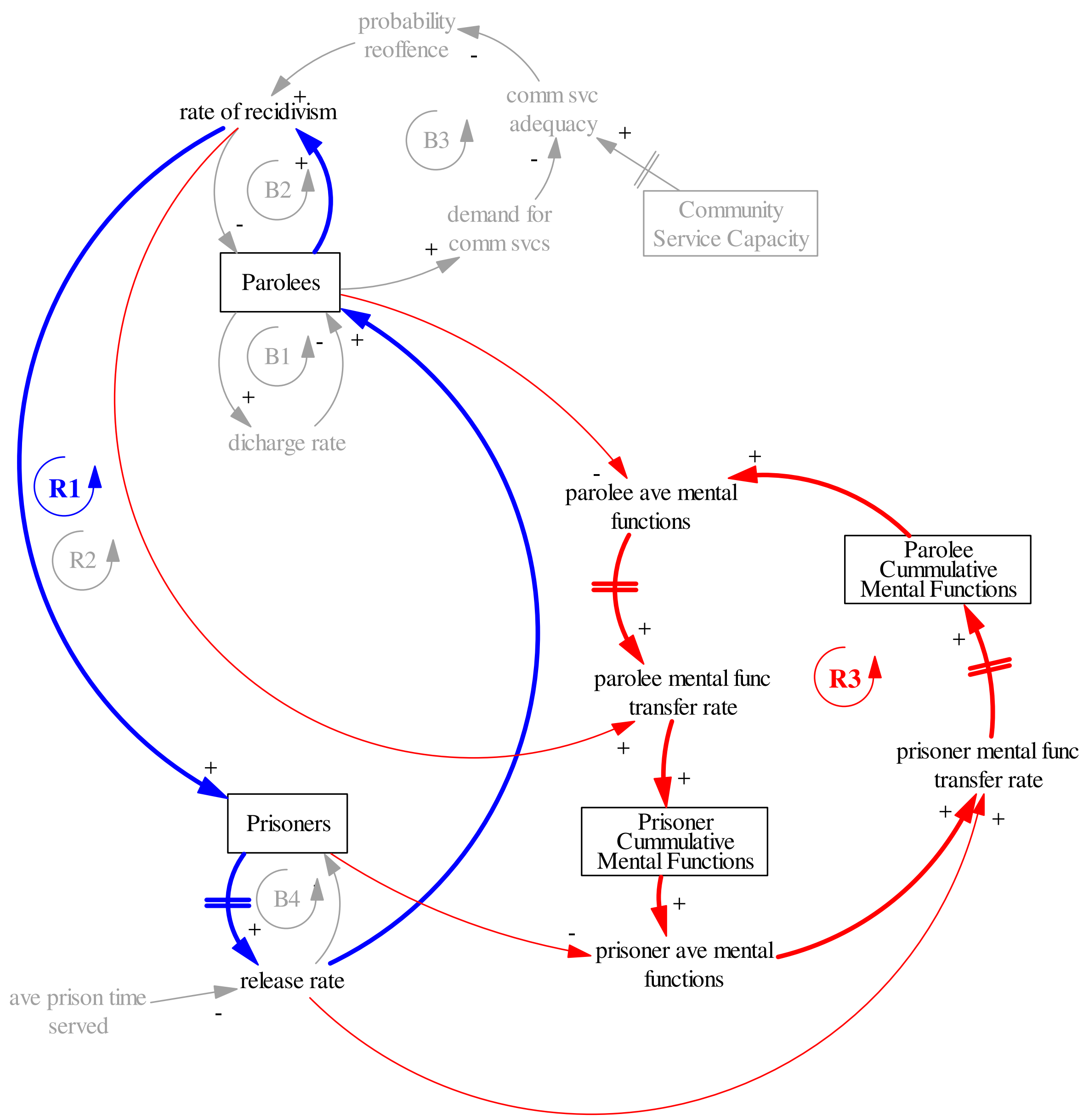


Figure 11 The Reinforcing Relationship between Prisoner's Release Rate and Parolee's Average Mental Functions (R3)

There are, however two additional mechanisms introduced by way of the mental functions associated with prisoners and parolees. We will first consider the mechanism of relevance to the parolees and the services they demand (Figure 12). This is because the demand for services is not merely determined by the number of parolees, but also by their average mental state.

To see the consequences of this additional mechanism, assume first that the system is in equilibrium. So then the discharge rate of the parolees matches the inflow of new prisoners, not only in terms of numbers, but also in terms of their average mental functions.

Moreover, there is a fixed distribution of persons between prisoners and parolees resulting in and from a constant inadequacy of community services and thus a constant fraction of reoffenders among the parolees. The service demand that, matched against the capacity (supply) to offer such services, results in such an inadequacy, is not only determined by the number of parolees with mental illnesses, but also by the average level of their mental functions.

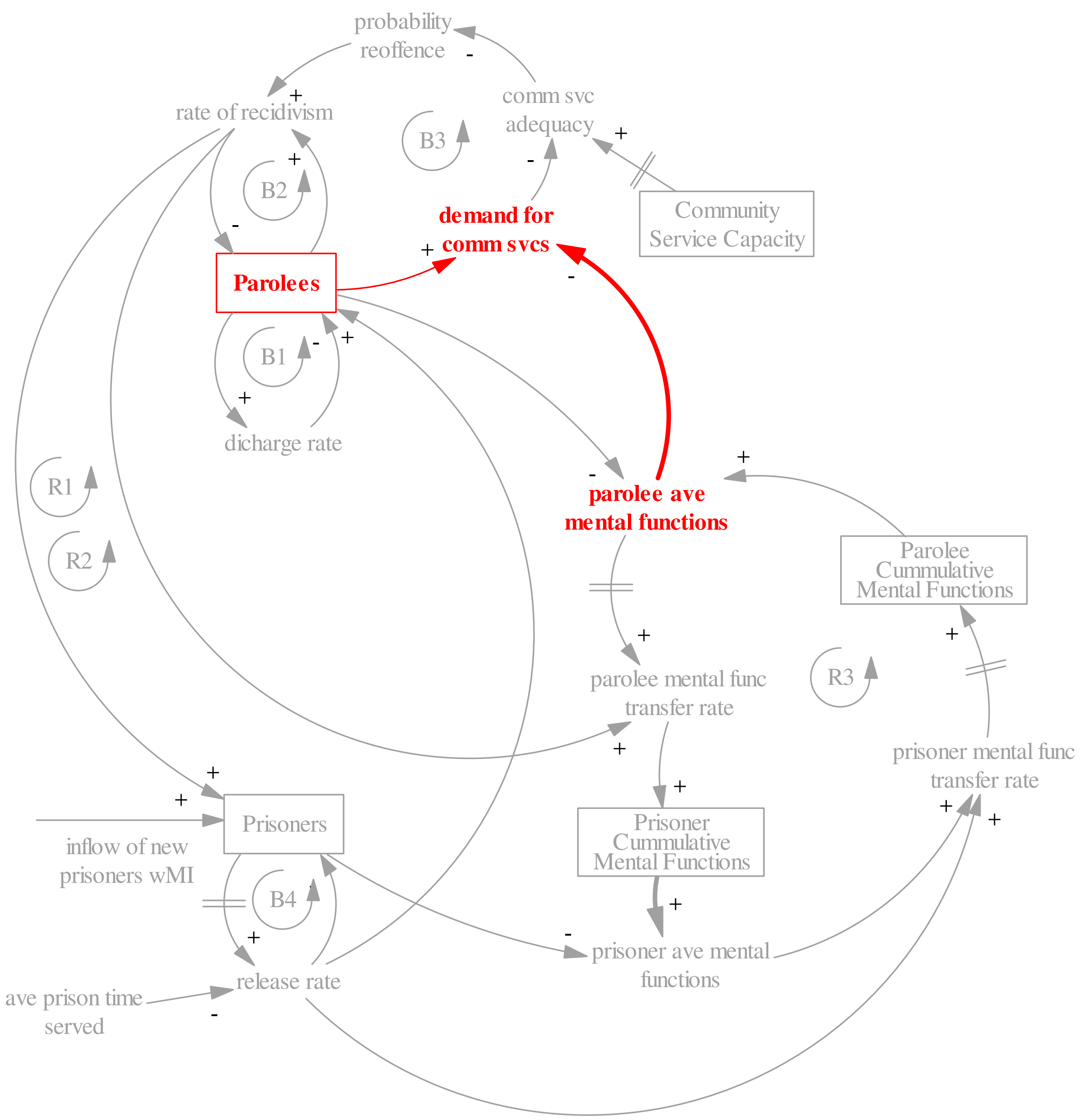


Figure 12 The Influence of the Parolee Stock and Parolee's Average Mental Functions on the Demand for Community Services

Now assume that the inflow of new prisoners remains the same, but that their average mental functions decreases abruptly (Figure 13). This implies that the prisoners now admitted are more severely ill than those previously admitted. This will cause a temporary disequilibrium condition: The mental functions of prisoners will decrease and so will the mental functions of prisoners released some (average prison-) time thereafter. The resulting increase in the severity of mental illnesses among parolees will leave the community service capacity less adequate and the fraction of reoffenders larger, - causing a larger rate of return of parolees to prison (B2 gains more control). This feedback loop is characterized by the positive R2 loop. In short, the sudden decrease in average mental functions of new prisoners triggers loop R2. As a result of the negative loops B2 and B4, the destabilization caused by the initial, abrupt change in mental illness (mental capabilities) among new prisoners, will be eliminated and a new equilibrium will be reached.

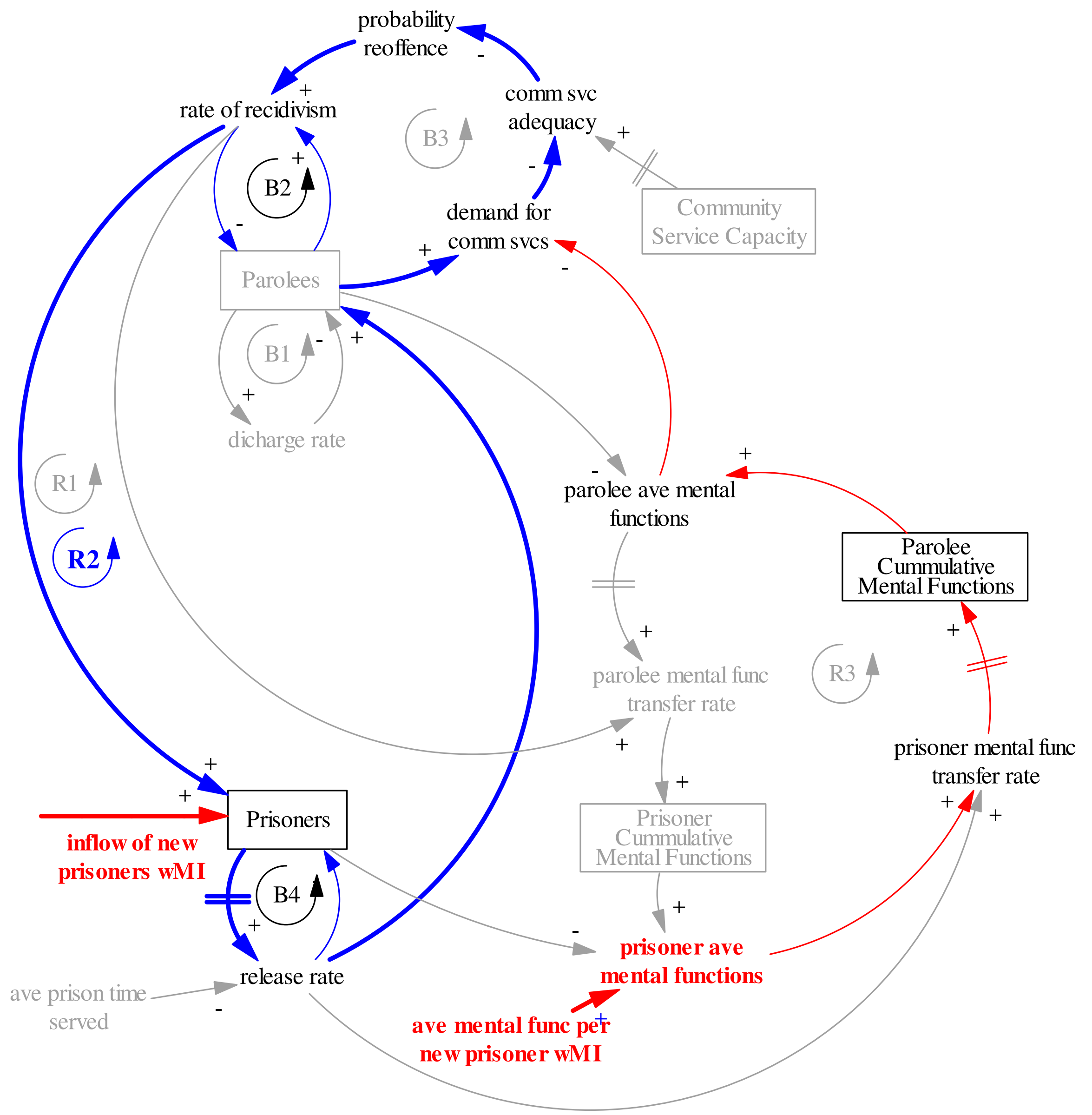


Figure 13 The Influence of Reduced Average Mental Functions of New Prisoners Admitted on the Demand for Community Services and Rate of Recidivism

With the new mechanism, an additional positive loop, R4, is introduced that will affect the stabilization and, possibly, shift the equilibrium. As long as there is no change in mental function among criminals (prisoners or parolees), then R4 does not influence the dynamics of the system: When parolees recidivate, they bring along their mental functions. So the average mental functions among prisoners remain unchanged. Likewise, when the average mental function of the parolees does not change, the community services demanded by parolees does not change in response to the mental functions of those parolees.

In the case that new prisoners with reduced mental functions are being recruited, however, then the average mental function of the parolees will eventually be reduced (Figure 14). The resulting service inadequacy offered to parolees increases, causing a higher frequency of re-offences, i.e. a reinforcement of B2, and thus a higher rate of returns to prison. So, again, we experience a temporary lock-in as the shift of the burden back to the prison system is strengthened, leaving fewer parolees discharged. This time, the lock-in is triggered by the decrease in mental functions among parolees, - one that over-burdens the service capacity. Due to the loops B1, B2 and B4, the system still tends to stabilize, yet at an equilibrium determined by the fraction of the parolees re-offending (now influenced by the mental functions of the parolees). As a result of this stabilization, the number of parolees will tend to decrease from its initial high, and so will the service inadequacy and the fraction of parolees re-offending. B2 will thus loose strength and the drop in the number of parolees will thus be dampened allowing B1 to gain more control so as to cause the discharge rate to, eventually, catch up with the inflow of new prisoners with more severely impaired mental functions. Again, this will allow the system to enter into a new equilibrium, characterized by a somewhat higher community service inadequacy, a higher fraction of re-offenders and thus a larger fraction of the population kept in prison (a lower fraction of the population in a state of parole). And, again, what may re-establish the original equilibrium condition is the offering of a higher community service capacity: That would lower the service inadequacy and thus the fraction of parolees re-offending, moving a larger portion of the population from being prisoners to being parolees, i.e. weakening the B2 loop while strengthening the B1 loop.

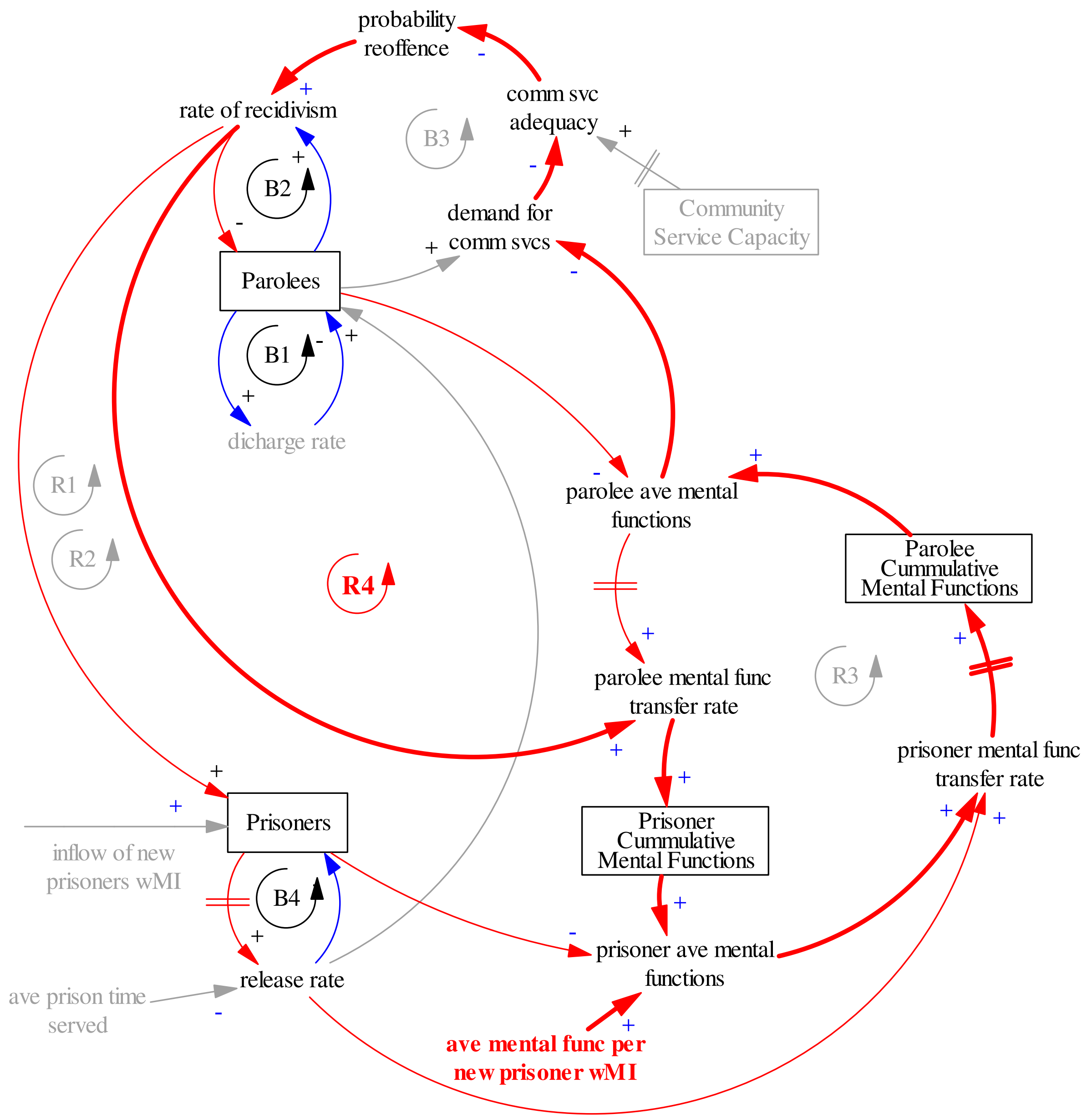


Figure 14 The Reduction in Average Mental Functions of New Prisoners wMI Triggers the Reinforcing Relationship Between the Parolee's Average Mental Functions and Rate of Recidivism (R4)

So, then what is the main role played by the reinforcing loop R4? When there is a sharp downturn in the mental functions of incoming prisoners, that will, eventually (after an average prison time served), result in a similar reduction in the mental functions of parolees. Consequently, there will be an extra burden on the community services offered to the parolees and, without a capacity adjustment, an increase in community service inadequacy will be felt (Figure 15). Thus B2 will be reinforced and more parolees will recidivate and return to prison (R2), - only to reappear as parolees with the mental functions that they have developed in prison. The implication is that R4 will offer more strength to the loop R2, the one that returns parolees to prison and returns them as parolees so as to add a burden to the system offering services to the parolees and return parolees to prison. Again, the prisons, rather than the parole institutions, takes on the burden of holding mentally ill criminals.

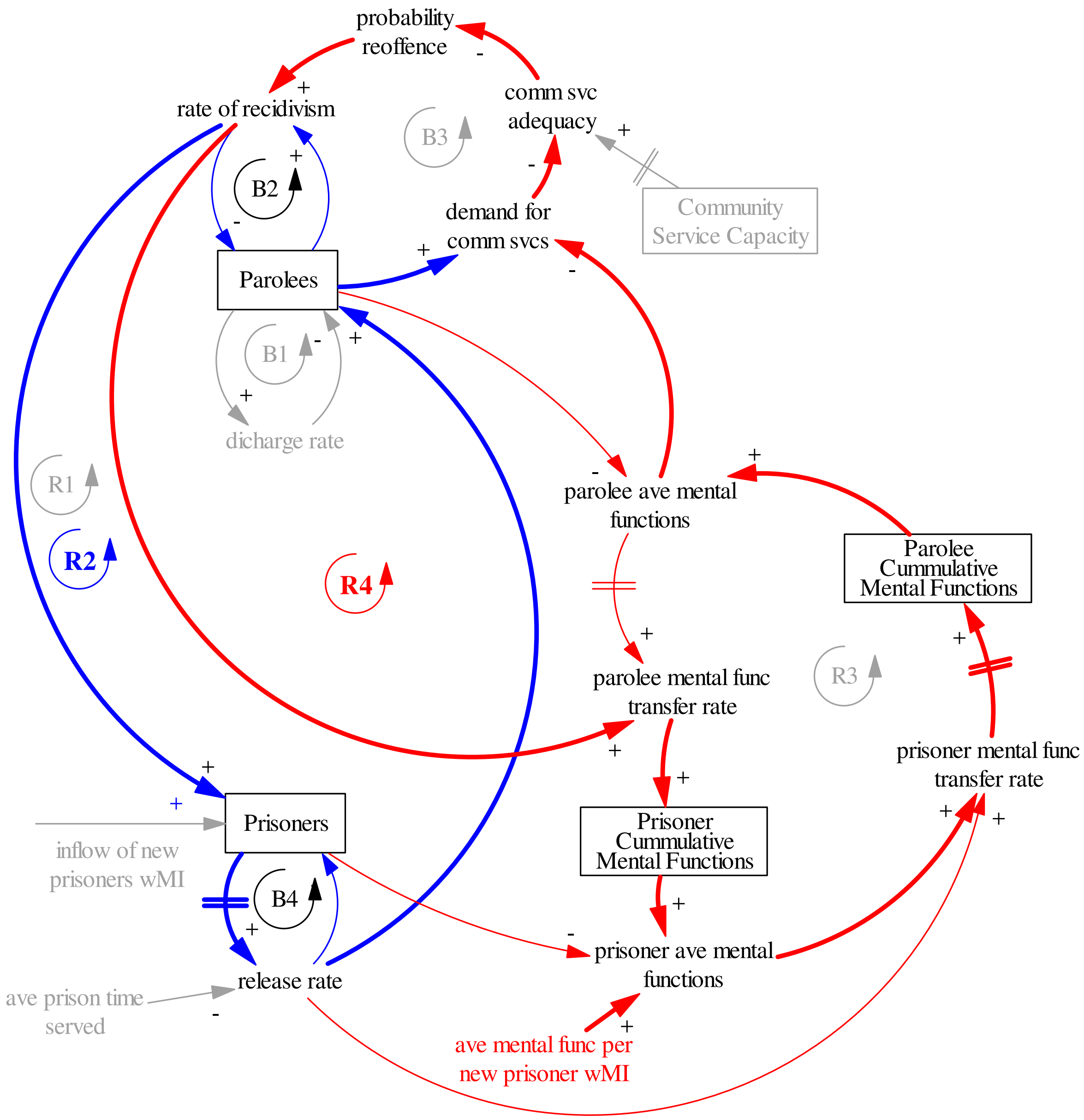


Figure 15 Higher Rate of Recidivism Increases Burden on Community Service Adequacy Due to Lower Parolee's Average Mental Functions (R2 & R4)

The consideration of the severity of mental illness, i.e. the magnitude of the impairment of mental functions, among prisoners allows us to identify an additional, very significant, reinforcing loop, R5 (Figure 16), in the system that is not apparent when considering merely the number of prisoners and parolees: If the capacity to treat prisoners with mental illnesses is inadequate (given the demand for treatment capacity that originates from both the sheer number of prisoners and their mental state), then their mental functions are further deteriorated. That causes prison mental illness treatment (prison mental health care) needs to escalate and, unless the treatment capacity is adjusted accordingly, the treatment adequacy (prison mental health care adequacy) decreases even further. Such reinforcement results in a lock-in:

> The less adequate the mental illness treatment capacity offered in prisons is,
> the larger the need for such capacity will be (R5).

The need for additional prison mental health care (MHC) capacity originates from two sources: On the one hand, prisoners with more severe mental illnesses will eventually be released on parole (unless they are retained in prison (see below)) and challenge the capacity of the community service. Community service inadequacy will cause more parolees to recidivate and return to prison so as to challenge the MHC capacity in prisons (loops R4). The reduction in mental functions among prisoners will call for more prison MHC capacity (R5). If the demand for prison MHC is unmet by prison MHC capacity, the overall mental functions of prisoners further deteriorate. This will eventually lead to even higher demand for prison MHC. Thus, this second mechanism that involves mental functions does not only shifts the burden to the prison system, there is also potential for a lock-in, - i.e. becoming addicted to that solution, - which leads to a call for an ever larger prison MHC capacity.

It was assumed in above that a larger prison population and/or more severe mental illnesses among those prisoners, eventually (upon their release) would cause the community service needs associated with parolees to increase (more prisoners and / or more severely ill prisoners). That might be mitigated: One may retain prisoners in prison for a longer period of time. Such a "solution" would require a change in the judicial system (which is probably unlikely to take place) and would cause the burden to remain with the prisons because prisoners would accumulate there and require adequate mental illness treatment. If that need cannot be met with an adequate prison MHC capacity, the reinforcing loops, R4 and R5, will prevail and cause the need for relevant capacities to escalate.

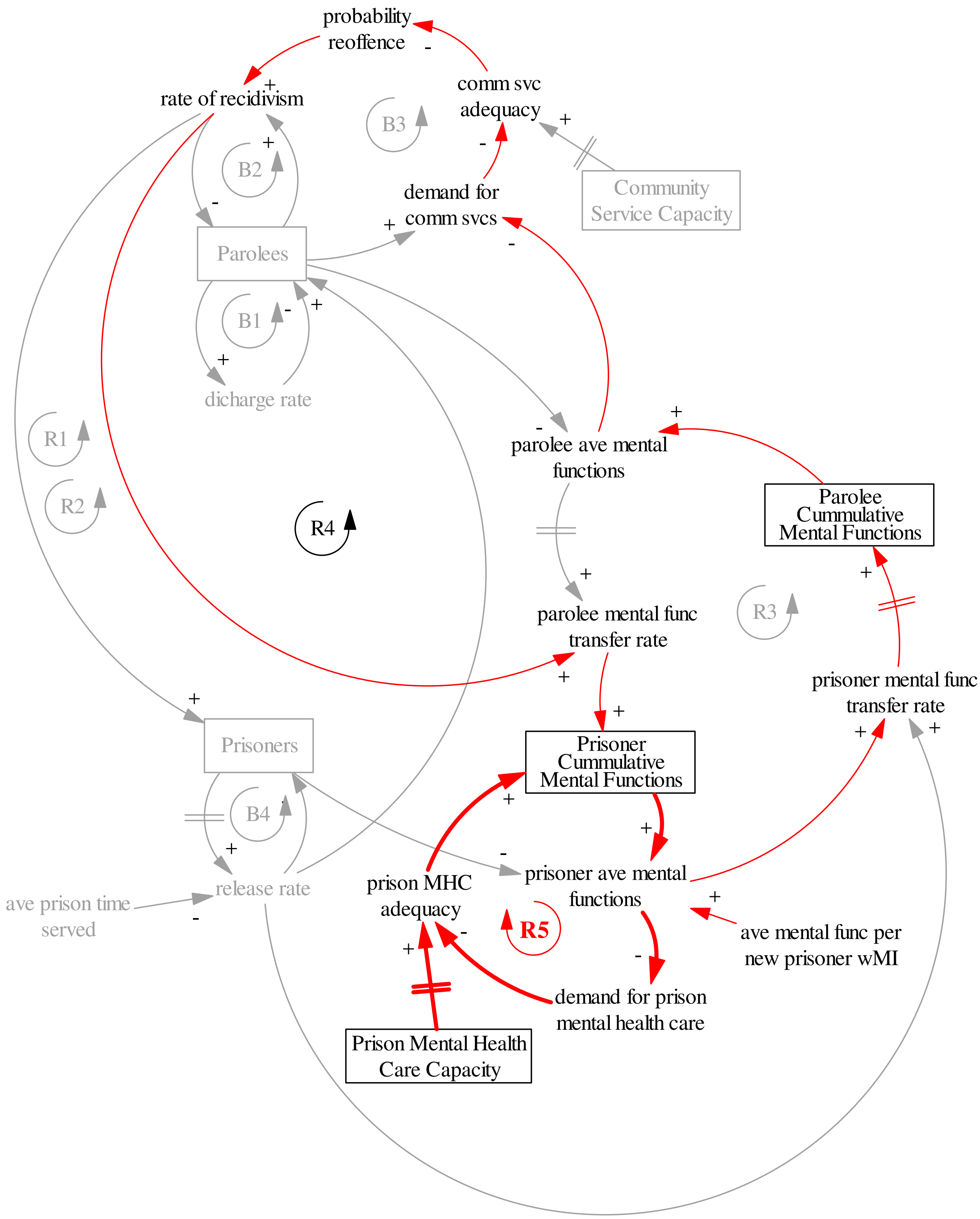


Figure 16 The Reinforcing Relationship between Prisoner's Average Mental Functions and Demand for Prison Mental Health Care (R5)

There are three other attributes associated with the prisoners and parolees are modeled in the form of co-flows. These attributes are age, social capital, and incarceration time served.

The age attribute is used to monitor the change in average age of prisoners in order to determine the capacity for age-related chronic care treatment and the health care resources required to support this treatment capacity. As prison health care resources are limited, each type of treatment capacity (i.e. mental health care, infectious disease treatment, and chronic care) compete against each other for resources. The more resources one type of care absorbs, the less resources are left for the other two types of care. The average age of parolees is also capture in this co-flow because it will affect the average age of prisoners if the parolees recidivate multiple times.

The purpose of capturing the changes in social capital of prisoners and parolees is to assess the impact of social capital on the demand for community services. Social capital is "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of mutual acquaintance and recognition" (Bourdieu, 1986b) (pp.51). As the social capital only accumulates through networking and less institutionalized relationship, the social capital of prisoners only deteriorates due to the prolong period of confinement. On the contrary, social capital of parolees accumulates because they are able to socialize with other people in the society. Therefore, the demand for community services is high for newly released prisoners or parolees. The longer the prisoners are isolated from the society, i.e. the longer the incarceration time is, the more severe the deterioration of social capital of the prisoners upon their release. This translates into higher demand for community services and fund needed to support the community services for parolees.

The last attribute, incarceration time served, represents the cumulative time prisoners, parolees, and recidivists have spent in prison. The cumulative incarceration time served by each prisoner or parolee is the average incarceration time served. Prisoners with no prior conviction have zero average incarceration time served until they finish serving their current sentence. Upon their release, they would have accumulated a certain number of incarceration time served. If these released prisoners fulfill their parole condition and proceed to desistance, a state where these individuals cease engaging in criminal activities permanently, their cumulative incarceration time served remain the same as when they are released until they die. However, if the parolees recidivate and are re-convicted to serve another prison sentence, their average incarceration time served grows upon their next release. This attribute is important because it affects the stock of prisoners through the Three-strikes Law and the demand for community services through social capital of parolees. The Three-strikes Law stipulates that the prisoners who are convicted for a second violent felony to the prison (the second strikers) are required by the law to serve twice as long the sentence as the first sentence for the same offences. This means that if the first strikers are granted one year of prison sentence, the second strikers will receive two years of prison sentence even for the same crime committed. In the third crime commitment, the third strikers are required to serve a mandatory life sentence or 25 years minimum. The reinforcing relationship between the cumulative incarceration time served and average prison time served (the average time each prisoner spent in the prison), is determined by this attribute.

As the age and social capital co-flow are similar to the mental functions co-flow, the CLD presentation for these two attributes are not explained in this section. Due to the interaction between the incarceration time served, average prison time served through the Three-strikes Law, and demand for community services through social capital, the reinforcing relationship between previous incarceration time served and average prisoner time served warrants further discussion. The relevant causal loops are presented in Figure 17 - 20.

When prisoners are released after serving their prison time, the average prison time served by these prisoners is transferred to the cumulative previous incarceration time served by parolees stock upon their release (the "Parolee Previous Incarceration Time Served" stock in Figure 17). When a constant fraction of these parolees recidivate (the remaining parolees stay in the stock until they are discharged after fulfilling parole condition) and return to the prison, the parolee previous incarceration time transfer rate equals to the outflow of parolee previous incarceration time from the Prisoner Previous Incarceration Time Served stock. However, with the introduction of the Three-strikes Law, the sentence for the recidivists is influenced by the recidivists' previous incarceration time. Loop R6 characterizes the reinforcing relationship between the recidivists' previous incarceration time and the average prison time served. The increase in parolees' average previous incarceration time leads to the increase in average prison time served. After the recidivists serving the average prison time for the second or subsequence reoffences, the longer average prison time served for the reoffence is added to the cumulative parolee previous incarceration time served. The accumulation leads to higher parolee average previous incarceration time.

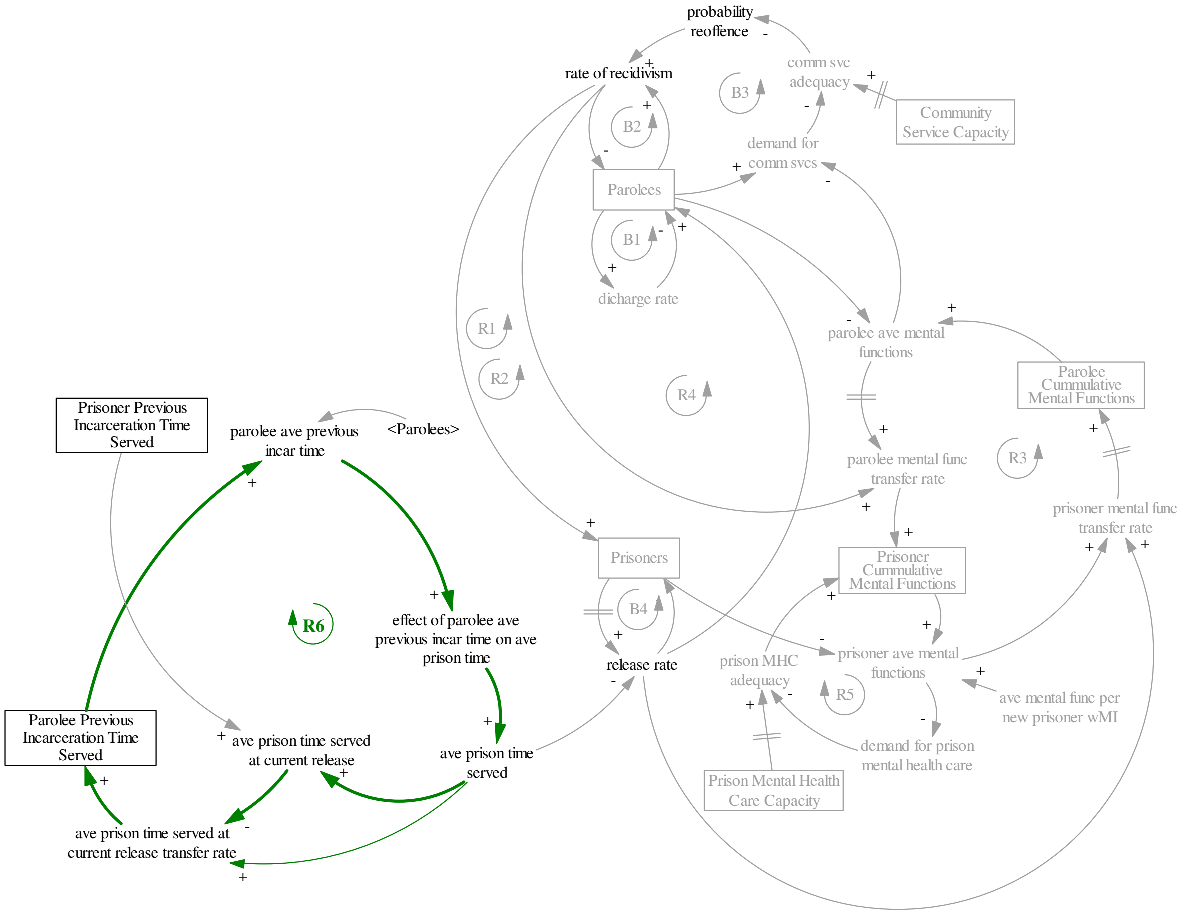


Figure 17 The Reinforcing Relationship between Parolee's Average Previous Incarceration Time Served and Average Prison Time Served When They Recidivate

Loop R6 does not grow indefinitely because the growth is limited by loop B5 and B6 (Figure 18). Although the increase in parolee average previous incarceration time leads to higher parolee previous incarceration time transfer rate, the higher the transfer rate, the lower the cumulative parolee previous incarceration time served remains (the Parolee Previous Incarceration Time Served stock). Hence, the parolee average previous incarceration time reduces gradually (B5). On the other hand, when the average prison time served increases, the release rate reduces because more prisoners are staying longer. Initially, the average prison time served for the current release transferred to the cumulative parolee previous incarceration time served is lower. After prisoners serving the new increased average prison time, the release rate gradually returns to the initial rate while the parolee discharge rate matches the inflow of new prisoners. The average prison time served and parolee average previous incarceration time settle into new an equilibrium with higher values (B6).

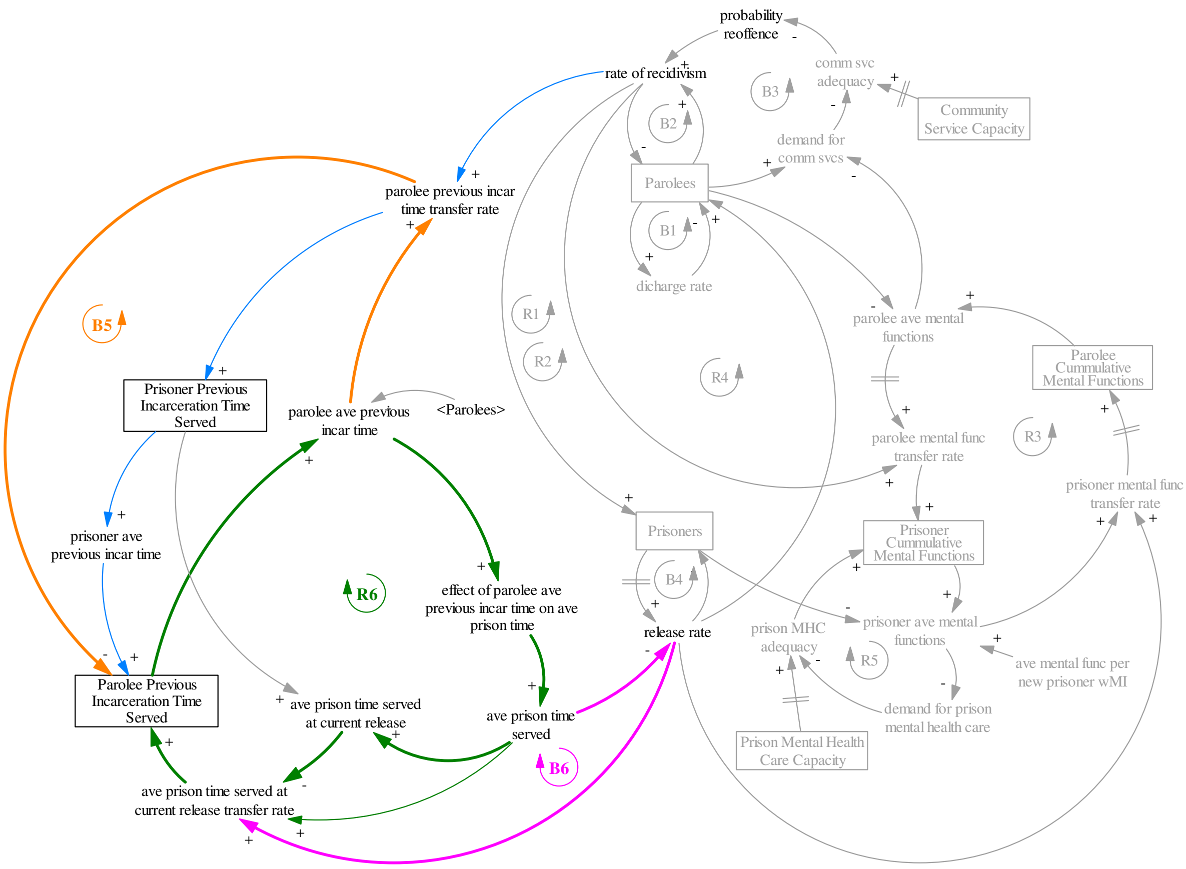


Figure 18 Longer Average Prison Time Served Limits the Rate of Recidivism and the Effect of Parolee's Average Previous Incarceration Time Served on Average Prison Time Served in the Next Sentence (B5 & B6)

Given that B5 and B6 are limiting the exponential growth of R6, the increase in average prison time served or average prison time served at current release is slow. However, there are three more loops that fuel the growth in average prison time served: R7, R8, and B3 (Figure 19). Similar to the mental function attribute of prisoners and parolees, parolee average previous incarceration time served also affects the demand for community services (R7 and R8). R7 characterizes the influence of the extension of average prison time served on the demand for community services through the number of prisoners released to become parolees. When more prisoners remain in prison due to longer average prison time, the Parolees stock reduces. Upon the release of the prisoners who serve longer sentence, the inflow of parolees surges. Hence, the stock of parolees also increases. When more recidivists are kept in the prisons due to longer average prison time, the demand for community services relaxes. However, in the case of a surge in the inflow of parolees and thus the stock of Parolees, community service inadequacy will lead to the strengthening of B3 because the probability of reoffence increases. As the recidivists reenter prisons, their average previous incarceration time ("parolee ave previous incar time") increases upon their next release. This does not only lead to a stronger B2 and R2, and a weakening B1, it also triggers R6.

On the other hand, R8 shows the impact of parolee average previous incarceration time served on the demand for community services. The longer the time the parolees have spent behind bars, the larger the demand for community services because the more severe their social capital deteriorates during confinement. R7 and R8 together triggers B3. If community service capacity adjusts according to the demand for community services promptly and community service is adequate to serve the parolees, the probability of reoffence remains unchanged. Then, the rate of recidivism drops slightly because more prisoners are staying in the prison and fewer of them are released to become parolees. Subsequently, when the discharge rate matches the inflow of new prisoners, the probability reoffence and rate of recidivism return to the initial values. The Parolee stock also returns to the initial level. However, the Prisoners stock has shifted to an elevated equilibrium because the average prison time settles into a higher value and so are the prisoner and parolee average previous incarceration time served. If B3 fails to respond immediately, community service adequacy drops and the probability reoffence increases. Thus, the rate of recidivism also increases. This means that B2 starts to strengthen. The strengthening of B2 fuels R7 and R8 until B5, B6, and B3 react to counteract R6, R7, and R8.

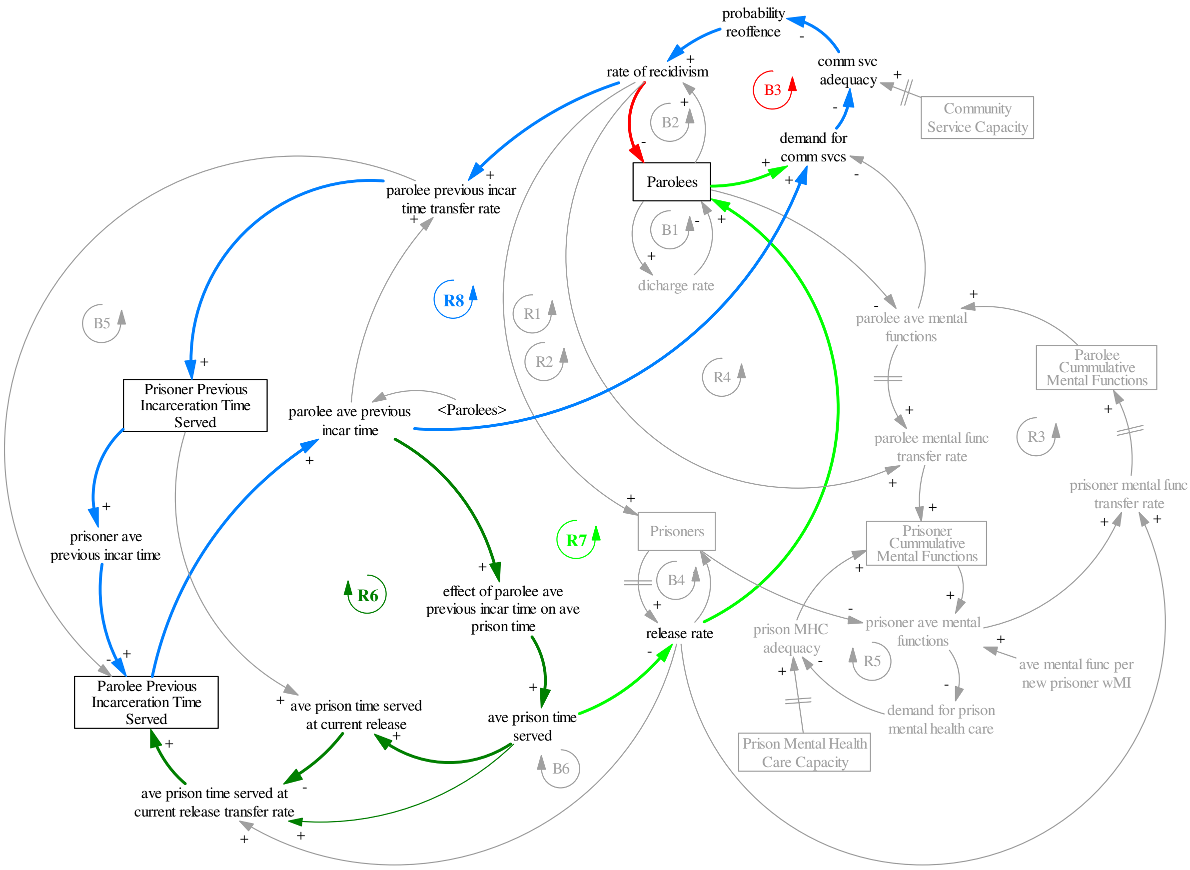


Figure 19 Community Service Inadequacy Fuels the Rate of Recidivism, Growth in Parolee's Average Previous Incarceration Time Served and Average Prison Time Served in the Next Sentence (R7 & R8)

When B3 fails to react according to the suddenly increased demand for community services, R6 starts to gain strength (Figure 20). When the average prison time served increases, more prisoners with mental illness remain in the prison. Due to the harsh prison environment, prisoners with mental illness tend to lose mental functions naturally. This means that the longer these prisoners stay in the prison without treatment, the more mental functions they lose. Hence, the prisoners are under pressure to increase prison mental health care (MHC) capacity to treat the prisoners with mental illness who are now staying longer as the result of the Three-strikes Law.

When prison MHC capacity responds timely to the increase treatment capacity, R5 gains strength and prisoners' mental functions increase (Figure 20). In this case, R5 prevents R3 from gaining strength. So, when the prisoners are released and some parolees recidivate, the recidivists return to the prisons with higher mental functions. At the same time, the burden on community services is lower when parolees possess higher mental functions. Consequently, community service adequacy is higher and the probability of reoffence is either constant or lower than it would have been (B3).

The Three-strikes Law has a profound influence on the prison MHC capacity. As in the case of mental functions attribute, the lengthening of the previous incarceration time served by the recidivists shifts the burden to the prison system. It produces the potential for a lock-in and addition to increase the prison MHC capacity continuously in order handle more mentally ill prisoners with deteriorating mental functions.

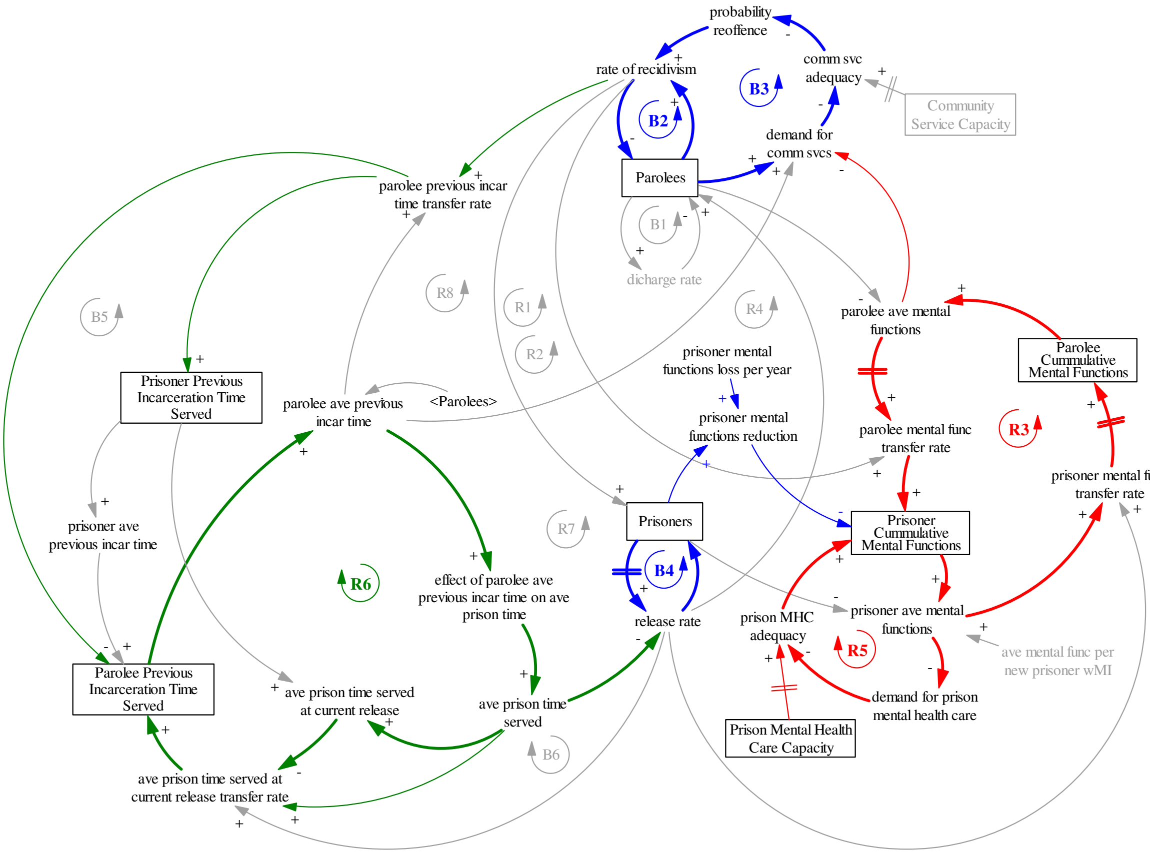


Figure 20 The Influence of Prison Mental Health Care Adequacy on Prisoner's Mental Functions Reduction through Various Feedback Loops

3.2 Overview of Major Stock and Flow Structures - Before Realignment Policy

This section explains the dynamic hypothesis through major stock and flow structures. Full model documentation is presented in Appendix P. The model consists of 11 modules. Each module contains a related set of stock and flow structure. Figure 21 summarizes the relationships between the modules.

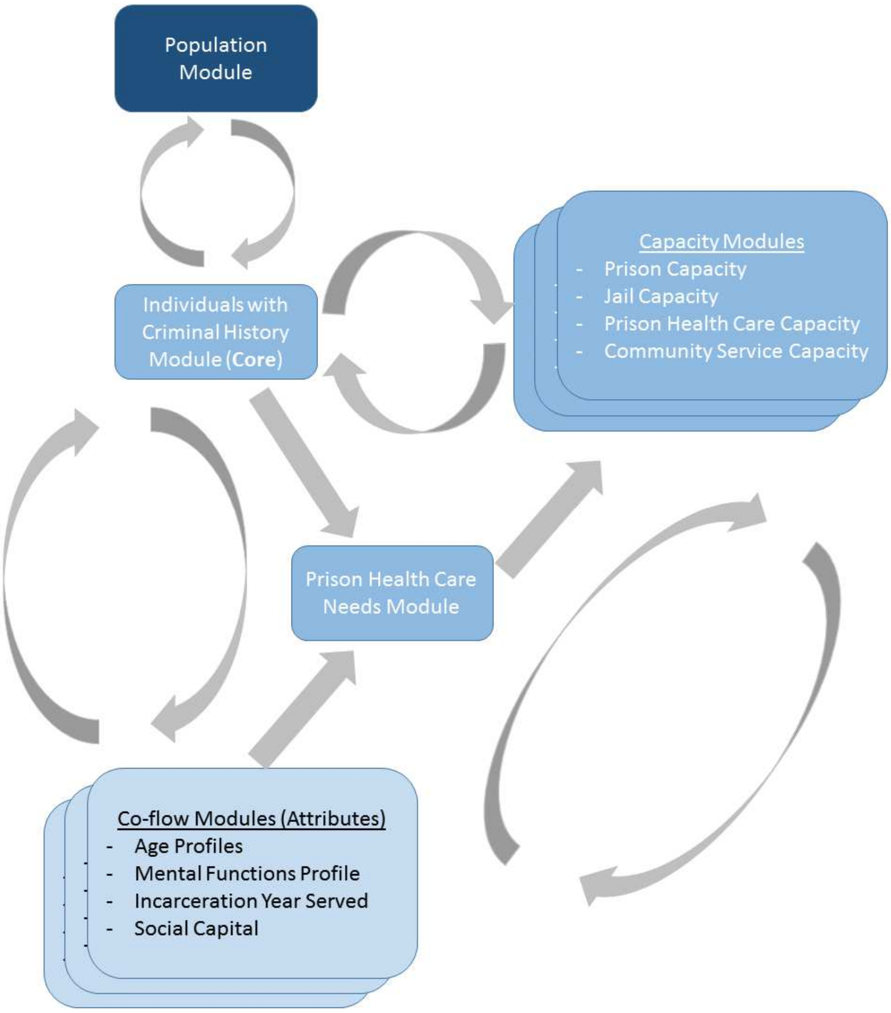


Figure 21 Simplified Module Relationship Diagram

The **Population** module comprises a highly aggregated aging chain of the population groups that have no contact with the correctional system (the Innocent Population), has initial contact with the criminal justice system, affected with criminality, and recovered from criminality. **Individuals with Criminal History** module is the only module that has a bi-directional relationship with the **Population** module. A bi-directional relationship characterizes a feedback loop which one module influences the other module and the other module provides input back to the first module. These relationships will be further explain in the subsequent sections.

In the **Individuals with Criminal History** module, convicted offenders distributed in prison, jail, or probation are represented by aging chains that consist of these three forms of punishment. This module also demonstrates the progression of the offenders from their first contacts with the correctional system until they become desisting ex-convicts. The **Individuals with Criminal History** module is the core module that consists of the fundamental stocks and flows. This module provides input to the **Prison Health Care Needs** module. But the **Prison Health Care Needs** module does not feedback to the **Individuals with Criminal History** module. So, **Individuals with Criminal History** module has a uni-directional relationship with the **Prison Health Care Needs** module.

The **Individuals with Criminal History** module has bi-directional relationship with **Capacity** modules and some **Co-flow** modules.The **Capacity** modules contains prison, jail, prison health care (HC), and community service capacity modules. In the **Capacity** modules, only the Jail Capacity and Community Service sub-modules have direct bi-directional relationships with the **Individuals with Criminal History** module. The **Prison Capacity** and **Prison Health Care Capacity** sub-modules interact with the **Individuals with Criminal History** module via other **Co-flow** modules. The **Prison Health Care Capacity** sub-module also receives input from the **Prison Health Care Needs** module.

Finally, the **Co-flow** modules provide input to assess prison HC needs. The function of the co-flows is to capture the dynamically changing attributes of individuals in the core module. These attributes become input to other modules, namely the **Individuals with Criminal History** module and **Capacity** module. The dynamically chaigng attributes affect the stocks in the **Capacity** modules, which in turn influence the core module, the **Individuals with Criminal History** module.

Table 2 presents partial relationships between the **Co-flow** modules and other relevant modules.

Age Module Mental Profiles Module	→	Prisoner Health Care Needs Module		
Incarceration Year Served Module	→	Individuals with Criminal History Module	→	Social Capital Module
Mental Profiles Module Social Capital Module	→	Community Services Module		

Table 2 Partial Relationships between Co-flow Modules and other Modules in the Model

Figure 22 presents the relationships between 11 modules in the full model. This full module relationship diagram is presented in the beginning of each section to serve as a visual cue to orient readers to the relevant module each section focuses on.

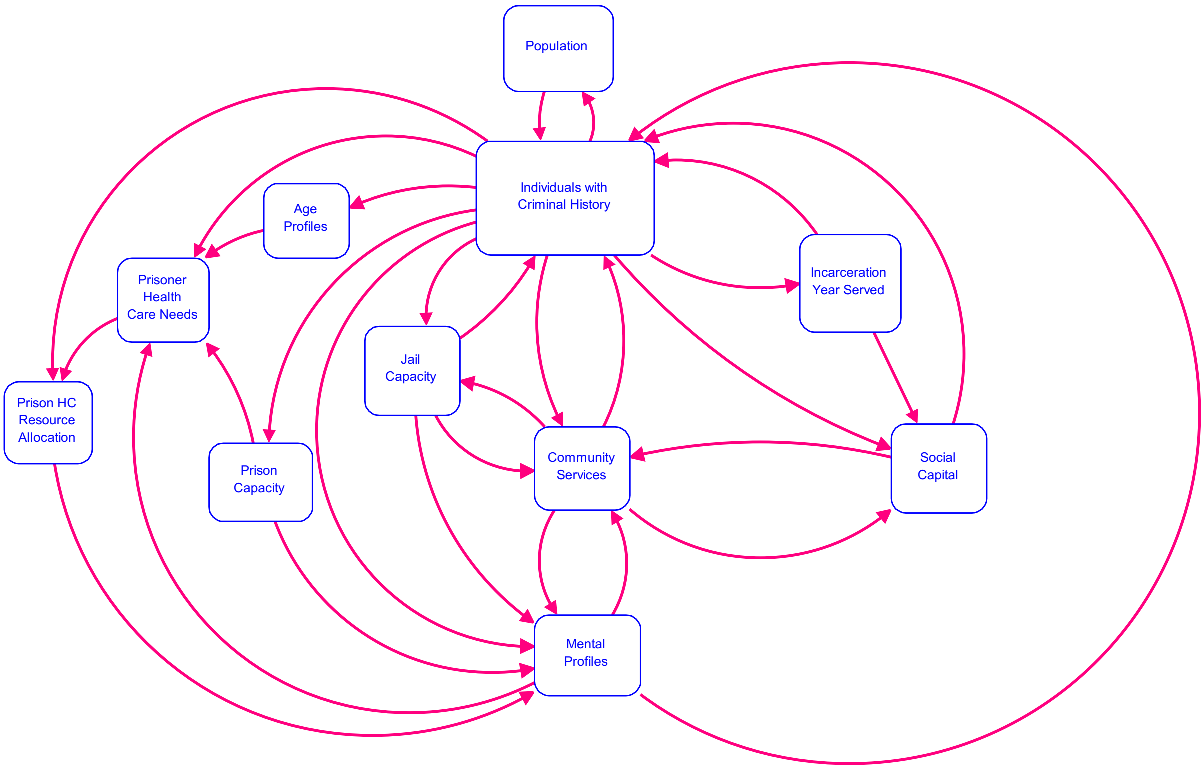


Figure 22 Full Module Relationship Diagram

Table 3 features the relationship between Prisoners wMI stock in the **Individuals with Criminal History** module, which is the core module that contains the fundamental stocks, and the directly related stocks in the coflow modules, such as Age Profiles, Mental Profiles, Incarceration Year Served, and Social Capital. The variables connecting the stocks in the core module and coflow modules are presented. The use of these connecting variables are also explained. The relationships of other stocks in the core module and coflow modules are similar.

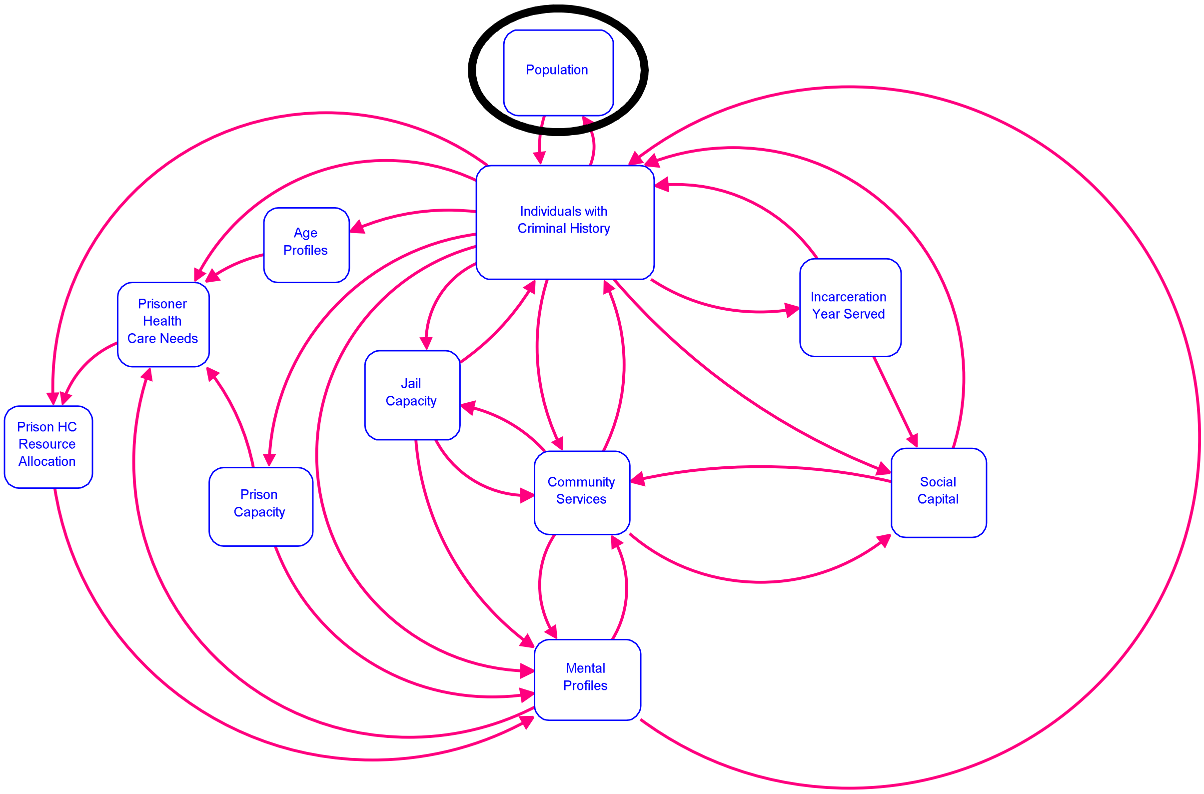
Fundamental Stock in Core Module	Coflow Stock	Coflow Module	Connecting Variable	Purpose
Prisoners wMI	Total Age of Prisoners wMI	Age Profiles	ave age per prisoner wMI	The connecting variable is the ratio of total age of prisoners wMI and total number of prisoners wMI stocks. This variable along with the age of prisoners wo MI are used to calculate the average age in prison.
	Mental Functions of Prisoners wMI	Mental Profiles	ave mental func per prisoner wMI	The connecting variable is the ratio of mental functions of prisoners wMI and total number of prisoners wMI stocks. This ratio as an input parameter to "effect of mental func per prisoner wMI on recovery time".
	Previous Incarceration Time Served by Prisoners wMI	Incarceration Year Served	ave previous incar time per prisoner wMI	The connecting variable is the ratio of previous incarceration time served per prisoner wMI and total number of prisoners wMI stocks. This ratio is used as an input parameter to "effect of incar time on prison time served wMI" and "effect of incar time served per prisoner on SC loss per prisoner wMI". This ratio is also used as one of the inputs to the outflows from the stock of Previous Incarceration Time Served by Prisoners wMI. This ratio is also one of the input parameters to the death outflow from the Previous Incarceration Time Served by Prisoners wMI stock.
	Current Prison Time Served wMI	Incarceration Year Served	ave current prison time served wMI	The connecting variable is the ratio of current prison time served by prisoners wMI and total number of prisoners wMI stocks. This ratio combines with the previous incarceration time served by prisoners wMI become the total incarceration time per prisoner wMI, which is one of the inputs to the inflow to the Total Incarceration Time Served by Parolees wMI. This ratio is also one of the input parameter to the death outflow from the Current Prison Time Served wMI stock.
	SC Prisoners wMI	Social Capital	A ve SC per prisoner wMI	The connecting variable is the ratio of SC prisoners wMI and total number of prisoners wMI stocks. This ratio is used as one of the input parameters to the outflows from the SC Prisoners wMI stock. These outflows are release and deaths.

Table 3 Relationship between the Prisoners with Mental Illness Stock in the Individuals with Criminal History Module and Stocks in Other Coflow Modules

Note: Core module refers to the "Individuals with Criminal History" module.

The following sections explain the each module in detailed in the form of stock and flow diagrams (SFDs).

3.2.1 Population



The **Population** module comprises aggregate stocks from the **Individuals with Criminal History** module and Innocent Population stock. The Innocent Population stock is determined by the aggregate stocks from the **Individuals with Criminal History** module and the exogenous population growth rate. The structure within the **Population** module shows the progression of individuals moving through the criminal pathway from innocence to desistance. The sum of all the stocks in this module matches California's population.

From 1987, California's population growth has been slowing down (Figure 23). Annual growth rate declines from 2.5% to 1% in 2014. As such, California population is growing at a decreasing rate from about 27.7 million to 38.8 million between 1987 and 2014. After a period of mass incarceration from 1980s, the population with criminal history is expected to be rising given that those who have had criminal history will remain so until they die.

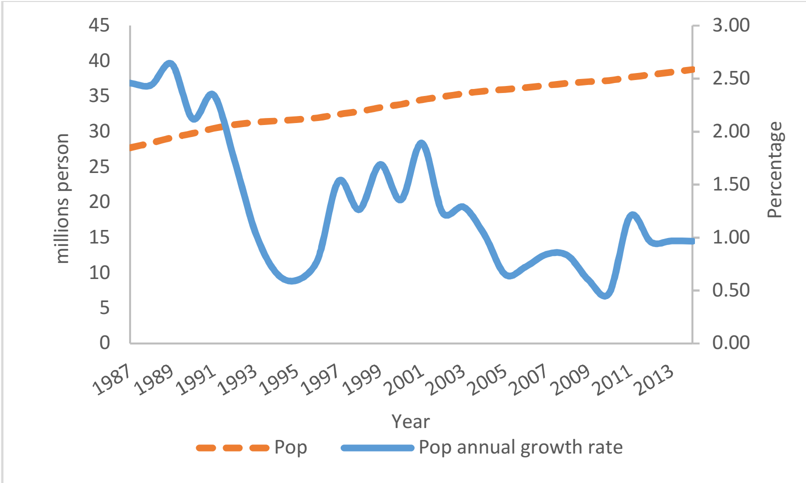


Figure 23 Historical Data: California Population and Annual Population Growth Rate (1987 - 2014)

Figure 24 demonstrates the structure of the aging chain in the **Population** module. The Innocent Population stock is defined as *individuals who have no criminal background*. The second stock from the left consists of individuals may or may not have committed crimes because they are arrestees and suspects. The last two stocks on the right consist of individuals with criminal history.

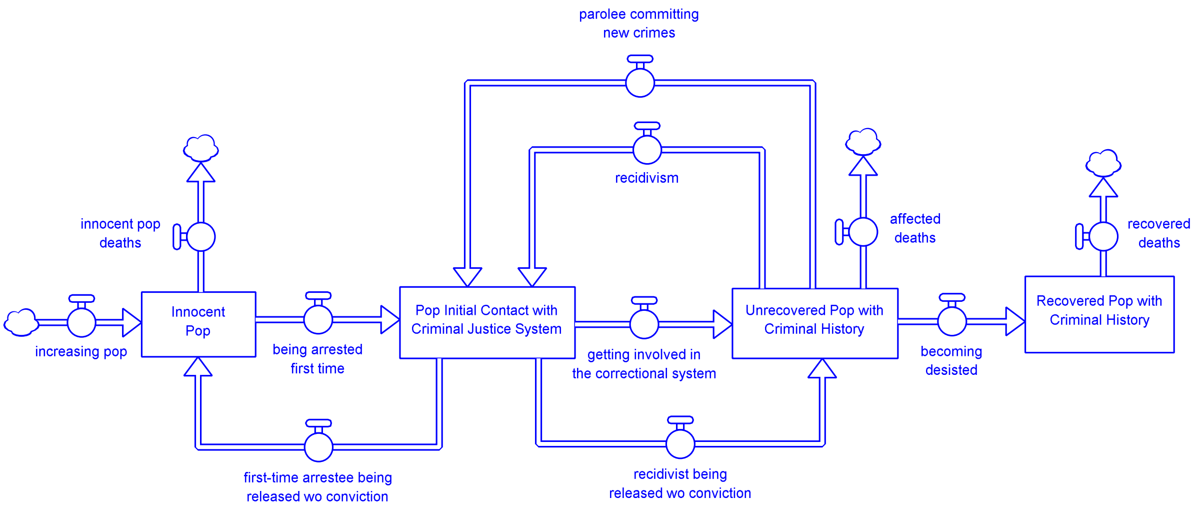


Figure 24 Overview of the Simplified Stock-and-Flow Structure in Population Module

The two inflows to the Innocent Population stock are the increase in population and first-time arrestees released before charges pressed. The two outflows from the Innocent Pop stock are individuals being arrested first time and deaths. "Being arrested first time" refers to innocent individuals being arrested. Although the innocent individuals can be arrested multiple times, as long as they are not convicted, they are still considered as first-time arrestees. A conviction refers to *a* *judgment, based either on the verdict of a jury or a judicial officer or on the guilty plea of the defendant, that the defendant is guilty*.

The Pop Initial Contact with Criminal Justice System stock consists of indivudals waiting arraignment. Arraignment *is a proceeding in which a criminal defendant is brought into court, told of the charges in an indictment or information, and asked to plead guilty or not guilty*. This is the first contact point with the criminal justice system. Once the individuals enter the Pop Initial Contact with Criminal Justice System stock, there are only three outflows from this stock, namely "first-time arrestee released wo conviction", "recidivist being released wo conviction", and "getting involved in the correctional system". Individuals who are released without conviction from this stock return to the Innocent Population or the Unrecovered Pop with Criminal History stock. First-time arrestees released without conviction re-enter the Innocent Pop stock while the recidivists released without conviction return to the Unrecovered Pop with Criminal History stock. Individuals who flow through the "getting involved in the correctional system" outflow are those who are convicted, either they are first-time or recidivating offenders.

Unrecovered Pop with Criminal History stock represents individuals who have been convicted before or are serving their sentence. Unrecovered Pop with Criminal History aggregates stocks from the **Individuals with Criminal History** module. These stocks contain individuals who are serving sentence, either in prison, jail, or community, convicted offenders, parolees, and all ex-convicts (high-risk and low-risk exconvicts) who may still recidivate. Recidivism in our study refers to *new crime commitment*. This differs from the return to prison due to parole violation. When individuals with criminal background recidivate due to new offenses, they are arrested and booked in the jail. The whole prosecution and judiciary starts anew. When parolees return to prison due to parole violation, they go back to prison directly. This structure also distinguishes the recidivism by parolees and ex-convicts. Parolees are individuals who are released on parole condition post-imprisonment. Once they fulfill parole requirements, they are discharged and become ex-convicts. The relatively high recidivism rate among the parolees form the basis to separate the two recidivism flows in order to track the flows of parolees and ex-convicts. Given the short period (about five days) the arrestees stay in the Pop Initial Contact with Criminal Justice System stock, the number of annual deaths is unlikely to be significant. Thus, the deaths outflow is omitted from this stock. However, individuals stay in the Unrecovered Pop with Criminal History stock comparatively longer. Hence, deaths outflow is included. Deaths outflows are also present in the Innocent Pop and Recovered Pop with Criminal History stocks.

After a lapse of several years post-release, some individuals have reintegrated into the society and committed to be law-abiding citizens. These individuals eventually become part of the desisting population. The desisting individuals with criminal history cease to engage in criminal activities. In this structure, they are termed as “Recovered Pop with Criminal History”.

Once individuals engaged in criminal activities and are convicted, they will live with their criminal history until they die. Some individuals may still be able to lead normal lives with criminal history and entered the last stock while some persistently fail to leave the Unrecovered Pop with Criminal History stock. Those remain in the Unrecovered Pop with Criminal History circulate in and out between prison or jail and the community.

California’s penal system has switched from rehabilitative to punitive since 1970s. After 59 years of indeterminate sentencing for felony conviction[18], California has adopted the determinate sentencing system[19]. To shape the system to be even more punitive, Three-strikes Law[20] and Truth-in-Sentencing Law were enacted in 1994[21]. Consequently, California saw an increasing recidivism trend because convicts are released without being rehabilitated. This resulted in a rapid increase in prison population. Facing budget pressure, the State government passed other laws in the past decade to deter inflow to the prison, such as:

- The establishment of mental health court to deter the inflow of mentally ill offenders;
- The Realignment policy to delegate criminal justice responsibility to the county government in order to sentence low-level offenses in jail and to keep some parolees and parole violators at county’s supervision;
- Proposition 47 to re-sentence existing inmates with reduced penalties in order to release certain inmates earlier; and
- Proposition 64 to legalize recreational use and cultivation of marijuana as well as resentence the punishment for marijuana-related offenses.

[18] Indeterminate sentence law was enacted in 1917. Under such system, sentence length was defined with a minimum and maximum term. After the convicts started serving sentence, the prison governing authority set the incarceration duration for the convicts. Depending on the convicts’ performance in the prison, the governing authority could adjust the incarceration duration within the minimum and maximum terms set by the courts. Indeterminate sentence law aimed to mitigate punishment and emphasize reformation of the convicts (Johnson, 1977).

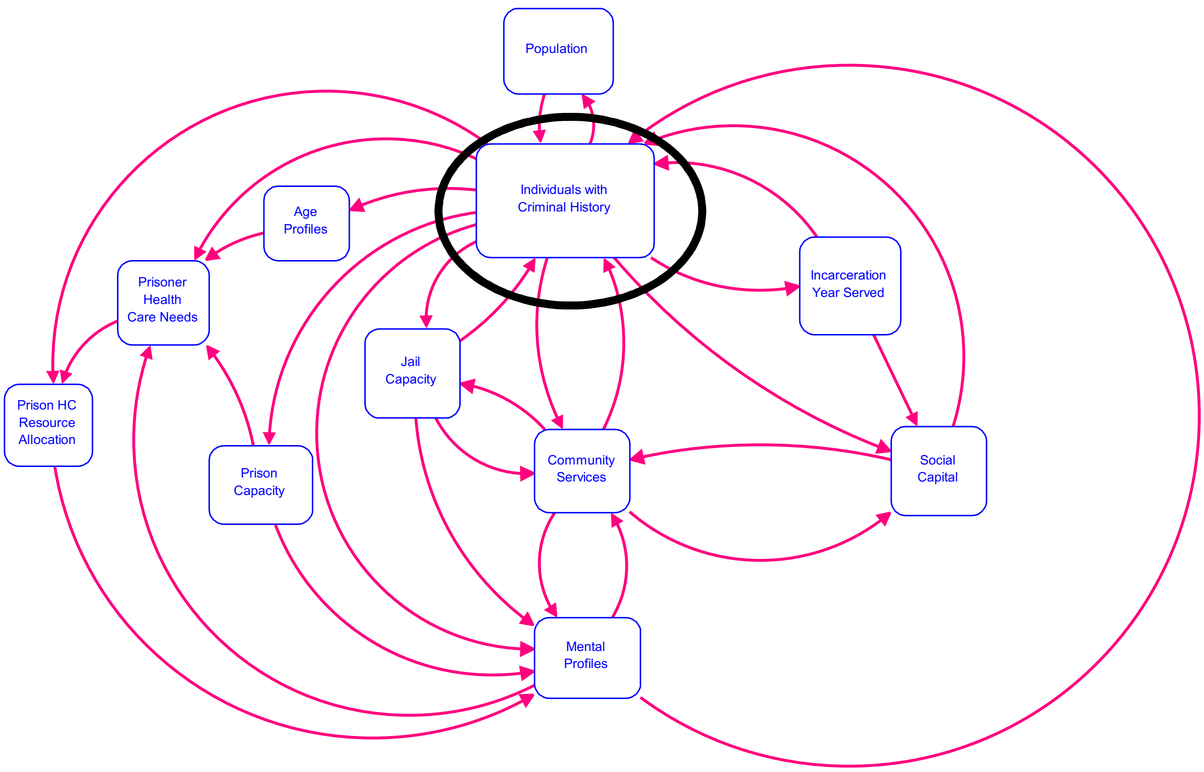
[19] Under determinate sentence law, sentence length is decided by the courts based on the seriousness of the offense. Whether the convicts have be reformed or not, the convicts will be released at the end of his or her sentence. Consequently, convicts may not be incentivized to participate in the rehabilitation programs in prison as they know they would be released regardless (Petersilia, 2006) .

[20] Under this law, the convicts with second conviction, who are normally called “second strikers”, will receive twice as long the sentence of the first conviction for the same offense. The third strikers or lifers, convicts who are convicted for the third time, receive life or at least a twenty-five-year sentence.

[21] Truth-in-sentencing (TIS) prevents sentenced convicts from being release early. Under this law, convicts are required to serve at least 85% of the prison sentence. California enacted both laws concurrently in 1994. So it is difficult to assess the effects of these laws separately.

These new laws mainly aim to reduce prison population and have little regard on the attempt to remove individuals with criminal background from the Unrecovered Pop with Criminal History stock. Only until the introduction of the Realignment policy had the State government increased resources to beef up community services. This move characterizes the recognition of criminal justice issue as a public health problem. Having acknowledged that the community contribution is a lever to reduce the inmate population will gradually shift the correctional system from punitive closer to rehabilitative.

3.2.2 Individuals with Criminal History



This is the core module consisting the aging chains for individuals with criminal history. Figure 25 provides a highly aggregate and simplified structure of the **Individuals with Criminal History** module.

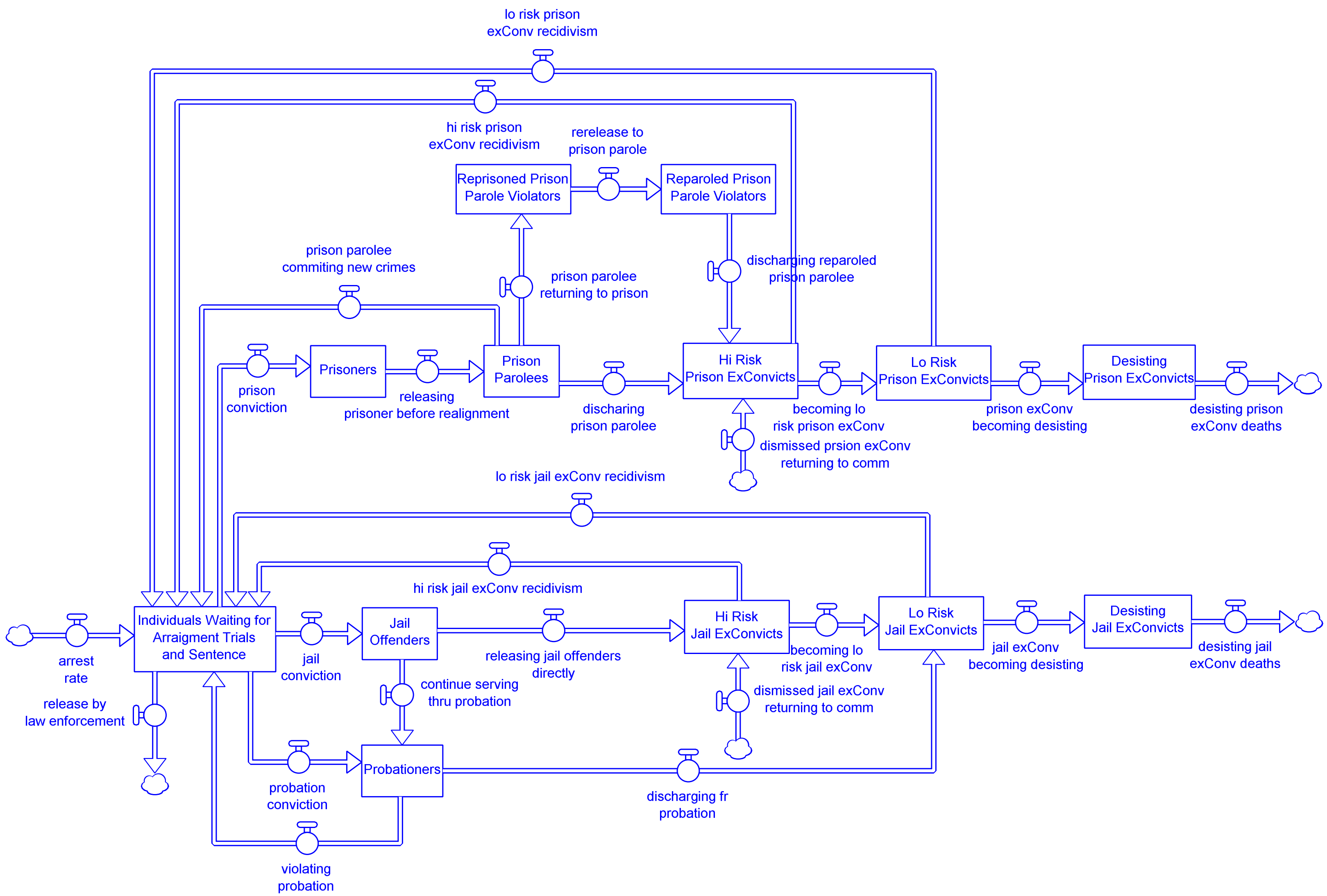


Figure 25 Overview of the Simplified Stock-and-Flow Structure in Individuals with Criminal History Module

The simplified presentation of the stock-and-flows structure in Figure 25 provides an orientation concerning the grouping of the actual stocks in this module. This presentation also facilitates and orients detailed explanation later. Note that the names of the stocks in Figure 25 intend to categorize the relevant structures by functions rather than actual stock names in the module. Hence, these stock names do not correspond to the actual stocks in the model.

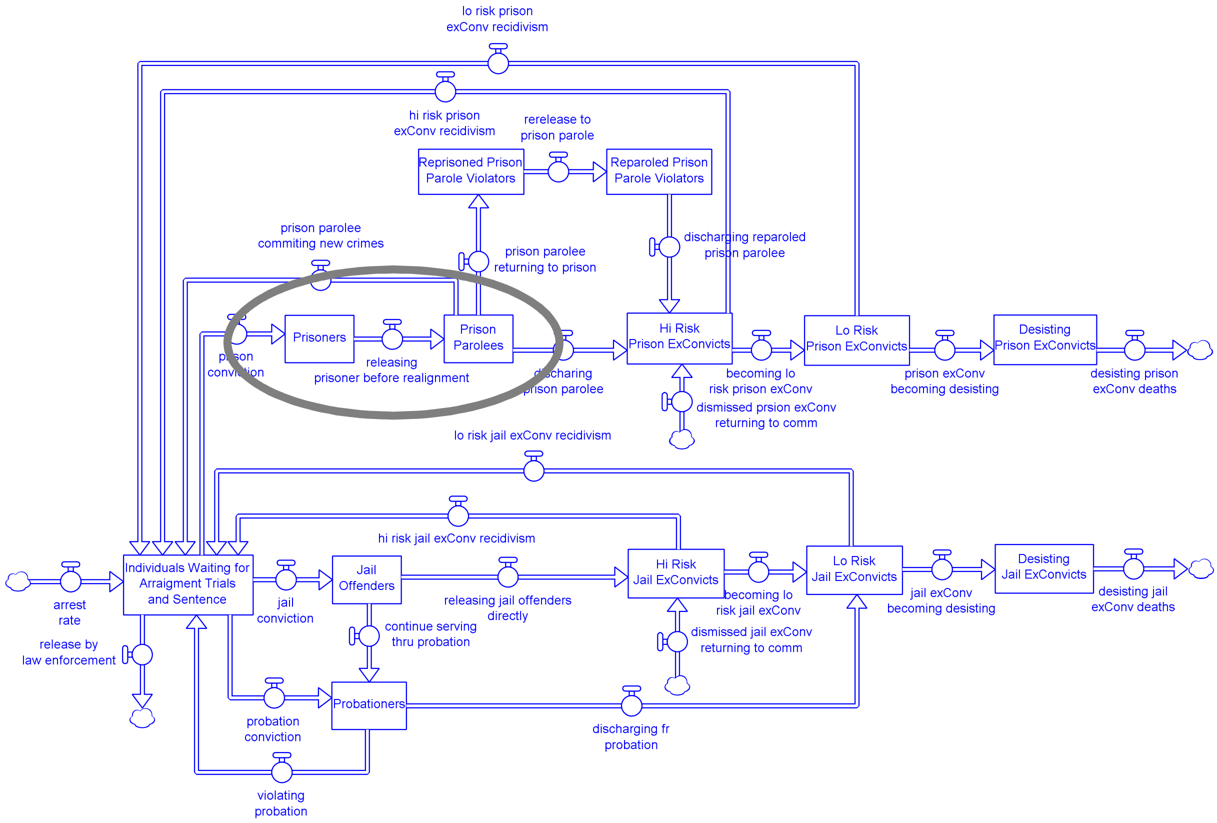
The initial contact point of the system lies in the “Individuals Waiting for Arraignment Trials and Sentence” stock (see Section 3.2.2.4 to 3.2.2.6). Table 4 shows the stocks aggregated in the “Individuals Waiting for Arraignment Trials and Sentence” stock.

Pre-trialed Individuals in Custody	Pre-trialed Individuals in Community	Individuals Being Trialed	Individuals Waiting for Sentence
Arrestees		Defendants in Custody Being Trialed	PreSentencing Defendants in Custody
Suspects in Custody	Pre-trial Suspects in Community	Defendants in Comm Being Trialed	PreSentencing Defendants from Comm in Custody
Suspects in Custody with Cases Filed	Suspects in Community with Cases Filed		

Table 4 Individual Stocks in the "Jail Detainees and PreTrial Release Pop" Stock

Individuals in the “Individuals Waiting for Arraignment Trials and Sentence” stock are either arrestees waiting for arraignment, pre-trialed individuals, defendants being trialed, and convicts waiting for sentence. Convicts with prison and jail sentence progress through the prison and jail aging chains. Prisoners advance to parole upon their rlease become ex-convicts. Ex-convicts are categorized as high-risk and low-risk ex-convicts because the probability to reoffend for the former is relatively higher than the latter. The jail offenders do not serve parole. Instead, some of them serve split-sentence where they are put on probation after serving a designated jail time. When prison parolees violate parole condition, they return to prison for a short period and then they are reparoled. However, if the parolees commit new crimes and are arrested, they enter the “Individuals Waiting for Arraignment Trials and Sentence” stock. The same goes for the jail ex-convicts who commit new crimes. In the aging chain for prisoners and jail offenders, each type of convicts are further divided by their mental health status. In other words, prisoners with mental illness (wMI) and prisoners without mental illness (wo MI) are subsets of this aging chain. The prisoners and jail offenders wMI and wo MI have similar progression (see Section 3.2.2.1 to 3.2.2.3 and 3.2.2.7).

3.2.2.1 Prisoners with Mental Illness



The main stock for this study is the prisoners with mental illness (wMI). Figure 26 portrays part of the structure related to prisoners wMI.

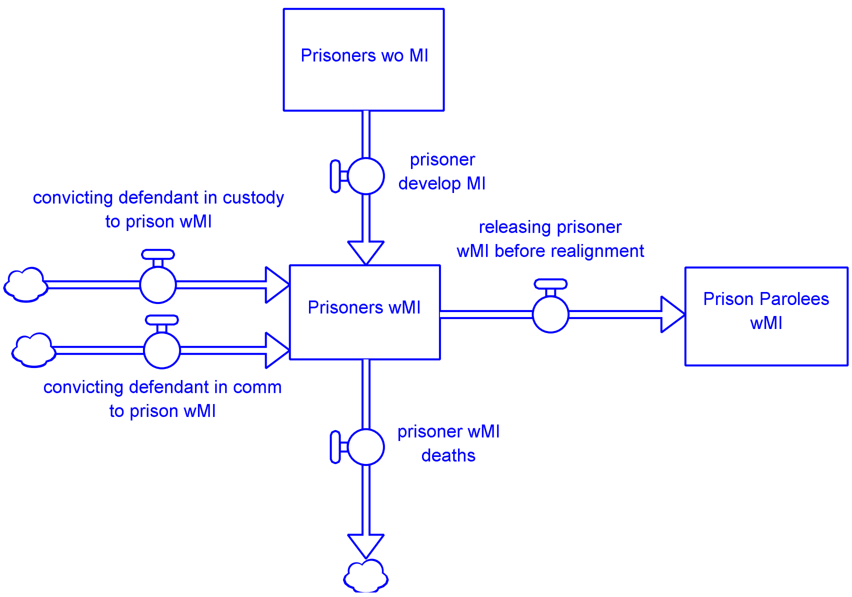


Figure 26 Bare Stock and Flow Structure of Prisoners with Mental Illness

Prevalence of MI is a ratio of the number of prisoners wMI and total number of prisoners. MI prevalence is frequently used to measure the fraction of a population assumed or diagnosed with MI. The Sterling Report commissioned by California state government for the *Coleman v. Wilson* lawsuit reports that the prevalence of severe mental disorder in 1987 was 0.14 (Figure 1). Thus, 0.86 of the total prisoners is assumed to be mentally fit. In 1987, the total number of prisoners was 66,975. Assuming that the reported 0.14 MI prevalence in 1987 was accurate, the stock of prisoners wMI and without MI are 9,136 and 56,126 respectively (excluding parole violators). Nieto (1998) reveals that between 10 – 18 percent of incoming offenders, which was more than 20,000 each year , are in need of mental health attention[22].

Prisoners wMI stock has three inflows and two outflows (Figure 27). The inflows to the Prisoners wMI stock are the admission of newly convicted offenders wMI and prisoners develop MI in prison. The admission of newly convicted offenders is divided into the conviction of defendants[23] being held in custody, i.e. in jails, and the conviction of defendants who are waiting in the community for trials before sentencing. These two inflows are the split flows[24] from "convict in custody being sentenced" and "convict in comm being sentenced" outflows from the PreSentencing Convicts in Custody and PreSentencing Convicts fr Community in Custody stocks (Section 3.2.2.5). Strikers are usually convicted to prison sentence.

[22] P.1. The author of the paper obtained this figure from prison medical staff.
[23] Refers to arrested suspects who are being trialed.
[24] This structure splits an outflow into subflows that lead to other stocks. Refer to Hines (1996) for more explanation.

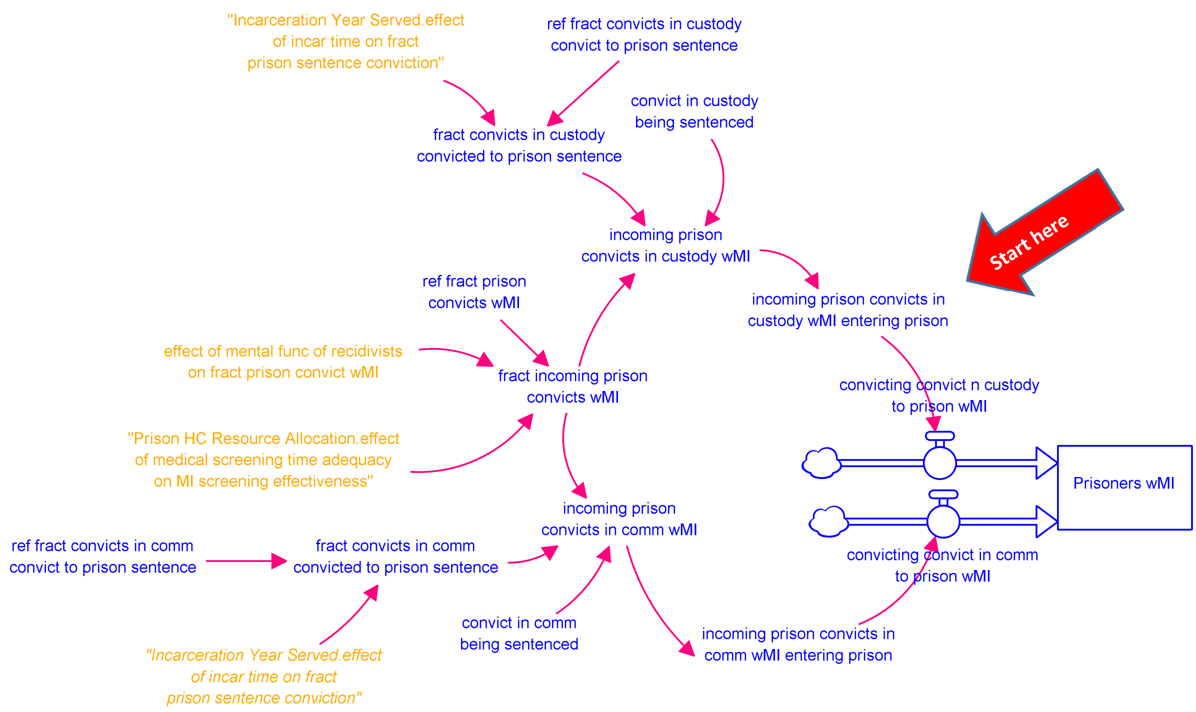


Figure 27 Parameters Associated with the Admission of Prisoners with Mental Illness

Figure 27 illustrates the inflows of newly convicted offenders wMI to prison. As the structure for the inflow "convicting convict in comm to prison wMI" is similar, only the "convicting convict in custody to prison wMI" will be explained.

"Incoming prison convicts in custody wMI entering prison" refers to *the number of convicts wMI being convicted to prison sentence*. This parameter is the product of "convict in custody being sentenced", "fract convict in custody convicted to prison sentence", and "fract incoming prison convict wMI". "Fract convict in custody convicted to prison sentence" is affected by the average previous incarceration time served by the convicts. This effect is explained in Section 3.2.9.4.

"Fract incoming prison convicts wMI" is influenced by the mental functions of recidivists wMI and medical screening effectiveness at the reception center. If the average mental functions of recidivists wMI increases relative to the initial condition, the fraction of incoming prison convicts wMI decreases. Figure 28 shows the inverse relationship between the fraction of recidivists wMI and the fraction of incoming prison convicts wMI in a table function.

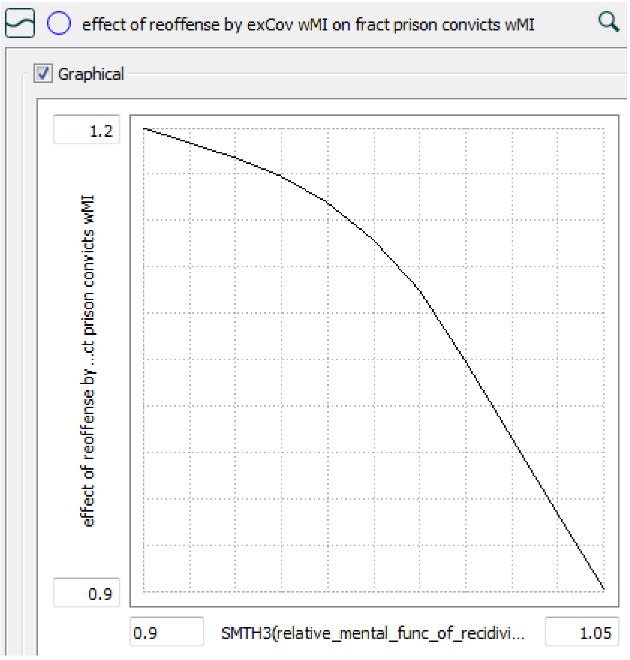


Figure 28 Effect of Reoffence by Ex-Convicts with Mental Illness on Fraction of Prison Convicts with Mental Illness

The input parameter to the table function in Figure 28 is the relative mental function of recidivist. The input parameter is expressed with the following equation.

SMTH3 (relative_mental_func_of_recidivists, 1, relative_mental_func_of_recidivists) (3-1)

SMTH3 is a built-in third order delay exponential smooth function that smooth the relative mental function of recidivists over an exponential averaging time. The relative change in the mental functions of the recidivists is not instantaneously updated as soon as the average mental functions of the recidivists change. The formulation of the average mental functions of recidivists is explained in Section 3.2.4.6. As it takes time for the recidivists to be arrested and to go through the judiciary process, the second term in this equation represents the averaging time. The time taken to update information is expected to be one year on average. The last term of the equation indicates the initial value.

However, with little screening capacity at the reception center before the Realignment, the incoming prison convicts being diagnosed with MI is lower than it would have been. After Realignment, as the screening capacity increases, more incoming prison convicts are accurately diagnosed. Hence, more of them enter the Prisoners wMI stock.

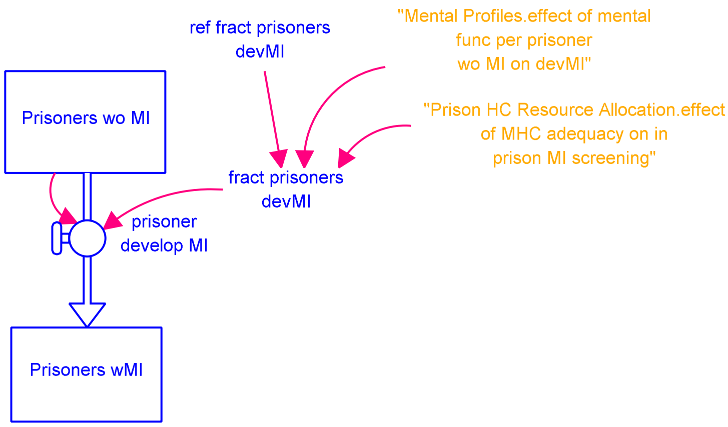


Figure 29 Parameters Associated with the Prisoner Develop Mental Illness Flow

Figure 29 shows the parameters influence the fraction of prisoners develop MI. When the mental functions of prisoners wo MI decreases, more prisoners wo MI become mentally ill. Hence, the fraction of prisoners develop MI increases. The "effect of mental func per prisoner wo MI on devMI" is explained in Section 3.2.4.4. However, the fraction of prisoners develop MI is also influenced the screening capacity in prison. If prison mental health care (MHC) is adequate, then there will be resources available to identify and diagnose onset of mental illness. On the contrary, if MHC is inadequate, fewer prisoners are diagnosed and move into the stock of Prisoners wMI even though their mental functions have deteriorated. The "effect of MHC adequacy on prison MI screening" is explained in Section 3.2.6.7.

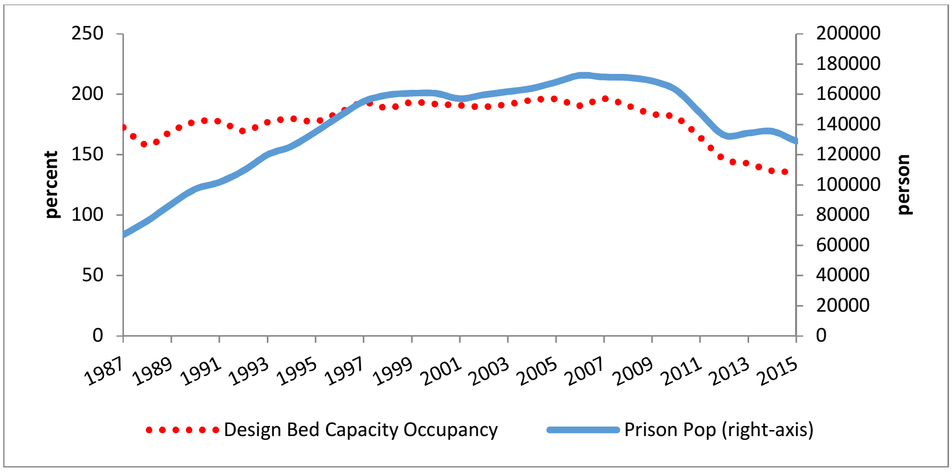


Figure 30 Historical Data: Number of Prisoners and Design Bed Capacity Occupancy Level

Source: CDCR Annual Prisoners and Parolees Reports 1987 – 2010
"Historical Trends 1987-2007" by CDCR Offender Information Services Branch (Data Analysis Unit)
CDCR Monthly Population Reports 2011 - 2016
Design bed capacity[25] refers to number of inmates that a prison is designed to accommodate according to standards developed by the Commission on Accreditation and the American Correctional Association.

The development of MI prevalence is related to prison overcrowding. California adult prison population had risen 700% from about 20,000 inmates in 1970s to over 160,000 in 2010 (Figure 30). Much of this increment emerged after 1980s. In 1994, California enacted the Three-strikes Law. With the Three-strikes Law, California prison population was expected to grow[26] (LAO, 1995). Since the late 1980s, the prison population had exceeded the design capacity by 50%. From late 1990s until 2010, the prisons housed over 200,000 offenders beyond its design capacity. After 2011, the prison population declined after the implementation of the Realignment policy (see Section 3.3).

It has been reported that 7% of the state prisoners in the U.S. had a recent history[27] of mental problem without any prior symptoms (James et al., 2006). This information is used as a proxy to estimate the

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[25] This standard covers the consideration of the need for humane conditions, environment that prevent violence, and provision adequate health care. The number can be based on any combination of single-occupancy cells, double-occupancy cells, single- or double-bunked multiple occupancy rooms, or dormitories; "*operable capacity*"- takes the space requires for effective programming, safety, and security into consideration. It is greater than the design capacity.; "*maximum safe and reasonable capacity*" – represents the maximum number of prisoners to be housed safely and reasonably based on custody level, staffing levels, and physical structure of the facilities (Corrections Independent Review Panel, 2004).

[26] The report presented the projected population growth by California Department of Corrections (CDC) before and after the implementation of Three-strikes Law. CDC estimated the increase in "Three Strikes" admission would be 35,000 offenders between 1994 and 1999. But after the implementation in fall 1994, CDC reduced the expected increment to 19,000. But in the long run, CDC projected the prison population would grow by 275,000 in fiscal year 2026/27.

[27] "Recent history" is defined as the occurrence of mental health disorders diagnosed by mental health professionals, overnight stay in a hospital due to mental disorders, using prescribed medication or receiving

fraction of prisoners develop MI. As the study was conducted in 2006, but our model is initialized at 1987 during which the prison utilization[28] was 160% over the design capacity as compared to 190% in 2006, we adjusted the fraction of prisoners develop MI through calibration and found that a fraction higher than 2% yields an exceptionally high MI prevalence. In the absence of more accurate data, we assign 2% as the fraction of prisoners develop MI.

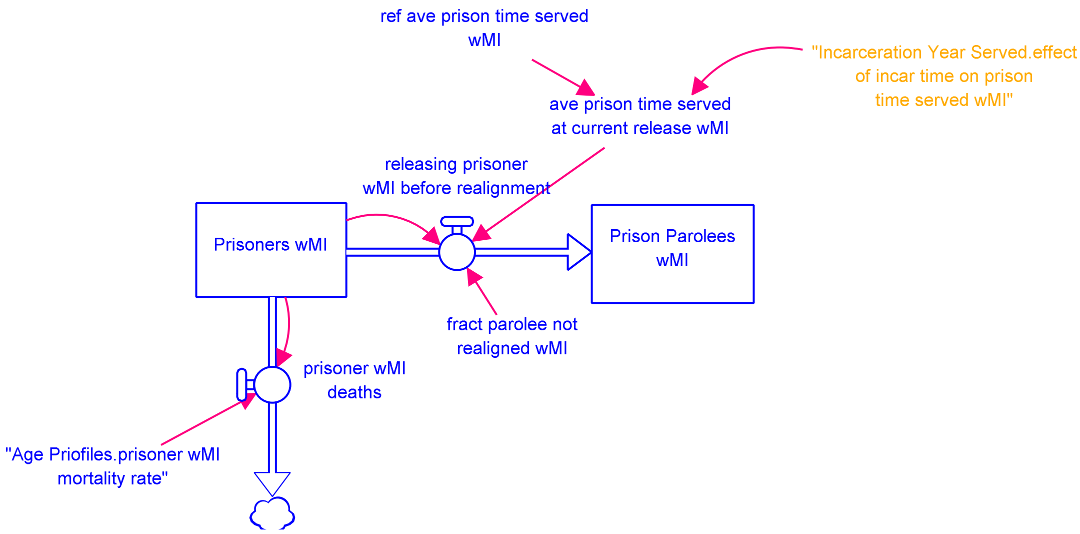


Figure 31 Outflows from the Prisoner with Mental Illness Stock

The outflows from the Prisoners wMI stock are prisoners wMI being released to parole and deaths (Figure 31). After serving a certain period of sentence, the prisoners leave to serve parole. The "ave prison time served at current release wMI" is influenced by the previous incarceration time served by the prisoners. Previous incarceration time served by prisoners refer to *the previous incarceration time served by the recidivists*. Prisoners with the first prison conviction have zero previous incarceration time served until they leave the prison. At that time, these prisoners bring their accumulated previous incarceration time served along with them. This accumulated previous incarceration time served becomes the previous incarceration time served of the parolees. If the average previous incarceration

professional mental health therapy. The study broadly categorizes mental disorders into three groups: major depression, mania, and psychotic disorder. The symptoms on which the professionals diagnosed major depression are depressed mood or decreased interest or pleasure in activities plus 4 additional depression symptoms; the criteria of mania are persistent angry mood or 3 symptoms in a 12-month period; symptom for psychotic disorder is either delusion or hallucination. Hence, these are the prisoners who are assumed to have developed MI during custody.

[28] Refers to the ratio between prison population and design bed capacity.

time increases over time, it means that more of the prisoners are habitual offenders or strikers (prisoners who recidivate). Therefore, the prison time served for the current offense will be longer.

The “ave prison time served at current release wMI” represents the actual time served by prisoners from the first day of admission to the prison to the day of their first release to parole. This parameter differs from the actual sentence length determined by the court (Figure 32). After the prisoners start serving sentences, many of them are eligible to participate in good conduct credit-earning programs and work or education participation programs that help reduce the serving time (Prison Law Office, 2016). Since 2010, other new credit laws have been passed to target on second strikers, lifers, ill and elderly prisoners. Under the new credit laws, about 29,000 of non-violent, non-serious, and non-sex-offenders (the 3Nons) prisoners have been released earlier between 2010 and 2016 (Prison Law Office, 2016). The average prison time served has been relatively stable from 1998 to 2009; it ranges between 1.63 and 1.73 year per prisoner (Figure 32). However, it starts to climb to 3.99 in 2012. This is due to the diversion of the 3Nons to county jails instead of the prisons after 2011. Hence, those who remained in the prisons were convicts of more serious felonies with longer sentences. Figure 32 also shows that the average prison sentence length for felonies in 33 states in the U.S. The numbers linger around five years from 1998 to 2006. If Californian prison population is a representative sample of the prison population of these 33 states, the Californian prisoners likely served about 40% of their sentences.

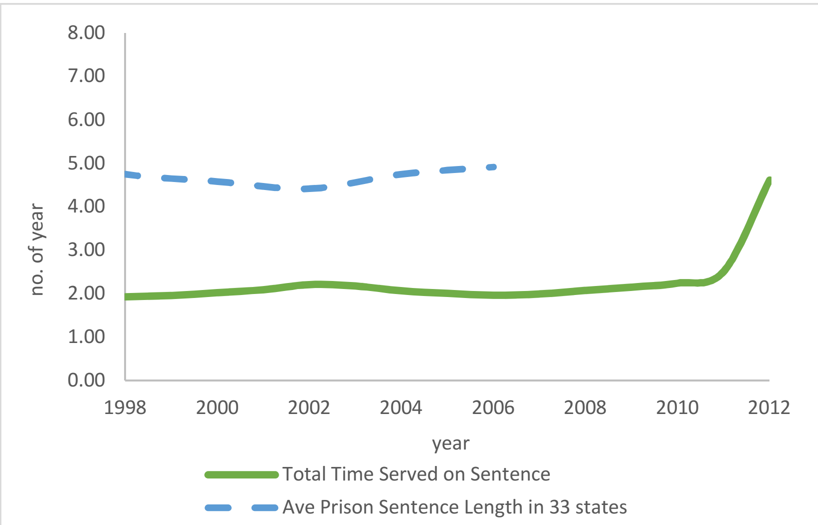


Figure 32 Historical Data:
Comparison of Average Prison Sentence Length and Average Prison Time Served

Source: CDCR Annual Time Served On Prison Sentence Report from 1998 to 2012
Felony Sentences in State Courts (Bureau of Justices Statistics, 1986-2006)

Studies suggest that the actual time served by prisoners wMI is longer than those without MI. A national study reports that mentally ill prisoners are expected to serve 15% longer sentence than those without MI (Ditton, 1999). The same study also reveals that mentally ill prisoners were likely to be convicted for violence crimes (53% as compared to 46%), about 52% of this group of offenders had three or more prior offense (compared to 42% for other offenders). The higher number of prior offenses and violence offense infer that many of the prisoners wMI might be strikers. The mentally ill prisoners tend to have difficulty in abiding prison rules. Hence, they can be easily charged with infractions (Torrey et al., 2010). Prisons are also a holding place for these offenders before they are offered a place in treating facilities[29] (LAO, 1999a).

The "ave prison time served at current release wMI" is modeled with SMTH3. This formulation reflects the delay in measurement and reporting of the average prison time served by the prisoners who are being released. CDCR cannot report the instantaneous time served of the prisoners who are leaving. It must be averaged over a period of time to filter out short-term variations. Also, the change in "ave prison time served at current release wMI" does not affect the prisoners instantaneously. The prisoners remain in the stock for the duration as long as the "ave prison time served at current release wMI". Thus, the change in "ave prison time served wMI" only influence those who enter the prison later.

In California, almost all offenders released from prisons are placed on parole. The purposes of parole are to ensure successful reintegration to the community and public safety. Released prisoners wMI flow into the Prison Parolees wMI stock; prisoners wo MI flow into the Prison Parolees wo MI stock (not shown in Figure 33). Some prisoners die during incarceration. The average prisoner mortality rates ranged between 0.001 and 0.003 from 1987 to 2000[30] (CDCR, 1987-2010). As prison is a harsh environment, we take 0.003 as the reference mortality rate for prisoners. Prisoner mortality rate is endogenized and presented in the **Age Profiles** module in Section 3.2.3.3.

[29] In the past, the Board of Prison Terms might keep offenders who were about to be release on parole in the state prison for another year due to the lack of capacity in community psychiatric treatment facilities. But starting from 1998, this practice has been ruled by the court as illegal.

[30] CDCR's mortality data series discontinued in 2000.

Figure 33 presents a first-order delay stock-and-flow structure of the new prisoners in the reception center. The purpose of this structure is to capture the average daily population (ADP) of the reception center in order to measure the effect of medical screening capacity adequacy (Section 3.2.6.7). The inflow is the annual total new prison admission, which is the sum of all convicts receiving prison sentence. The outflow is a first-order delay structure that represents the new prisoners leave the stock after a year. “ADP of Reception Center” is the division of the stock by “year to day conversion”. The “year to day conversion” denotes 365 days in a year. Hence, “ADP of Reception Center” reports the average daily population in the reception center.

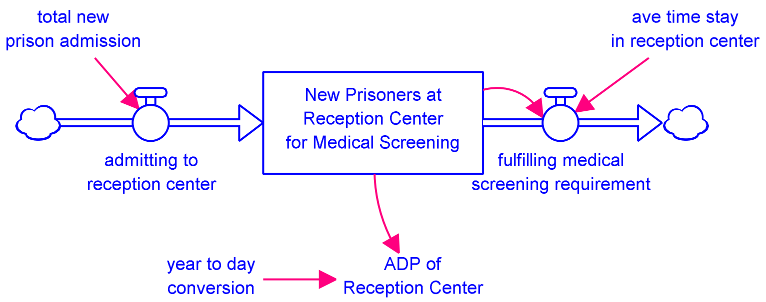
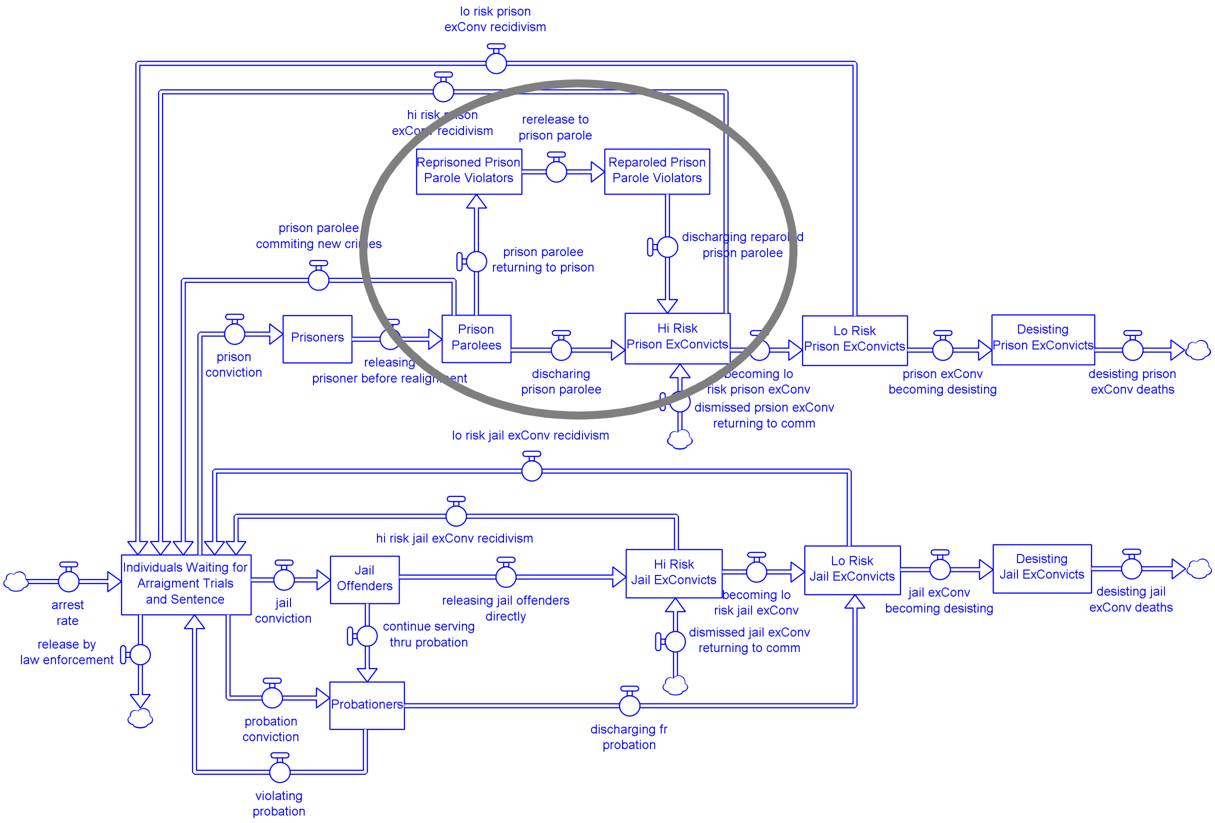


Figure 33 Stock and Flow for New Prisoners at Reception Center for Medical Screening

3.2.2.2 Parolees Stocks and Flows



The following structure depicts the stock-and-flow structure for prison parolees wMI, prison parole violators wMI, reprisoned prison parole violators wMI, and reparoled prison parolees wMI (Figure 34). The structure for parolees wo MI, parole violators wo MI, reprisoned parole violators wo MI, and and reparoled prison parolees wo MI are identical.

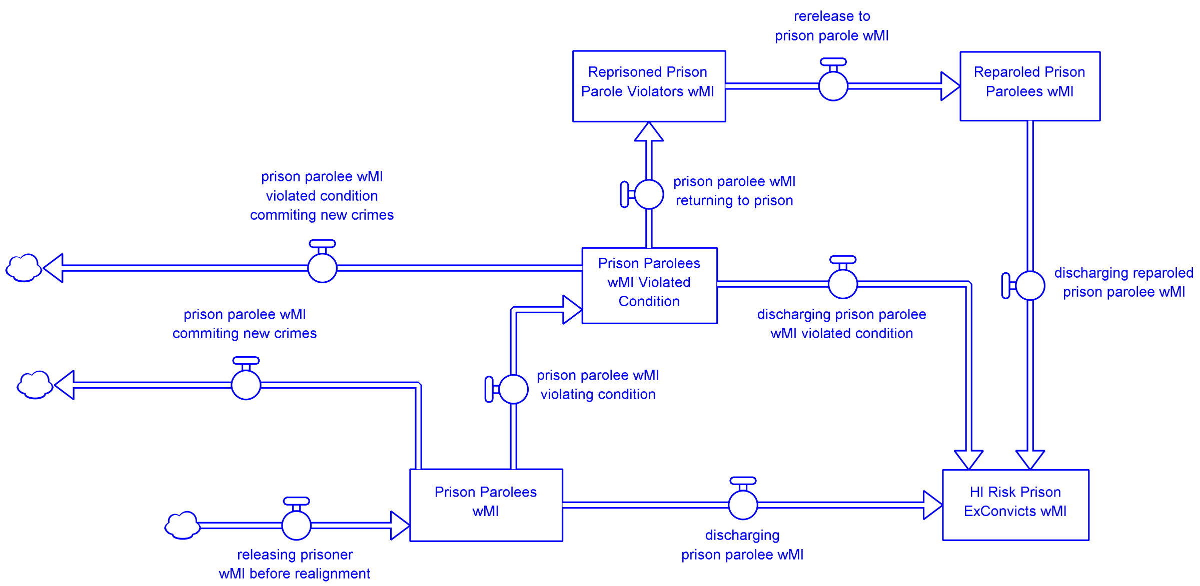


Figure 34 Bare Stock and Flow Structure of Prison Parolees with Mental Illness

Parolees wMI are distributed into four stocks: Prison Parolees wMI, Prison Parolees wMI Violated Condition, Reprisoned Prison Parole Violators wMI, Reparoled Prison Parolees wMI. The Prison Parolees wMI stock contains all prison parolees wMI who have not violated condition. Those who have violated condition flow into the Prison Parolees wMI Violated Condition stock. A fraction of these violators are sent back to the prison for their violations. Those who remain in the stock will be discharged after the designated parole duration. The reprisoned parole violators wMI serve a short sentence. Then, they are placed on parole again. However, when the prison parolees wMI and prison parole violators wMI commit new crimes, they flow out from the respective stocks to the Arrestees stock, from which the judiciary process starts anew.

All the prisoners are released to parole under the CDCR parole supervision before Realignment. There were 40,900 parolees in 1987 (Figure 35). This population peaked in 2007 with 125,200 parolees. After the Realignment in 2011, about 30,000 prisoners were released per year to post-release community supervision (PRCS), which is operated by the counties (CPOC, 2012; Loftstrom et al., 2012). In this model, this new type of supervision is called “county parole” to set apart from existing “prison parole”. Consequently, prison parole population dropped by about 40% from 2011 to 2012. After that, the parole population continued to decrease.

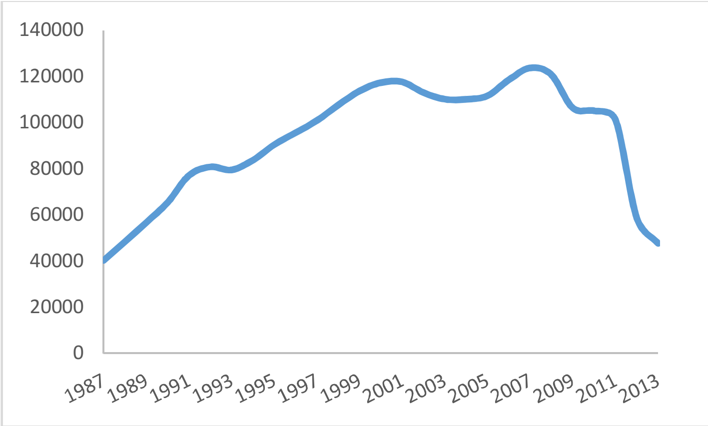


Figure 35 Historical Data: Stock of Parolees

Source: CDCR Annual Prisoners and Parolees Report 1998 to 2010
Parolee Census Data Dec 2012 and Dec 2013

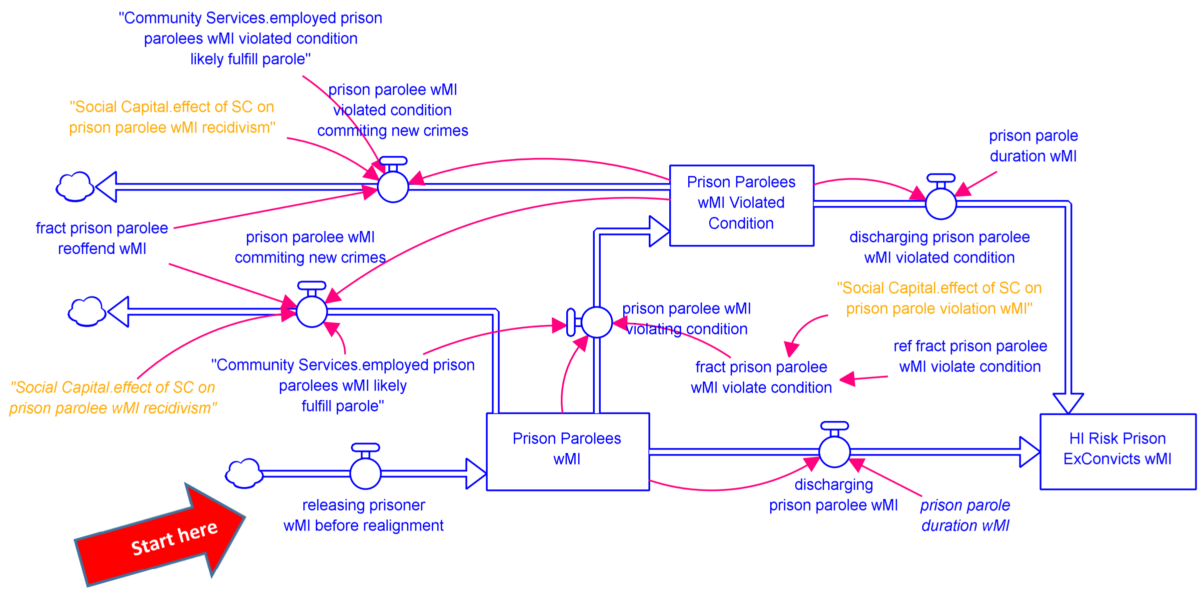


Figure 36 Stocks and Flows for Prison Parolees with Mental Illness and Parole Violators

The inflow to Prison Parolees wMI is represented by the "releasing prisoners wMI before realignment" (Figure 36). There are three outflows from the Prison Parolees wMI. The first outflow characterizes the parolees who successfully finish parole and are discharged to the Hi Risk Prison Ex-Convicts wMI stock. Not all parolees complete parole successfully. Some parolees commit new crimes and some return to prison due to parole violation. Parolees and parole violators with new commitments reenter the conviction process anew (see Section 3.2.2.4 to 3.2.2.6). Employed parolees have a lower probability of reoffending because employment is an important factor in reducing parole violation and recidivism. In order to get permanent employment, the prerequisite conditions such as stable accommodation and health care need to be fulfilled first (Roebuck, 2008). Once the parolees maintain gainful employment and become independent, they will be less likely to engage in survival crimes[31] (Novac, 2006). Therefore, employment is seen as an indicator of the probability of parole violation and recidivism. A group of employed employees are assumed to fulfill parole conditions. Hence, when calculating the prison parolees wMI who reoffend, only those who are unemployed and those who are employed but are still likely to reoffend are considered. The similar calculation goes for the prison parolees wMI who have violated condition and committed new crimes. When the parolees wMI commit new crimes, they are sent to jail to start the prosecution and judiciary process again. Then, they start new sentences correspond to the offences that they are convicted for.The fraction of employed parolees who might fail reoffend is set as 0.4. Thus, the fraction of employed parolees likely fulfill parole is 0.6.

The following equation explains this concept:

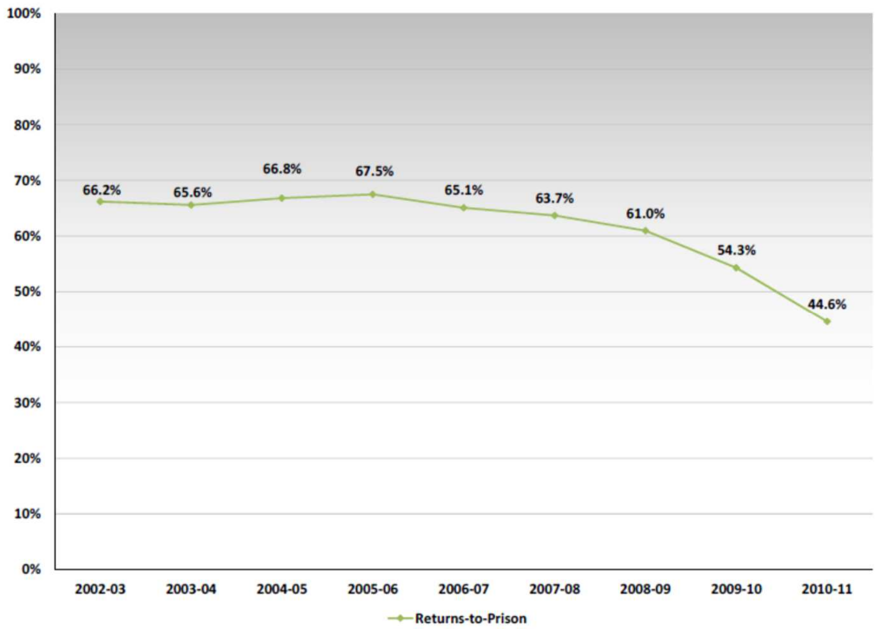
Prison parolee wMI committing new crimes =

(Prison_Parolees_wMI -
Community_Services.employed_prison_parolees_wMI_likely_fulfill_parole) *
fract_prison_parolee_reoffend_wMI *
Social_Capital.effect_of_SC_on_prison_parolee_wMI_recidivism (3-2)

Equation 3-2 reads that the employed prison parolees wMI who are likely to fulfill parole are subtracted from the total number of prison parolees wMI. A fraction of the remaining parolees wMI, conditioned by their SC, commit new crimes. The similar equations are used for parolees wMI violate condition.

Some of the parolees have their parole revoked on the ground of technical violation or new commitment. Technical violation refers to *parolee's failure in compliance to the parole process*; revocation due to new commitment refers to *new crime commitment during parole*. At the discretion of the parole officer, parole violators are sent to the parole board hearing if they have violated parole conditions. The parole hearing board decides whether these parolees will be returned to prisons.

[31] Refers to nonviolent crimes to get food, shelter, money, or drugs.



2002-2003 – 66.2%
2003-2004—65.6%
2004-2005—66.8%
2005-2006—67.5%
2006-2007—65.1%
2007-2008—63.7%
2009-2010—61.0%
2001-2010—54.3%
2010-2011—44.6%

Figure 37 Historical Data: Three-year Return-to-Prison Rate for Prisoners Released from All California Department of Correctios and Rehabilitation (CDCR) Iinstitutions

Note: Adapted from CDCR Adult Institutions Outcome Evaluation Reports (CDCR, 2010 - 2015)

Figure 37 shows the trend of the three-year RTP rate[32]. By 2002-2003, 66.0% of the prisoner cohort released in 1999 is returned to prison. When the RTP rate is broken down year by year, the first-year RTP rate is 36.0% while the second- and third-year RTP rates are 4.7% and 3.5% respectively. Hence, a first-order delay structure captures this dynamics as the highest fraction of parolees return to prison in the first year. As the stock of parolees reduces, the number of parolees return to prison also reduces. Therefore, we divide 66.0% by 3 and roughly set "fract prison parolees reoffend" as 0.2 per year. Given that the data are reported for the prisoner cohort in 1999, we take a lower value, i.e. 0.2 instead of 0.36, in the absence of data for 1987.

The fraction of prison parolee wMI violate condition is conditioned by the parolees' social capital (SC). Social capital, which is primarily defined by social networks in our model, serves as informal social control. The individuals in the parolees' social networks serve as the role models that help encourage parolees to adhere to social norms. Hence, higher SC reduces parole violation rate. The "effect of SC

[32] CDCR's definition of three-year return to prison rate: "An individual convicted of a felony and incarcerated in a CDCR adult institution who was released to parole, discharged after being paroled, or directly discharged during Fiscal Year (FY) 2010-11 and subsequently returned to the State prisons within three years of their release date."

on prison parole violation wMI" (Figure 36) is explained in Section 3.2.11.5. The fraction of prisoners return to prison due to parole violation in 1987 is reported as 0.25 (CDCR, 2010 - 2015). "Ref fract prison parolee wMI violate condition" is set as a constant at 0.3. SC also has an inverse relationship with parolee recidivism. The "effect of SC on prison parolee wMI recidivism" is explained in Section 3.3.11.4. When parolees wMI and prison parole violators wMI fulfill their parole requirements, they will be fully discharged from CDCR.

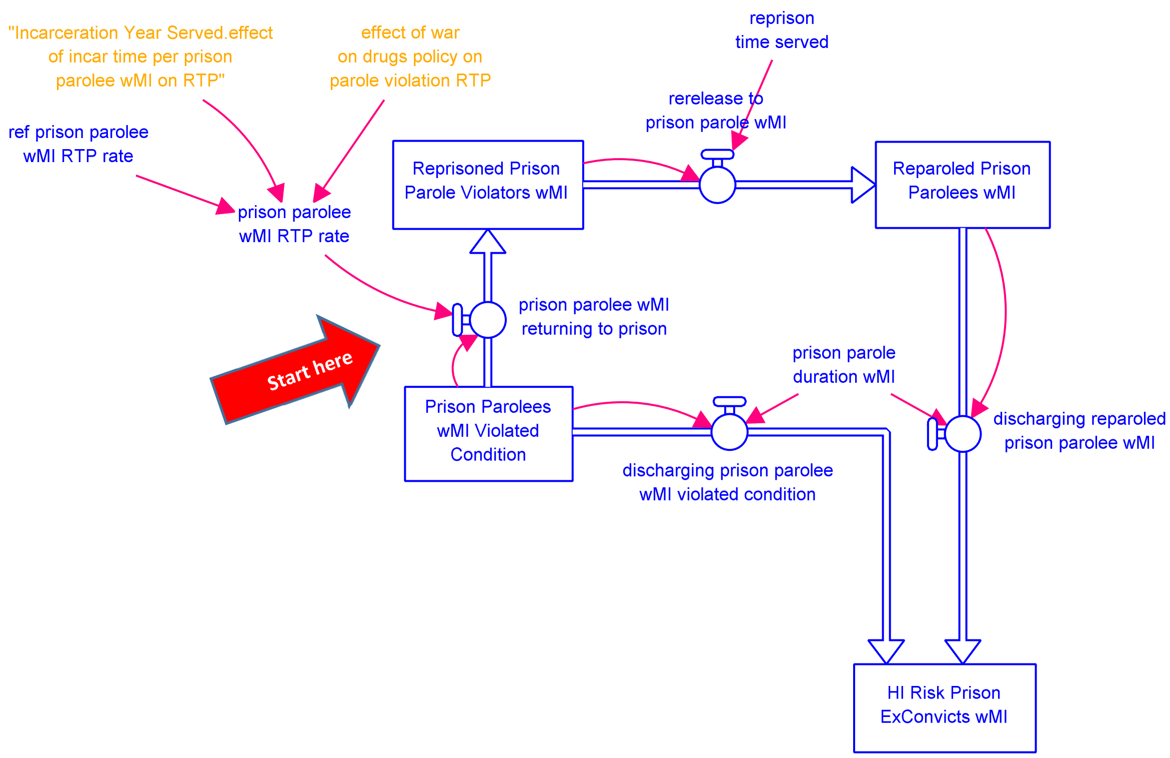


Figure 38 Stocks and Flows for Prison Parole Violators with Mental Illness, Reprisoned Parolees and Reparoled Parolees

Parole violators return to prisons due to technical violation enter the "Reprisoned Prison Violators wMI" stock (Figure 38). Although parole violators are defined as "*parolees returned to prison for violating their parole conditions or pending parole revocation*" (CDCR, 1987-2010), our study has a different definition for parole violators. We define all parolees who fail to adhere to parole conditions as "parole violators". Those who are returned to prisions due to parole violations are termed as "parole violators who are returned to the prisons". Petersilia et al. (1993) discover more intensive supervision leads to higher parole revocation. This is because that under closer surveillance, violations may receive more official attention than other types of less intensive supervision. In fact, about 50% of the parolees have at least one formal parole violation (Grattet et al., 2008). But not all parole violaters are sent back to the prisons. The risk of parole violation is the highest within six months following the prisoners' release and the violation rate continues to decline afterward[33] (Grattet et al., 2008). Grattet et al. (2008) observe that parolees with mental illness have a higher risk to reoffend. In a community study, a total of 94% of the mentally ill parolees were returned to prisons (Shield, 2003) as compared to 65% of non-mentally ill parolees statewide.

The "prison parolee wMI RTP rate" is affected by the "war on drugs" policy (introduced in mid-1980s and carried over to early 1990s), the incarceration time served by parolees wMI, and the employment level of the parolees wMI.

Following the tightening of law on drugs, expanded federal resources contributed to the increase in drug-related arrests, including new crime commitmment as well as parole revocation. A table function is used to model this exogeneous effect (Figure 39). This exogeneous effect increases the "prison parolee wMI RTP rate" by two times in 1987. Between 1987 and 1993, the effect of this exogenous impact decreases gradually. From 1994 onwards, the tightening of law on drugs is no longer influencing the "prison parolee wMI RTP rate" because federal resources had been reallocated to other address other national priorities. The input to the horizontal axis is the time between 1987 to 1994. The output of this table function is the effect of "war on drugs" on the RTP rate. During this period, more individuals are arrested for drug-related felony offenses due to expansion in resources. When these convicts are released to parole, a large fraction of them fail to pass drug-test. This leads to higher RTP rate.

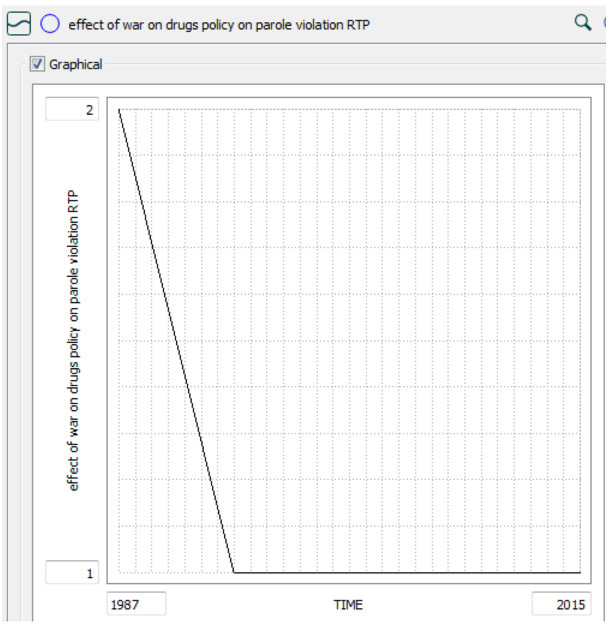


Figure 39 Exogenous Effect of "War on Drugs" on Parole Violation Return-to-prison (RTP) Rate

[33] The authors collect data on every adult parolee between January 1, 2013 and December 31, 2014. The sample size consisted 254,468 unique individuals without double count.

The fraction of parolees wMI who violated conditions and are returned to prisons is set at 0.23 every year. This assumption is based on the premise that only those with intensive supervision are most likely to be returned to prison after they violate condition. Those with lower-level supervision manage to finish serving parole without being reported because they are rarely in contact with their parolee officers. Sometimes parole violators only receive warnings for minor parole violations.

If the parolees wMI return to prison for parole violation, they serve a significantly shorter duration in prison, i.e. an average of four to five months (Grattet et al., 2008) , as opposed to about two years for felony conviction (CDCR, 1998 - 2012). Once these reprisoned parole violators serve their sentence, they return to the community to finish their remaining parole period (Figure 38). Before the Realignment, these parole violators return to prison; after the realignment, a fraction of the violators is sent to jail (see Section 3.3.1.1).

The high parole revocation and RTP rate may superfically shift the blame on the parole officers' for overly active in reporting parolees' violation to the parole board. Nevertheless, despite the increasing caseloads, the caseload mix of each parole officers changes little. The parole officers' caseload is measured by "points" (Grattet et al., 2008). The points of each case determine the intensity of supervision. The higher the points associated with the case, the more intense the surveillance a parolee receives. As stated in the agreement with the California Correctional Peace Offiers Association (CCPOA), each parolee officer's caseload may not exceed 160 points[34]. Parolees are subject to one of the levels of supervision associated with the frequency and level of oversight by the parole officers when they are released from prison. As such, the parole officers have no input to the decision on the level of supervision the parolees receive. The decision is literary based on the seriousness of crimes the parolees are convicted for (sex offenders, gang members, and other serious crimes), previous convicted felonies (second striker), and behavioral patterns (severe mental illness).

There were about 12,000 or 10% of offenders released with history of psychiatric problem documented in their records that appeared on state parole caseloads (LAO, 2000b). This implies that about 106,000 parolees did not have MI.The fraction of parolee wMI seems to have increased in eight years as Grattet et al. (2008) claim that 21% of parolees "had an officially documented mental health condition" (pp.12). As the MI prevalence in 1987 is assummed to be lower than that in 2000, we adjust the initial values for the Prison Parolees wMI and Prision Parolees wo MI stocks downward to 4,194 and 29, 101 persons.

[34] Refer to Appendix I for California Parole Population Caseloads and Supervision Requirements.

Prison parolees serve are under the community supervision for a designated period before they are discharged. On average, parole period is reported to be three years[35] (Grattet et al., 2008). By calculating the residence time[36] of parolees with equation 3-3, the parole length has actually been reducing by more than half (Figure 40).

$$\text{Residence Time} = \text{Stock} / \text{Outflow} \qquad (3\text{-}3)$$

The data series used to calculate the residence time is the Parolees wMI stock and its outflow, i.e. the number of parolees being discharged from parole from 1987 to 2013. The residence time of parolees shows a downward trend. Parole length is set by the state law and determined by the type of offence committed by the parolees. Once the parolees fulfilled the supervision, they are discharged officially.

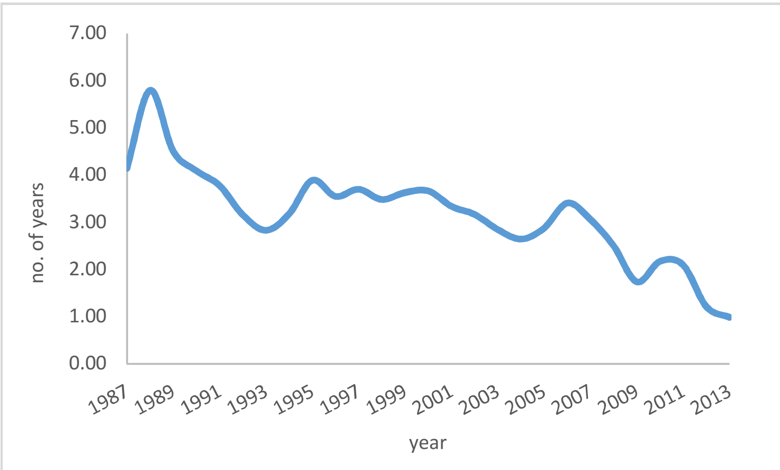


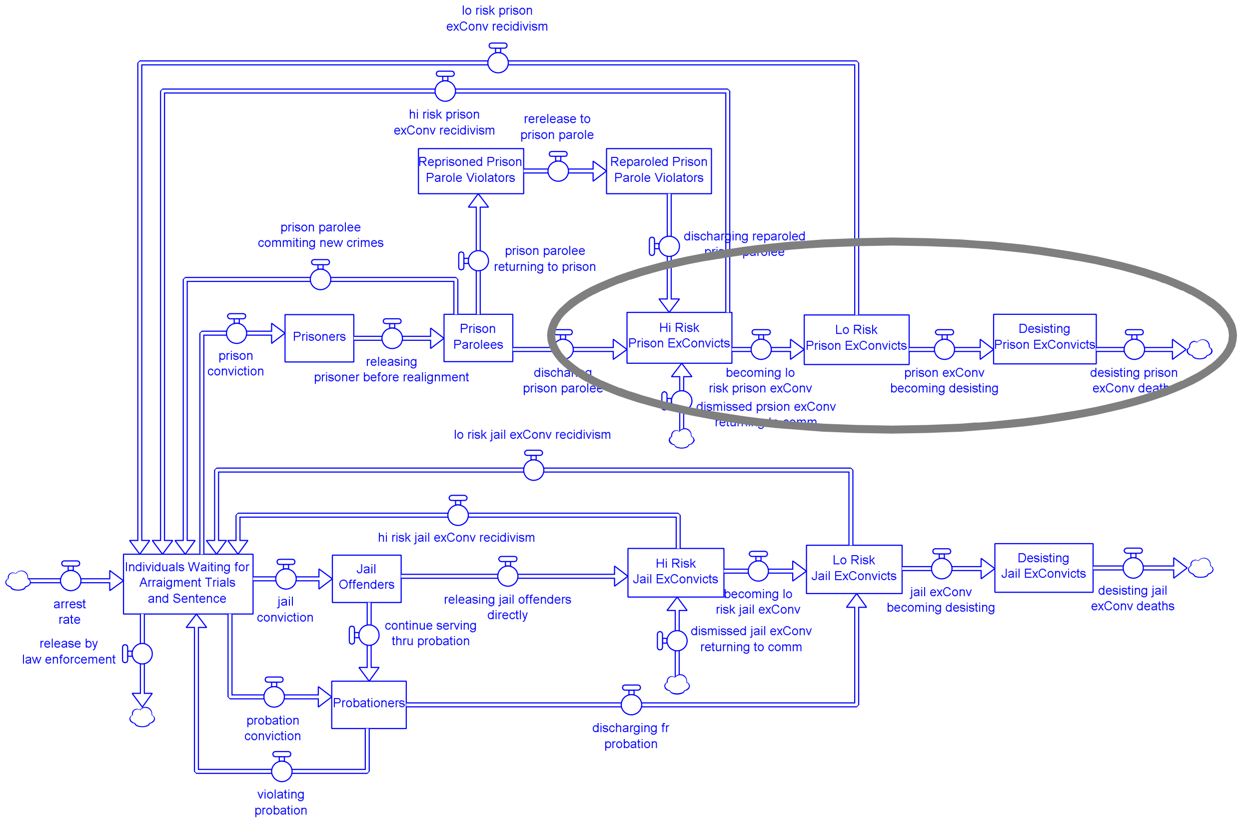
Figure 40 Calculated Data: Parolee Residence Time m

Sources: Institution and Parole Pop 1986 - 2006; Prisoners and Parolees 1992 – 2010

[35] There are three-, five-, ten-, twenty-, and life-long based parole period. For further information, refer to Prison Law Office (2013).

[36] Residence time is the time a unit of material or information remain in the stock before it exits.

3.2.2.3 Ex-convict Stocks and Flows



The following stock and flow structure presents the progression of discharged parolees (Figure 41).

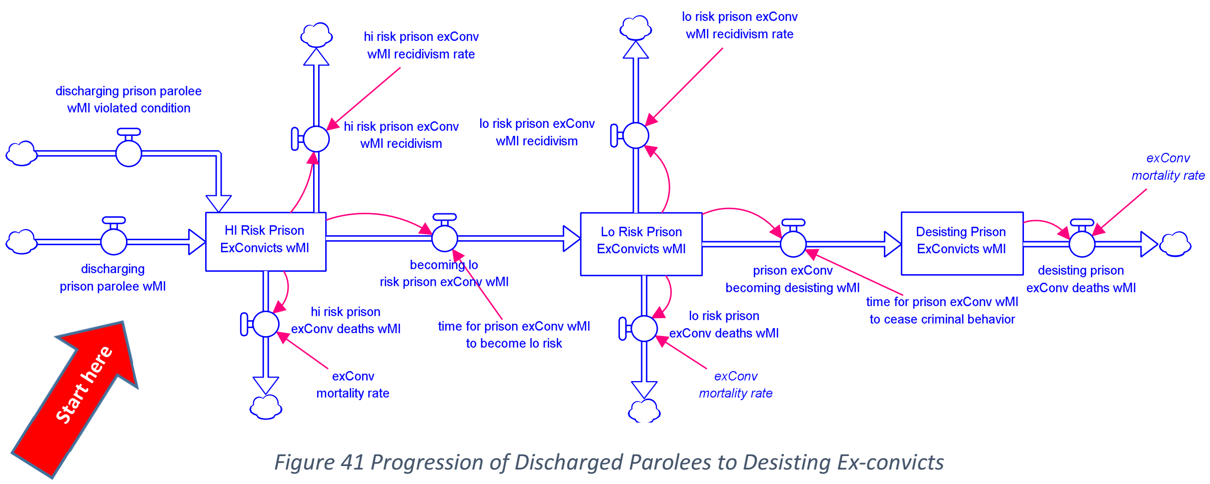


Figure 41 Progression of Discharged Parolees to Desisting Ex-convicts

Figure 41 illustrates the progression structure of ex-convicts wMI. The structure of ex-convicts wo MI is identical. If parolees are discharged, they become high-risk ex-convicts. The same is true for parole violators. After a period, the high-risk ex-convicts become low-risk ex-convicts if they do not recidivate. Subsequently, the low-risk ex-convicts become desisting ex-convicts if they do not recidivate. These three stocks have deaths as outflows. Figure 42 shows that the crude mortality rate[37] for Californa population has been decreasing from 700 to 620 per 100,000 between 1990 and 2015. Thus, we set the mortality rate of ex-convicts as a constant at 600/100,000, which equals to 0.006 per year.

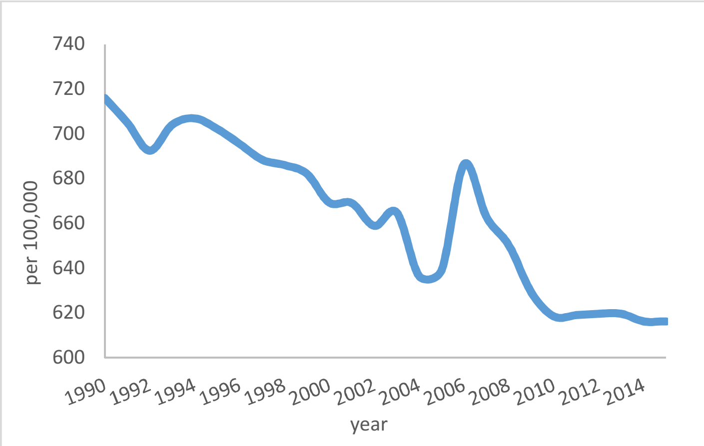


Figure 42 Historical Data: California Crude Mortality Rate per 100,000 (1990 - 2015)

Source: California Department of Public Health
(https://archive.cdph.ca.gov/data/statistics/Pages/DeathStatisticalDataTables.aspx)

A national study conducted by the Bureau of Justice reveals that the return-to-prison rates of ex-convicts in fourth and fifth year post release were less than 3% (Durose et al., 2014). Return-to-prison (RTP) rate is one of the variables used to measure recidivism rate. Generally, recidivism rate refers to *the number of prisoners released in a particular time who are rearrested, reconvicted and resentenced*. RTP rate is considered as a more reliable measure because only the RTP rate reports the magnitude of resentencing. To account for some recividists released without charges, we assign higher values for the fractions of high-risk and low-risk ex-convicts who recidivate. We assign 0.08 and 0.02 to the fractions of high risk ex-convicts wMI and low risk ex-convicts wMI recidivate respectively. The fraction of ex-convicts recidivate can be adjusted during the model validation stage to better fit the historical data when necessary.

The correctional system has four goals, namely retribution, incapacitation, deterrence[38], and rehabilitation (Kifer et al., 2003). Sentencing serves the first two purpose, but not the last two. The process of permanent abstention from criminal activity is called "desistance". The outcome of desistance is "termination". In our case, crime termination is conceptualized as the accumulation of

[37] Crude mortality rate refers to the number of deaths among the population of a given geographical location for a given year, per 1,000 of the same population.
[38] Generally, deterrence refers to instilling fear to prevent repeated or new criminal behaviors. In this specific context, deterrence refers to the preventing the criminals from reoffending.

ex-convicts who permanently cease criminal activity. As such, they are termed the “Desisting Prison ExConvicts wMI”[39].

Scholars from various disciplines attempt to understand the underlying factors that lead to termination of criminal activity permanently in order to design effective re-entry programs to help ex-convicts to reintegrate to the community (Denney et al., 2014; Jeffrey, 1959; Laub et al., 2001). It has been generally acknowledged that desistance stems from a complicated interactional process related to developmental, psychological, and sociological factors, yet scholars have difficulties in concretizing the concept. Primarily, the challenges lie in the definition of desistance.

Laub et al. (2001) suggest the use life-course framework to understand desistance. In Laub and colleagues’ analysis, desistance appears to be a gradual process influenced by individuals’ choice, situational context, and structural impact from institutions. Essentially, they postulate that the “turning point” of ex-convicts’ criminal activity cessation is the result of a dynamic interaction between vertical level factors, such as individual, situational, and community, and across horizontal environmental factors, such as one’s family, work, and social group association. The major premise from the life-course framework used to explain desistance is the variability of individuals’ development being embedded in “time-varying social context” (Laub et al., 2001). More specifically, the ex-convicts’ decisions in engagement such as marriage, employment, or social groups contribute to “structured role stability” through which provide these individuals well-defined and meaningful daily lives, and newly established social identities. These new changes aid individuals achieve a degree of maturity through family, work, and social responsibilities. As such, ex-convicts reorient themselves from short-term impulse to commit crimes to long-term commitments to social conformity.

Due to the challenges in defining desistance and complexity of the process of crime commitment termination, we are unaware of any studies to date that explicitly spell out the average time for permanent criminal activity termination to take place. From long-term observations of recidivism rate of ex-convicts, Kurlychek et al. (2012) acknowledge that high-risk ex-convicts recidivate in the earlier stage at a faster rate upon release than the medium- and low-risk ex-convicts. In other words, some ex-convicts are already desisting upon their release while there are some who reoffend long after their release. This implies a long tail for the desistance time. Kurlychek and colleagues analyze a data set of about 1,000 offenders sentenced between 1976 and 1977 and each of the record of the offenders was followed for eighteen years. Their analysis shows that the ex-convicts in their data set had the highest

[39] Desisting ex-convicts from prison without MI, desisting ex-convicts from community supervision with and without MI have the identical progression structure. Hence, the presentation and explanation of these structures are omitted in this section for the sake of simplicity.

risk[40] to reoffend at the twelfth months upon release. Using the survival analysis to study the ex-convicts' recidivism trend, their finding demonstrates that the accumulative re-arrest rate increases linearly in the first twelve months after the ex-convicts are released (Figure 43). Then the cumulative re-arrest rate increases at a decreasing rate until it almost levels off at about 0.75 from two hundred months (16.7 years) after release. The graph shows that the marginal increment of the re-arrest rate seems to approach zero after 150 months (12.5 years).

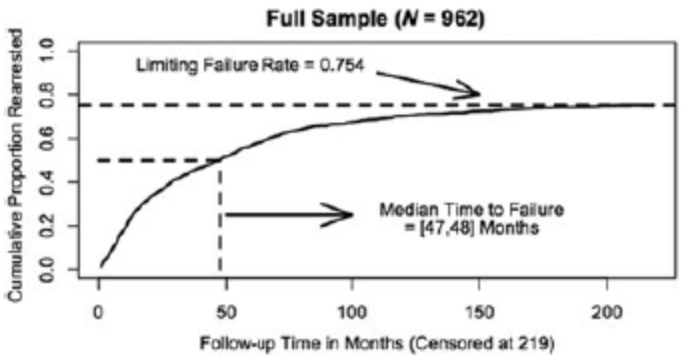


Figure 43 Empirical Data: Accumulative Re-arrest Rate of Ex-Convicts in Kurlychek et al. (2012)

Source: Kurlychek et al. (2012)(p. 84)

Combining the theoretical perspective and empirical findings, we model desistance as a gradual transformation process. The ex-convicts transit from the parolee stock to high-risk ex-convict stock if they do not reoffend. From then on, the high-risk ex-convicts become lo-risk ex-convicts if they do not reoffend after a certain period. "time for prison exConv wMI to become lo risk" is set as 2.5 years. Given the long tail in reoffending time, we define the residence time for the low-risk ex-convicts to remain in the stock as seven years before they become desisting ex-convicts. This value can be modified in the validation stage to better-fit historical data when necessary.

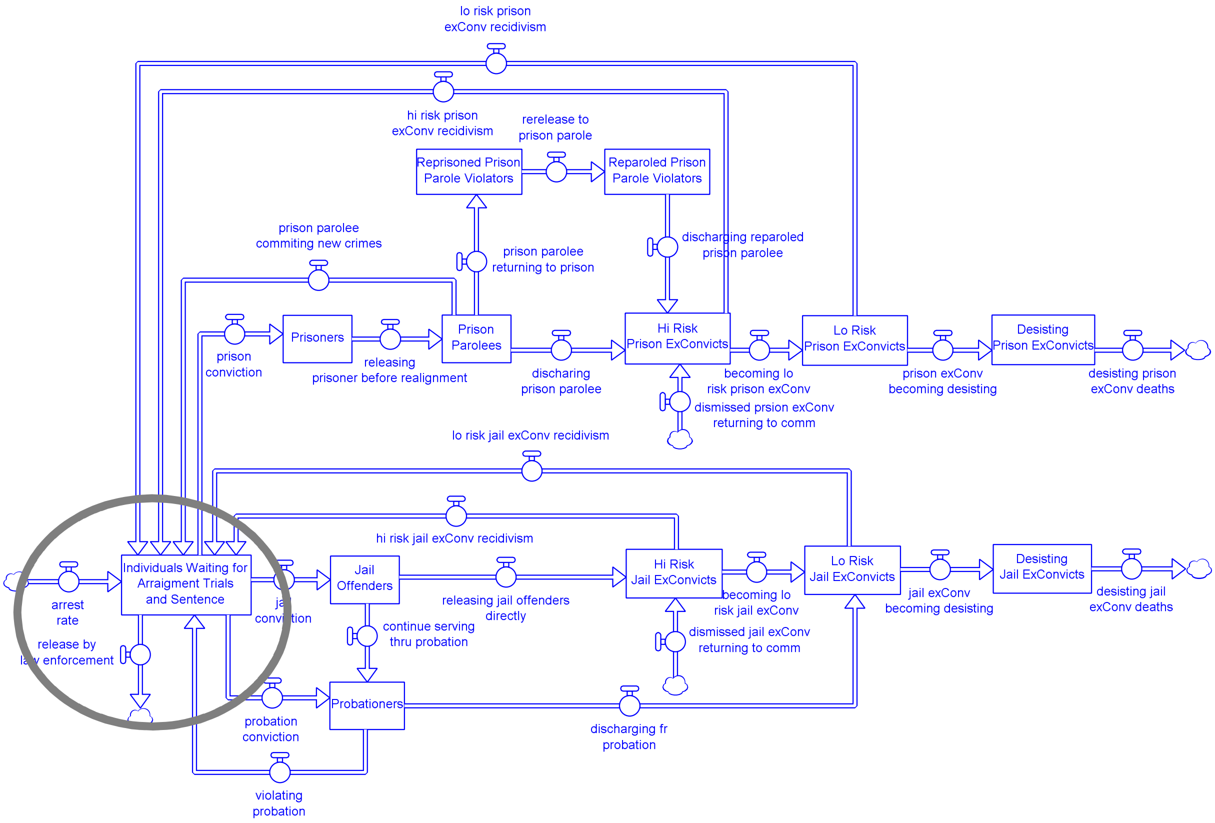
[40] The authors actually refer the risk as "hazard rate". This is actually a ratio of the number of ex-convicts re-arrested and the number of the remaining number of ex-convicts who had not been re-arrested.

Data for ex-convict population is not publicly available to estimate the intial values for the ex-convict stocks. Hence, we estimate the initial values that based on the estimated ex-convict population by Schmitt et al. (2011). The detailed calculation is presented in Appendix F. Table 5 outlines the initial values estimated for each ex-convict stocks.

Stock	Initial Value (person)
Hi Risk Prison ExConvicts wMI	3,074
Lo Risk Prison ExConvicts wMI	8,607
Desisting Prison ExConvicts wMI	205,334
Hi Risk Prison ExConvicts wo MI	22,195
Lo Risk Prison ExConvicts woMI	77,681
Desisting Prison ExConvicts wo MI	1,853,257
Hi Risk Jail ExConvicts wMI	3,203
Lo Risk Jail ExConvicts wMI	5,605
Desisting Jail ExConvicts wMI	267,429
Hi Risk Jail ExConvicts wo MI	21,681
Lo Risk Jail ExConvicts woMI	50,590
Desisting Jail ExConvicts wo MI	2,413,855

Table 5 Initial Values for All Ex-Convict Stocks

3.2.2.4 First Contact Point with the Criminal Justice System - Arrest



Jail is the first contact point to enter the criminal justice system. . In California, jails are operated by counties and it is a place where arrested suspects' records and offences first registered. This process is termed as "booking". Thus, jails do not only function as a confinement for convicted offenders with short sentences, it also serves as a holding place for some suspects.

After the law enforcement[41] agency acknowledges a crime commitment, the suspect must be identified and arrested[42]. There are three types of arrest that lead to the Arrestee stock (Figure 44). "first time arrest rate" represents the *inflow of arrestees without criminal background*. These arrestees are from the innocent population. The second and third inflows of arrestees are recidivist from the jail and prison ex-convicts population. These two inflows in Figure 44 are aggregated from several flows. In the full model, the "total recidivism of jail exConv" and "total recidivism of prison exConv" consist

[41] Refers to the individuals and agencies responsible for enforcing laws and maintaining public order and public safety. Law enforcement includes the prevention, detection, and investigation of crime, and the apprehension and detention of individuals suspected of law violation.
[42] Refer to Appendix E for the case flow within the criminal justice system

of recidivists made up by high-risk and low-risk ex-convicts, and ex-convicts wMI and wo MI. All the arrested individuals are considered as arrestees when they are arrested.

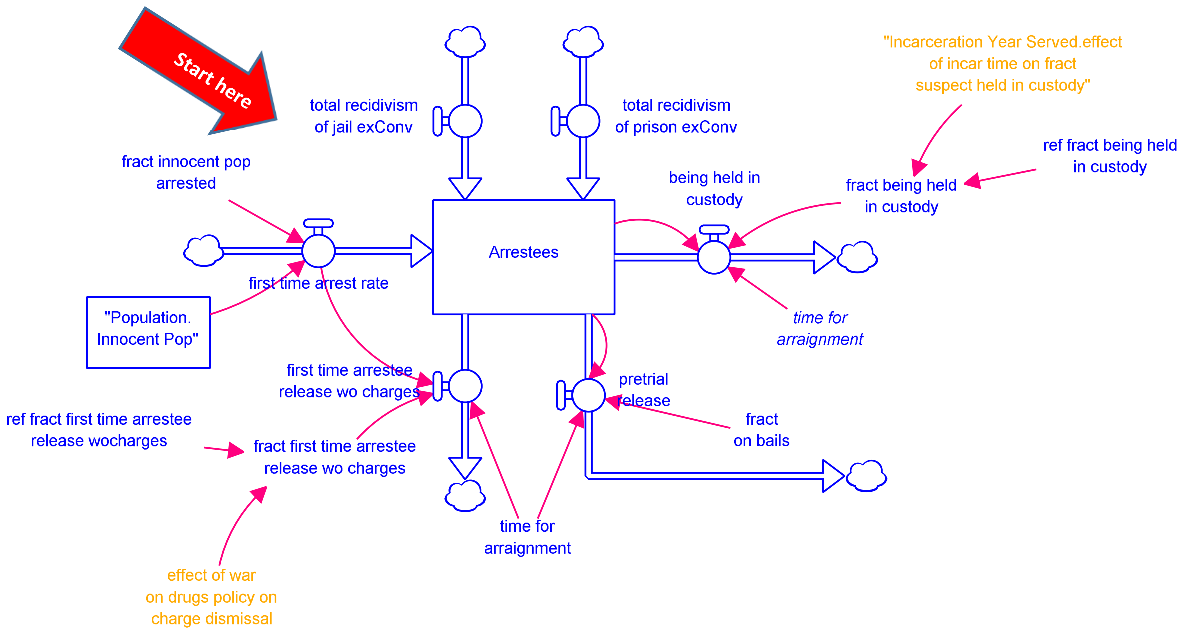


Figure 44 Stock and Flow Structure of Arrestees (Simplified)

Following the arrest, the police presents information about the case to the prosecutor. The prosecutor decides whether formal charges will be filed. Because of this process, in our model we differentiate the suspects into "arrestees" and "suspects" stocks. The arrestee from the Arrestee stock flows out of the system if the prosecutor decides not to file charges (California Courts, 2017). If the prosecutor decides to file charges and the arrestee, who will be called as a "suspect" at this stage, is brought before a trial court, the court informs the suspect about accusations against him or her, provides advice on rights of criminal defendants, and asks the arrestee to enter a plea to the charges. This process is called "arraignment". As stipulated by the law, arraignment must take place within 48 hours after arrest[43] (California Courts, 2017). Given the short time frame between arrest and arraignment, our model separates the release of first-time arrestees without charges and the release of recidivists without charges into two processes. The "first time arrestee release wo charges" characterizes the release of individuals without criminal history. Hence, these individuals flow back to the Innocent Population stock in the **Population** module from the Arrestee stock. The release of recidivists without conviction will take place after the arraignment.

[43] Only working days are considered by the law. Holidays and weekends are excluded from this 48 hours limitation.

The formulation of the outflow “first time arrestee release wo charges” is the following.

DELAY1 ((first_time_arrest_rate) * fract_first_time_arrestee_release_wo_charges, time_for_arraignment, (first_time_arrest_rate) * fract_first_time_arrestee_release_wo_charges)

(3-4)

Equation 3-4 reads that a fraction of the first time arrestee are released after a delay, which is defined by the time for arraignment. The first time arrested who are not released before charges are assumed to be convicted eventually.

The “fract first time arrestee released wo charges” is conditioned by the effect of “war on drugs” policy. The “effect of war on drugs policy on charge dismissal” will be explained later in this section.

The process of releasing individuals with criminal history takes place after charges, either before or after trials (refer to Section 3.2.2.5). The judiciary process is modeled with a set of stocks and flows. When individuals are arraigned, they flow through these stocks and flows within the judiciary process. As the residence time for each stock in the judiciary process is fairly short, the isolation of this process from the release without charges from the Arrestee stock will not affect model behavior significantly. The purpose of separating the release of first-time arrestees and the release of recidivists without chargers is to prevent the arrested recidivists from flowing into the innocent population if they are released without charges.

At the arraignment, the court may decide if the suspect will be release on bail before trial or remain in custody. The decision for pretrial release is based on the nature and circumstances of the offense, suspects’ character, financial stability, social ties, past conduct, criminal history, and public safety (American Bar Association, 2017). Prior arrest or conviction reduces the likelihood of getting pretrial release (Cohen et al., 2007). Therefore, recidivists are more likely to be remained in custody before trials. Figure 45 depicts the downward sloping trends of the fraction of individuals released from jail due to pretrial release and early release.

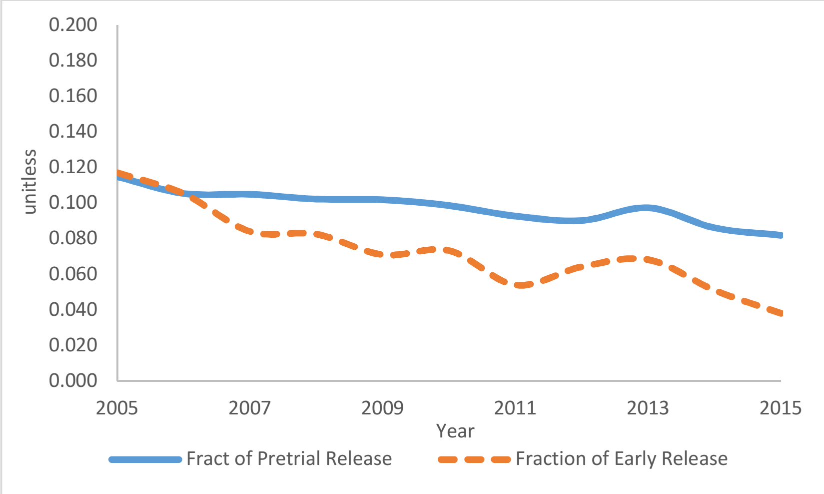


Figure 45 Calculated Data: Fraction of Arrestees being Released by Law Enforcement and Early Release as the Total Fraction of Jail Release

Source: Jail Profiles 1987 – 2015 (California Board of Corrections); Office of the Attorney General (http://ag.ca.gov/)

We infer that the fraction of innocent population being arrested is decreasing over time. With a population growing at a decreasing rate (Figure 23), a downward sloping fraction of population being arrested (Figure 48), and a growing trend of recidivists before the Realignmwent (Figure 46). Consequently, the "fract innocent pop arrested" is a calibrated with table function that ranges between 0.07 and 0.03. The fraction decreases gradually from 1987 to 2015 (Figure 47).

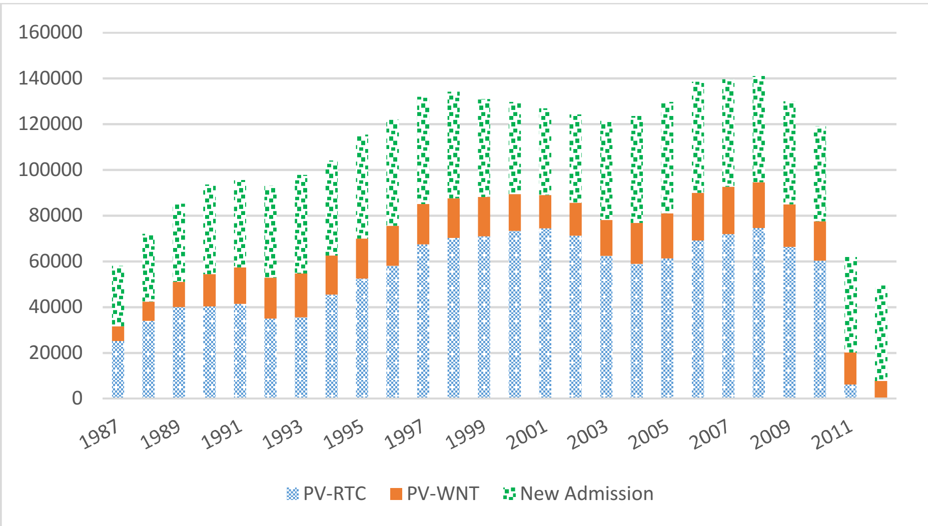


Figure 46 Historical Data: Annual Prison Admission (1987 - 2012)

Source: Prisoners and Parolees 1987-2010; Prison Movement 2011-2012

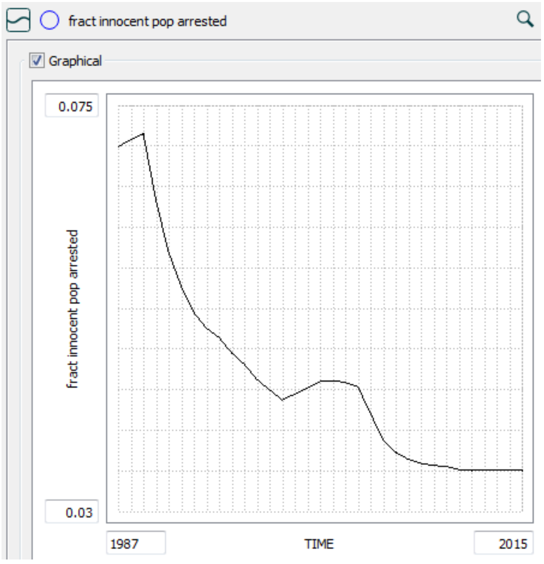


Figure 47 Table Function with Calibrated Fraction of Innocent Population Being Arrested

All the inflows add up to the historical arrest rate in Figure 48. From 1987 to 2015, arrest rate has been declining steadily from about 1.6 million to 1.0 million person per year. This trend does not distinguish the arrest of the first time arrestee from the arrested recidivists (Figure 41).

Despite the decrease in arrest rate, the fractions of arrestees being released before arraignment has also been declining from 0.83 to 0.72 (Figure 45). This infers that more arrestees are arraigned even though fewer people are arrested.

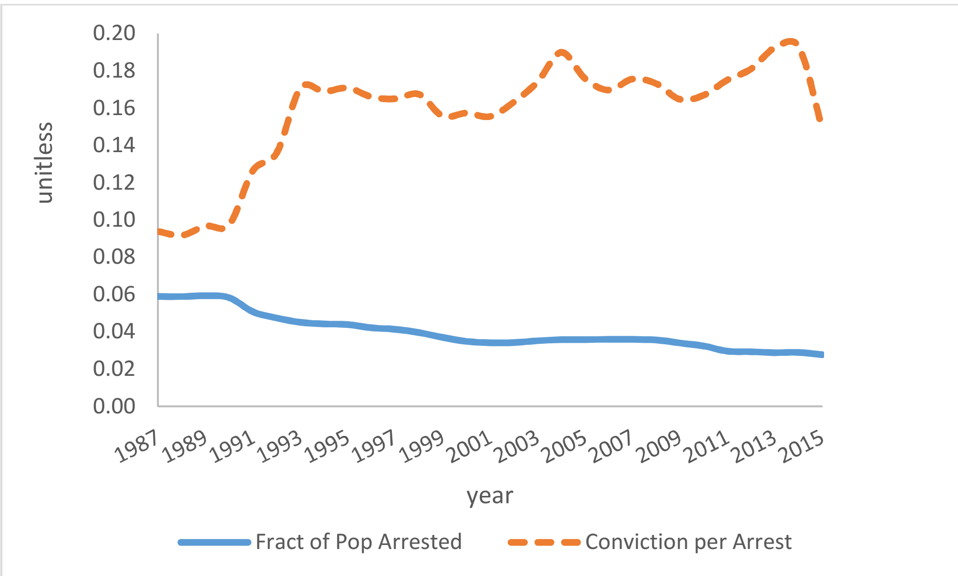


Figure 48 Calculated Data: Arrest Rate and Fraction of Arrestee Released Before Arraignment

Source: Office of the Attorney General (http://ag.ca.gov/)

The release of arrested individuals without charges outflows are modeled as split flows because all the arrestees must be arraigned or released within 48 hours after arrest. This means that all arrestees must leave the stock at about the same time and transfer to the appropriate adjacent stocks in a relatively short time if the arresteeds are arraigned.

Figure 49 presents the exogenous effect of drug policy on “first time arrestee released wo charges” outflow in a table function.

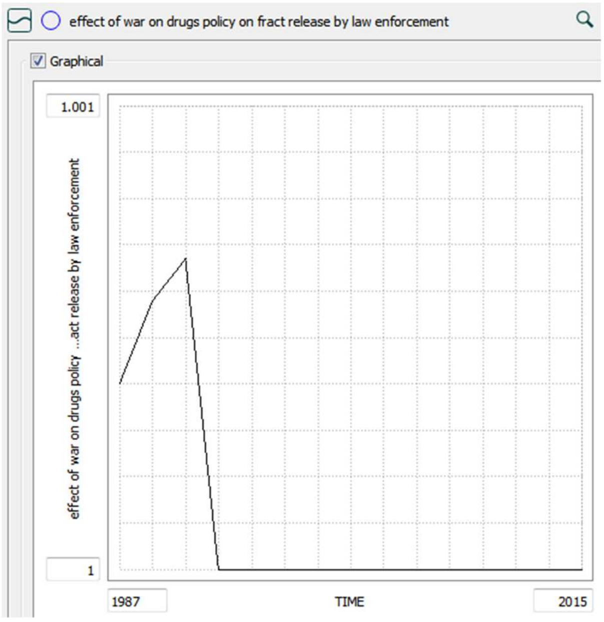


Figure 49 Exogenous Effect of “War on Drugs” on the Fraction of Arrestees Released without Charges

The “war on drugs” policy emerged from the mid-1980s. The effect gained momentum between 1987 and 1995, after which the impact of this policy faded and returned to one. This means that the fraction of first time arrestees released without charges increases slightly during the period under the influence of “war on drugs” policy. After that, the fraction of first time arrestee released without charges becomes a constant because the effect of the “war on drugs” policy has no effect on the fraction of first-time arrestees released without charges.

3.2.2.5 Process from Arraignment to Sentencing

Figure 50 presents the stock-and-flow structure of the progression from being a suspect to a sentenced convict. A suspect who is ordered to be held in custody enters the Suspects in Custody stock. If the prosecutor decides to press charges, this suspect moves into the Suspect in Custody with Cases Filed stock. When this suspect is trialed, he or she becomes a defendant and flows into the Defendants in Custody Being Trialed. It is also possible that this suspect is released when his or her charges are dropped after the case is filed (before trial) or after the trial. If the suspect pleads guilty in the first trial appearance after charges filed, he or she moves directly to the Pre-Sentencing Convicts in Custody stock. The convict waits in the stock until the sentence is decided by the court. Then, the convict flows out of the stock and moves to the relevant stocks correspond to the sentence he or she is convicted for. Suspects in community share the same progression structure as that of the suspects in custody, except that the Defendants in Comm Being Trialed stock has an additional inflow from the Probationers stock. This inflow characterizes the probation violators who are sent back to court for hearing.

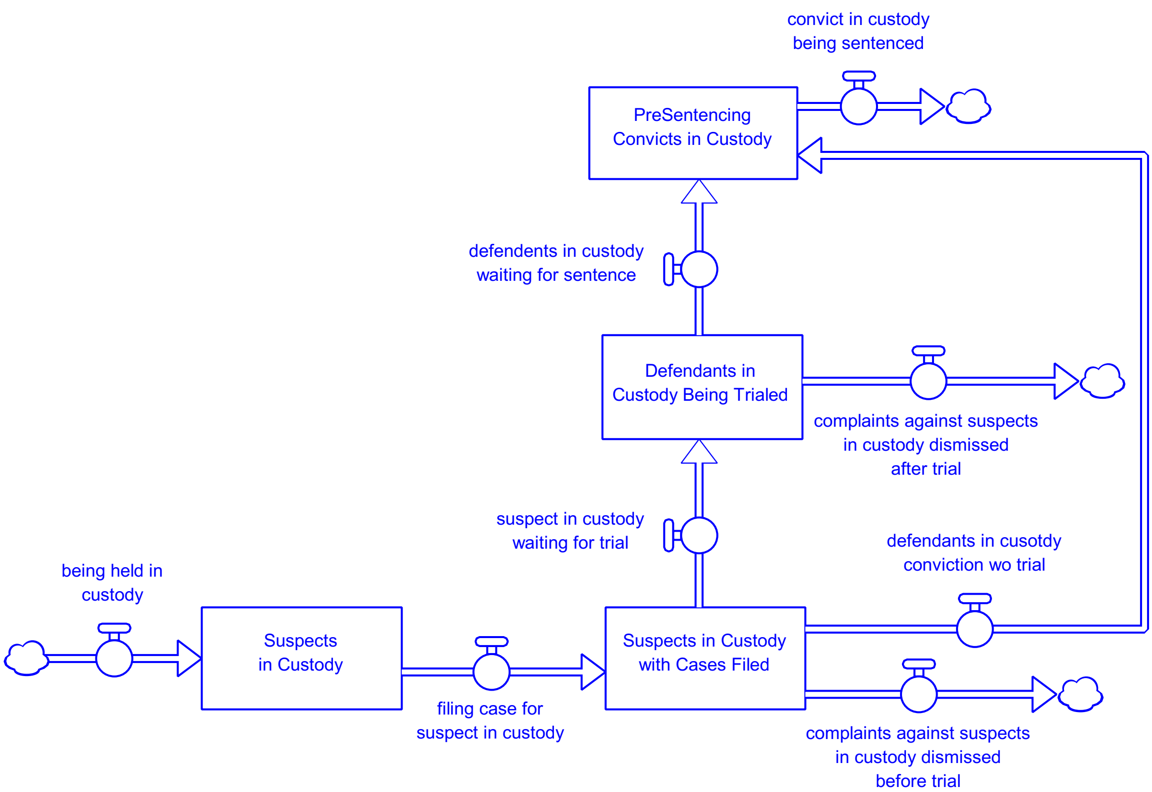


Figure 50 Bare Stocks and Flows Structure of the Progression from Suspects to Sentenced Convicts

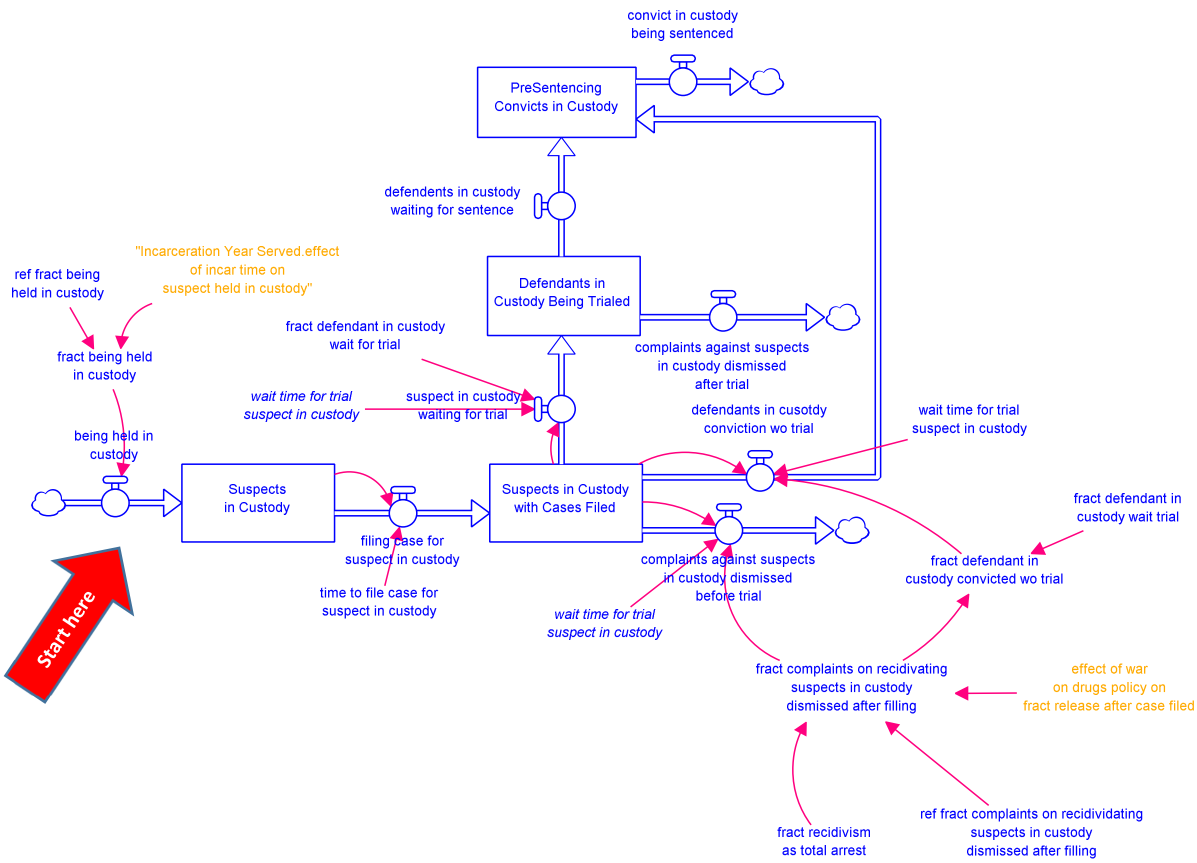


Figure 51 Progression from Arraignment to Case Filed

Figure 51 shows the parameters associated with the progression from being a suspect to a suspect in custody with case filed. "Ref fract being held in custody" is set as a constant at 0.018. This value can be calibrated later to better fit the historical data. The fraction of suspects being held in custody is also influenced by the previous incarceration time served by the suspects. Higher previous incarceration time per suspect relative to the initial condition implies a larger fraction of recidivists. Recidivists are unlikely to be granted pre-trial release. This effect is further explained in Section 3.2.9.7.

After arraignment,the suspect waits for his or her case to be filed. The waiting time is about a week. The suspect who pleads guilty will be convicted directly without trial. Thus, this convict flows into one of the pre-sentencing stocks. If the defendant pleads not guilty, he or she will wait for a trial. From the initiation of the trial, the suspect is considered as a defendant. Another outflow from the Suspects in Custody with Cases Filed stock is charge dismissal, which is named as "complaints against recidivating suspects in custody before trial". If the case is dropped after a trials begins, it is called "complaints against recidivating suspects in custody after trial".

The “complaints against recidivating suspects in custody before trial” outflow is driven by the reference fraction of recidivating suspect in custody dismissed after filing, “effect of war on drugs policy on fract release by law enforcement”, and “fract recidivism as total arrest” (Figure 51). The reference fraction of recidivating suspect in custody dismissed afte filing is set as 0.48 (California Department of Justice, 1987-2014). The table function for “effect of war on drugs policy on fract release by law enforcement” is same as Figure 49 in Section 3.2.2.4. “Fract recidivism as total arrest” is a ratio of the total recidivating ex-convicts and total arrest. This parameter determines that the suspects who are released without conviction from this flow and enter the “High Risk ExConvicts” stocks are individuals with criminal history. The outflow “complaints against recidivating defendant in custody dismissed after trial” from the Defendants in Custody Being Trialed stock has a similar formulation as the “complaints against recidivating suspects in custody before trial” outflow. About 30 - 40% of the defendants are released without conviction after the trial (California Department of Justice 1975-2005, 1996-2015).

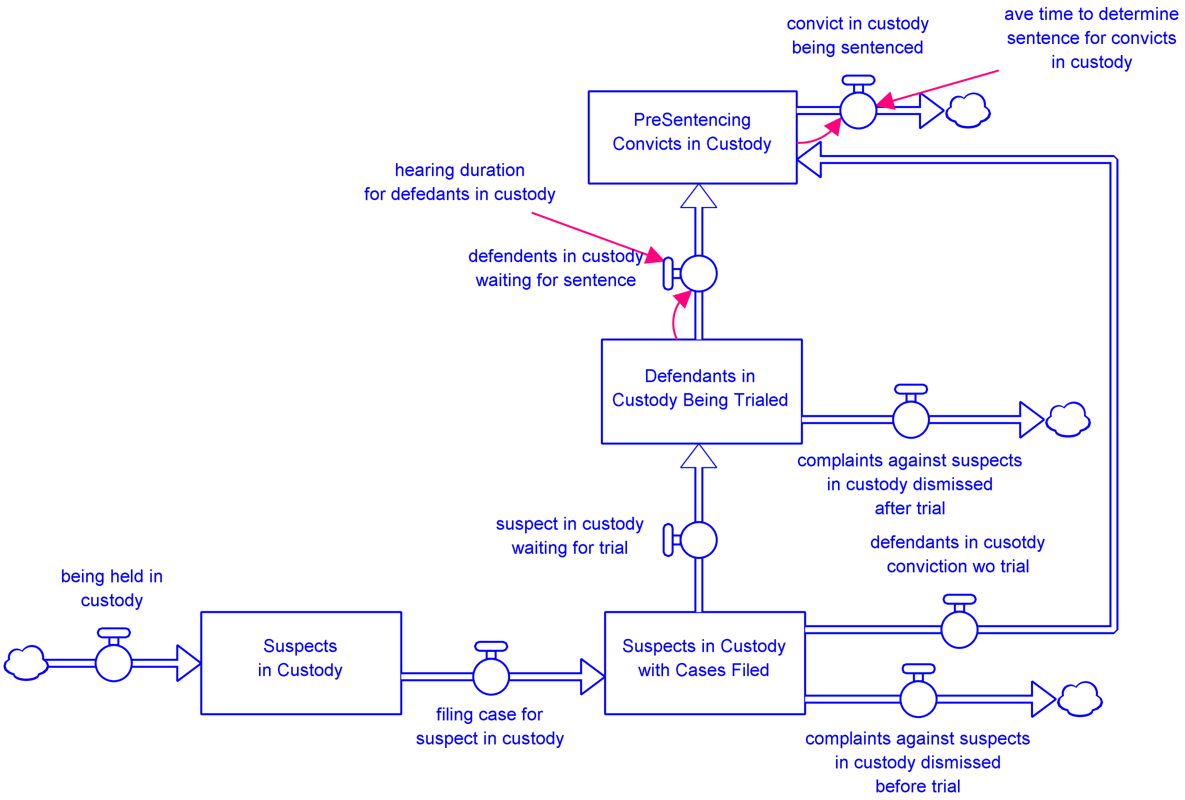


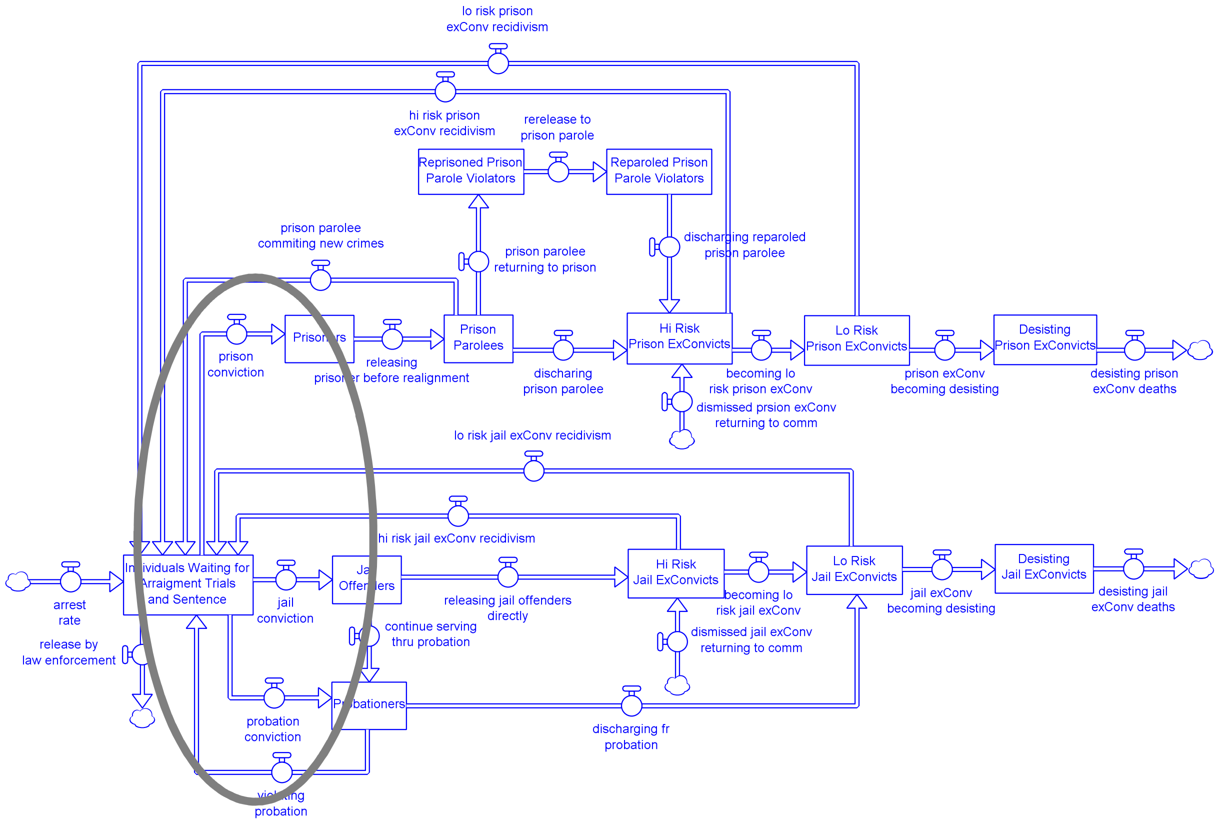
Figure 52 Progression from Case Filed, Trial, to Sentencing

The average trial duration takes less than two weeks (California Courts, 2017). So, the defendants in the Defendants in Custody Being Trialed stock stay for about two weeks. Once convicted, the defendant moves to the “PreSentencing Defendants in Custody” stock to wait for sentencing decision.

The sentencing decision may take about one to twelve months after conviction. Then, the convict leave the adjudication and sentencing stage and moves into the correctional system, which is the last stage of the criminal justice system[44].

[44] Refer to Appendix E.

3.2.2.6 Sentence Distribution



This section presents the structure of sentence distribution. Sentences can be carried out in the state in the state institution[45], jail, probation, and in the form of split-sentence[46]. Figure 53 displays the conviction by sentence types between 1993 and 2015. The most frequent type of conviction is the split-sentence. However, the fraction of split-sentence imposed has been decreasing slightly over the years. The second most popular type of sentencing is the prison sentence. The fraction of prison sentence conviction hovers around 0.2 and only shows a slight decrease after 2011. Usually prison sentence is longer than a year; imprisonment of less than a year is most likely a jail sentence.

[45] Before 2004, state institution sentence include sentences to death, prison, California Rehabilitation Center, and Youth Authority. Only after 2004, convictions to state institutions is categorized by prison, California Rehabilitating Center, and Youth Authority.

[46] Split sentence is a kind of sentence which is split into two parts. The first part is served by incarceration, usually jail time, and the second part is served by community supervision, such as probation.

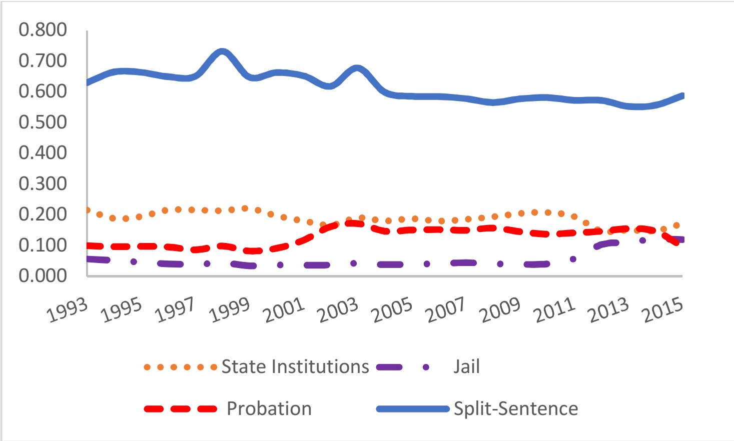


Figure 53 Historical Data: Conviction by Sentence Types (1993 - 2015)

Source: Office of the Attorney General (http://ag.ca.gov/)

Data show that the average time served by prisoner is about two years (CDCR, 1998 - 2012) while the average length of stay[47] in jail per offender is about 20 days (Board of Corrections, 1987-1994, 2004-2015).

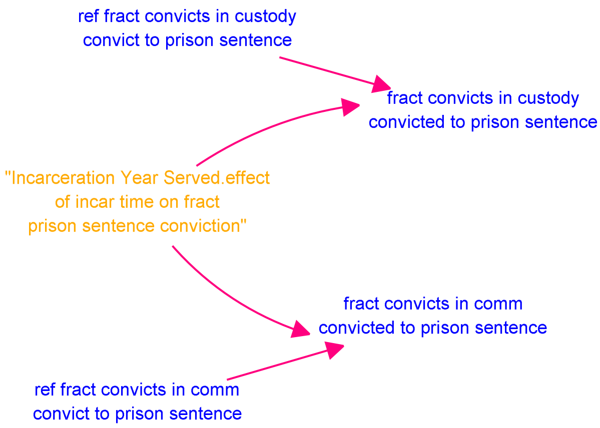


Figure 54 Convictions to Prison Sentence

Figure 54 shows the formulation of conviction to prison sentence. Convicts in custody and convicts in community being sentenced to prison enter the prisoners stock through two different inflows. Inferring from the conditions for pretrial release, it is assumed that a higher fraction of defendants in custody being convicted to prison sentence committed felonies[48], which are more serious crimes than

[47] Length of stay includes those who are only arrested and released as well as those who are serving jail sentences. The average jail sentence length in the U.S. is about six months.
[48] Felony is a serious crime that is punishable with death or by imprisonment in the state prison for more than a year.

misdemeanor[49]. Hence, the fraction of convicts in custody convicted to prison is slightly higher than the fraction of defendants in community. The fraction of convicts receiving prison sentence is also conditioned by the effect of the incarceration time served by the convicts. Higher incarceration time served implies more serious or longer criminal history, which leads to a larger probability for the convicts to receive prison sentence. This effect is explained in Section 3.2.9.4.

Figure 55 shows that the fraction of felony disposition hovers around 0.25 between 1996 and 2000. After that, the fraction increases slightly to around 0.30. After Realignment, the fraction of felony disposition approaches 0.40. Based on this data, we calibrate the value for "ref convicts in custody convict to prison sentence" as 0.38 while the "ref fract convicts in comm convict to prison sentence" as 0.29.

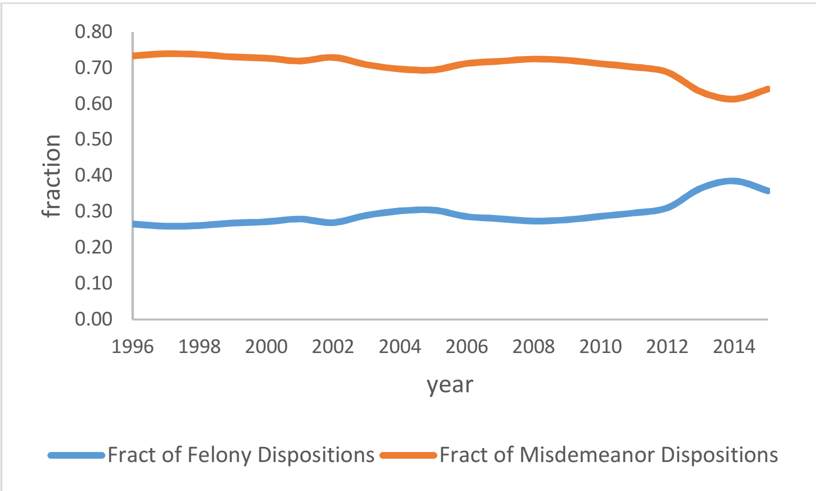


Figure 55 Calculated Data: Distribution of Felony and Misdemeanor Disposition

Source: Office of the Attorney General (http://ag.ca.gov/)

[49] Misdemeanor is a crime punishable by imprisonment in county jail up to a year.

Figure 56 presents the inflows to the Jail Offenders wMI and Probationers stocks.

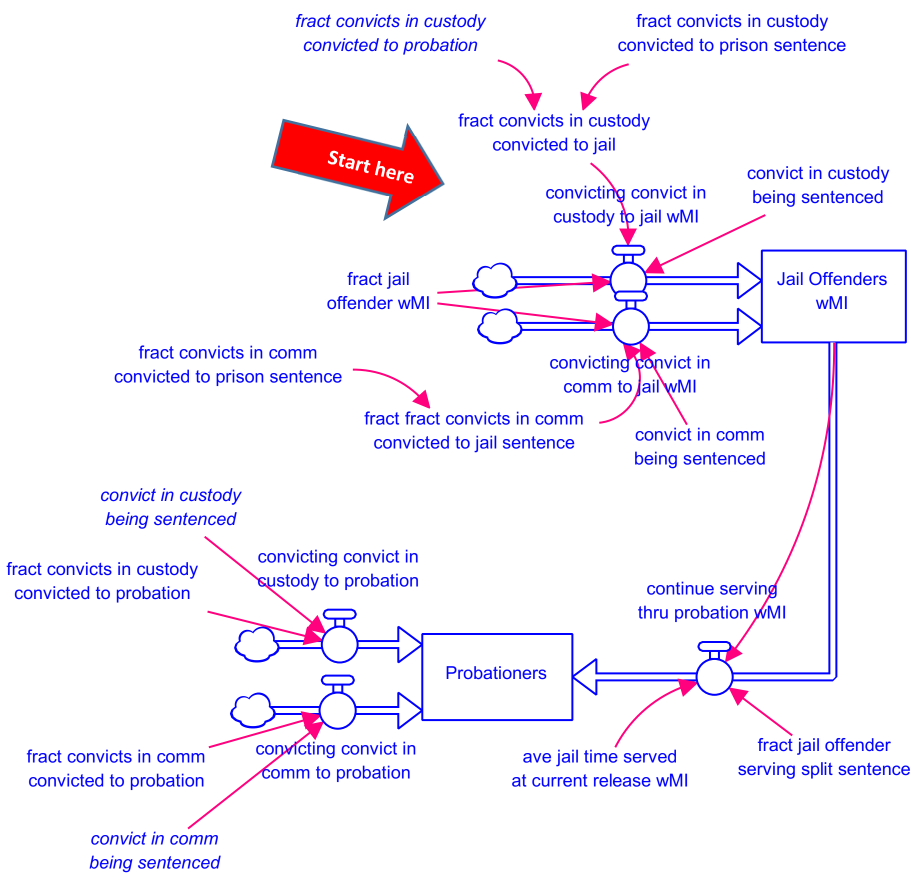


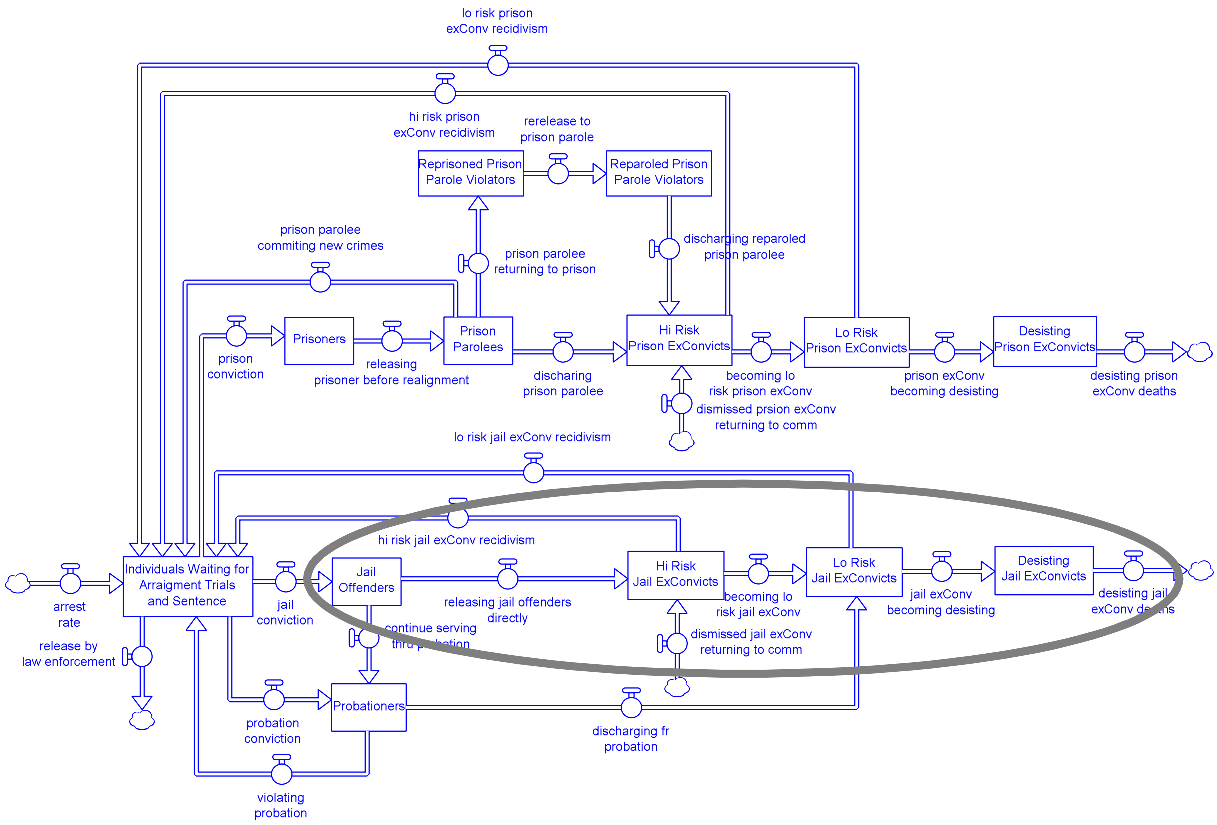
Figure 56 Conviction to Jail Sentence, Probation, and Split-sentence

The inflows to jail are also separated into the jail conviction of convicts in custody and jail conviction of convicts in community (Figure 56). The fraction of convicts convicted to jail is the residue of one minus the fraction of convicts receiving prison sentence and probation sentence. The sum of all these three parameters, i.e. the fractions of convicts convicted to prison sentence, to probation, and to jail sentence, must not exceed one.

Conviction to jail sentence is relatively stable and remains at the 0.05 level until 2011 (Figure 53). After the Realignment, jail conviction leaped to about 0.1. Under split-sentencing, convicts are required to serve their sentences in the jails first and then continue serving the remaining of the sentences in the form of probation. Thus, the inflows to jail consists of convicts carrying split-sentences. After serving an average jail time, a fraction of the offenders in jail are released to probation. The "fract jail offender serving split sentence" is set as 0.65 (California Department of Justice, 1987-2014) .This becomes one of the three inflows to the Probation stock. The other two inflows consist of convicts in custody and convicts in community being convicted to pure probation sentence. Probation conviction remained stable at around 0.1 before 1994 (Figure 53). After 1994, probation conviction hiked significantly to 0.15. Reason cited for the increase in probation conviction is to reduce jail spending (LAO, 1994). Hence, we assign 0.1 and 0.13 to “fract convicts in custody convicted to probation” and “fract convicts in comm convicted to probation” respectively.

Probationers are not distinguished by their mental health status because none of such data has been collected in the past. Probation supervision is the responsibility of county governments and probationers are not required to be screened for MI. Thus, we assume all convicts who serve split sentence are free from mental illness and are released to the High Risk Jail ExConvicts wo MI stock.

3.2.2.7 Jail Offender Progression



This structure presents the progression of jail offenders wMI (Figure 57). On average, jail offenders' average sentence length is about six months (U.S. Department of Justice, 1992-2006) .

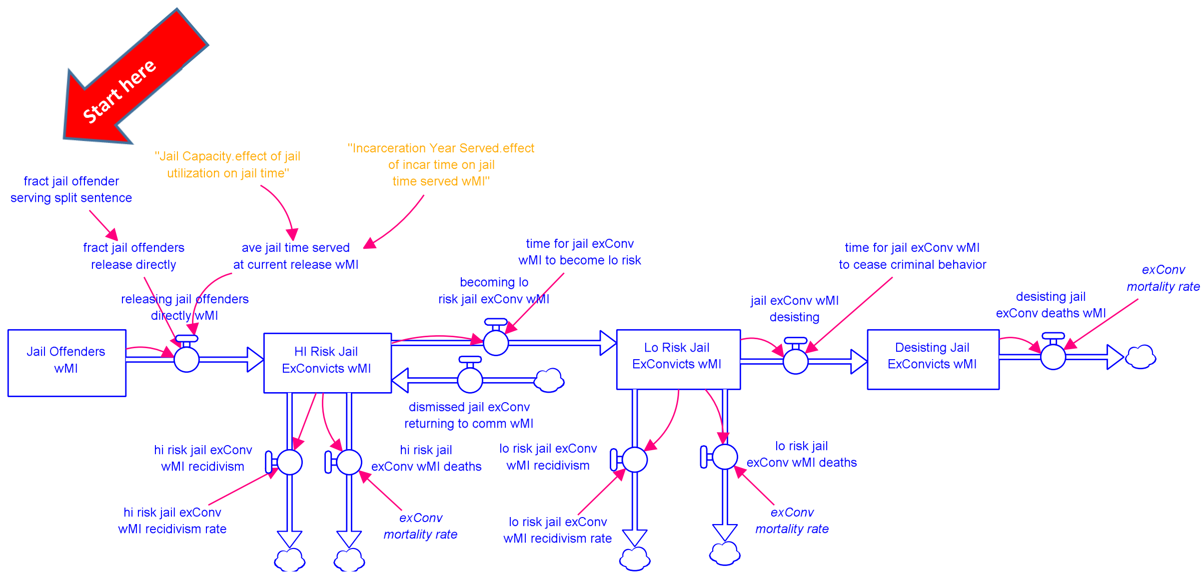


Figure 57 Jail Offender with Mental Illness Progression

The “fract jail offenders release directly” is the one minus “fraction jail offender serving split sentence” because jail offenders wMI who do not serve split sentence are released to the Hi Risk Jail ExConvicts wMI stock after they serve the average jail time. “Ave jail time served at current release wMI” is influenced by jail utilization and the previous incarceration year served by these jail offenders. Studies observe that county jails with population cap[50] have couple of options at their disposal to manage the jail population, such as pretrial release and early release (Lawrence, 2014; Lofstrom et al., 2013; Turner et al., 2015). Jail offenders may be granted an accelerated release for a maximum of thirty days prior to or 10% shorter than the offenders’ original jail sentence (Couzens et al., 2016). Figure 58 exhibits daily average population (ADP)[51] in jails. The ADP had been increasing moderately and gradually over time. Then, the ADP dropped after Realignment, but it started to climb back up from 2012 and return to the level silimilar to that in 2010.

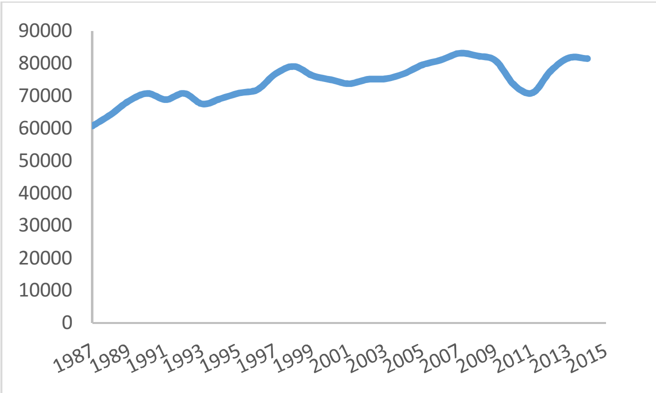


Figure 58 Calculated Data: Jail Average Daily Population

Source: BSCC (1987-2015)

Using pretrial release or early release as the mechanism to manage jail population, jail time of jail offenders may be reduced when jail utilization approaches or exceeds jail maxium capacity. This effect is illustrated in Section 3.2.8.2. The previous incarceration time served by jail offenders has a milder influence on jail time compared to the influence of previous incarceration history on prisoners’ sentence length. This is because that the Three-strikes Law does not apply to jail sentence. However, the effect of previous incarceration time served still influences the average jail time under the assumption that as jail ex-convicts commit crimes repeatedly, the new crimes they comit may become more serious over time.

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[50] Population cap refers to the court-ordered jail population limits. Currently there are 19 out of 58 California county jails (33%) are operating under the population cap. Population cap is usually ordered at the facility level instead of county level.

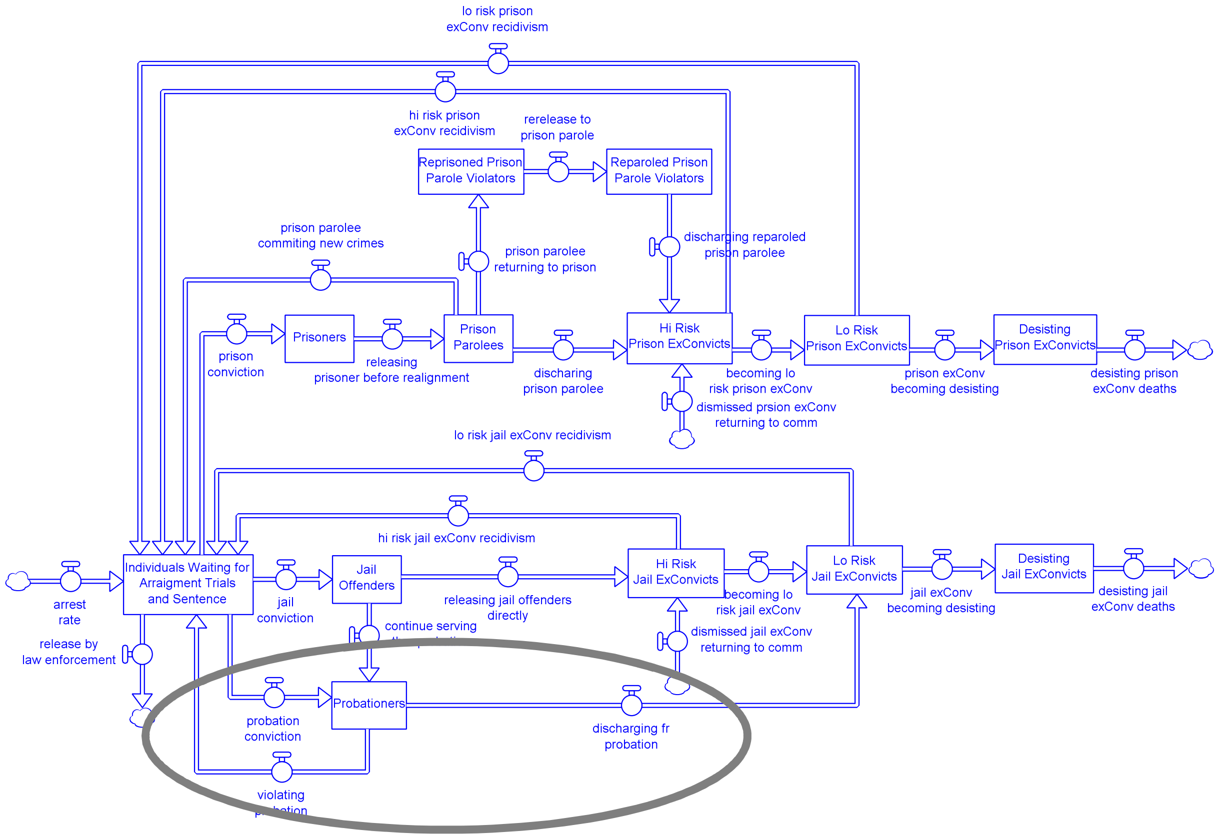
[51] ADP for a given year is calculated by summing the daily population for 365 days and then divided by 365.

Jail offenders are entitled the right to apply for parole in lieu of serving the remaining sentence[52]. Usually only the offenders commit felony offenses with long jail sentence will apply for parole to reduce their incarceration time. Because the county parole board is authorized to release jail offenders on parole for a maximum two-year, it is unlikely for the offenders with relatively short sentences to request for parole (Couzens et al., 2016). Hence, the jail offender parole stocks are omitted from the full model. As in the prison progression structure, newly released ex-convicts have a higher probability to reoffend. After 2 years, high-risk ex-convicts wMI become low-risk ex-convicts if they do not commit new crimes. In comparison to ex-convicts wo MI, ex-convicts wMI have a higher risk to reoffend, so the time that high-risk and low-risk ex-convicts wMI remain in the respective stock are longer than those without MI. The fraction of high-risk jail ex-convicts wMI recidivate is influenced by the social capital (SC) of these ex-convicts. Higher SC is associated with lower recidivism. This effect is similar to that in Section 3.2.11.4.

After 3.5 years, the low-risk ex-convicts wMI become desisting ex-convicts if they do not recidivate. Death outflows are included in all the jail ex-convict stocks except for the Jail Offenders wMI and Jail Offenders wo MI stocks. This is because that the offenders stay in jails for about six months, the number of deaths among jail offenders is unlikely to be significant.

[52] According to California Penal Code Section 3079 (a) Article 3.5. County Boards of Parole Commissioners, “No application for parole shall be granted or denied except by a vote of the board at a meeting at which a quorum of its members are present. This paragraph shall not be applied to the denial of applicants who are ineligible by order of the superior court, or to the granting of parole in emergency situations.”

3.2.2.8 Outflows of Probationers



The structure in Figure 59 demonstrates the outflows from the Probationers stock. The inflows have been illustrated in Section 3.3.2.7. The first outflow is the discharge of probationers after they fully serve their sentences without violation. Given that the condition to receive probation sentence is based on the severity of offense, prior criminal history, demographic, economic, and social factors, we infer that these ex-convicts are likely to have lower risk to recidivate compared to convicts who receive incarceration sentence. Due to the lack of data to differentiate probationers wMI from those without MI, the model is formulated under the assumption that these probationers do not suffer from MI. Hence, the discharged probationers flow to the "Lo Risk Jail ExConvicts wo MI" stock.

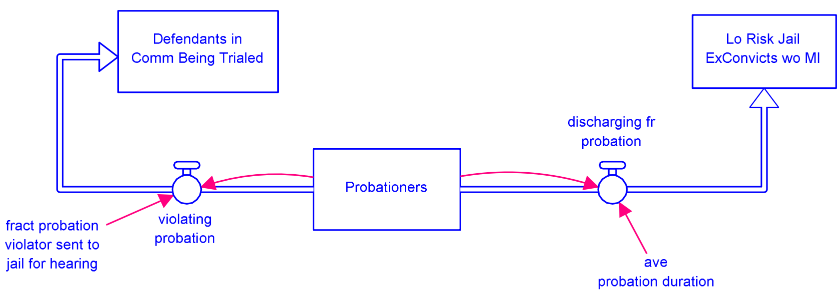


Figure 59 Outflows from the Probationers Stock

The stock of probationers grew slowly from 1987 to 2009 and then it started to decline until 2015 (Figure 60). Probationers can be divided in to felony probationers and misdemeanor probationers. The probation length is set by the court when the individuals are sentenced. The most common length of felony probation is five years, but a maximum probation term that matches maximum felony incarceration may be imposed in California if the felony probationers violate probation conditions (Watts, 2014). For misdemeanor probation, California caps the maximum misdemeanor probation length at five years.

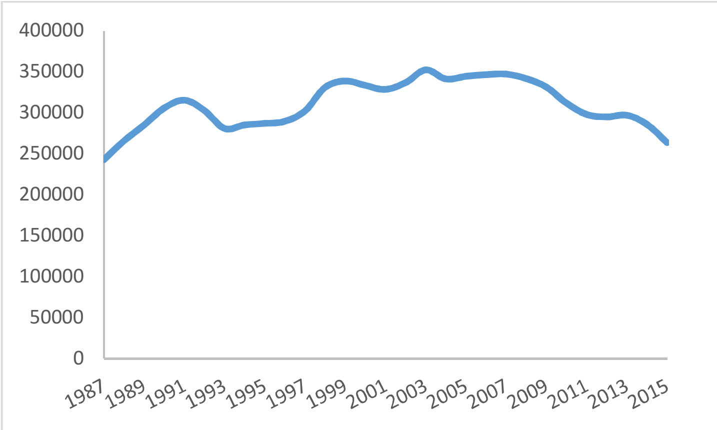


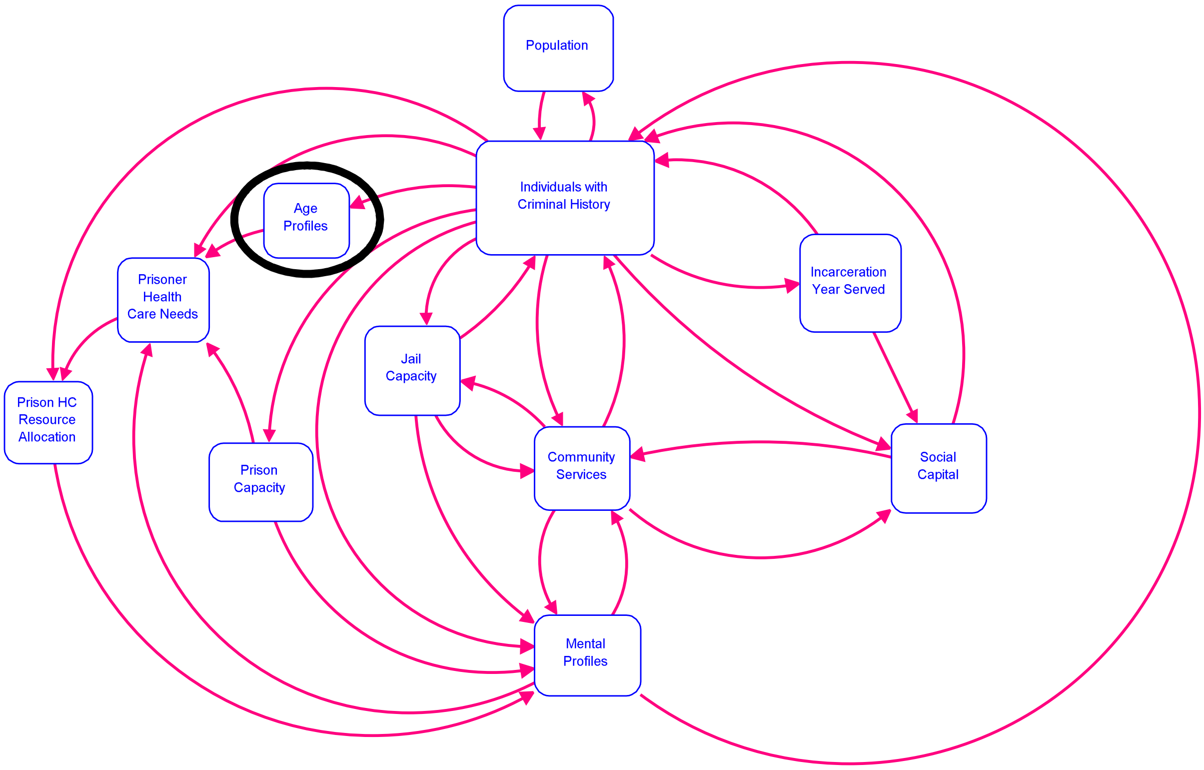
Figure 60 Historical Data: California Adult Probationers

Source: Office of the Attorney General (2015)

Not all probationers complete their sentence successfully. About 15% of the probationers had their probation revoked (Nieto, 1996). Probationers who violate probation conditions and are sent to courts by the probation officers enter the Defendants in Comm Being Trialed stock, in which they wait for court hearing. From this stage onwards, they go through the entire adjudication and sentencing process until the court decision is made.

3.2.3 Age Profile

This module presents the aging of individuals in the criminal justice system in the form of coflow structure[53]. Since it is almost identical to the fundamental stocks and flows, i.e. the stock-and-flow structure in the **Individuals with Criminal History** module, only the major major differences between these two modules will be pointed out.



The overview of the structure in **Age Profile** module is presented in Figure 61. This is a highly aggregate structure similar to the overview of the core module, **Individuals with Criminal History**, shown in Section 3.2.2, except that this module contains a coflow structure to capture the age dynamics of the individuals with criminal history. In the following subsections, only the structures that are different from the core module will be illustrated in detail.

[53] A nearly identical stock and flow structure to the fundamental stock and flow structure that is used to capture the attributes or characteristics of the fundamental stocks.

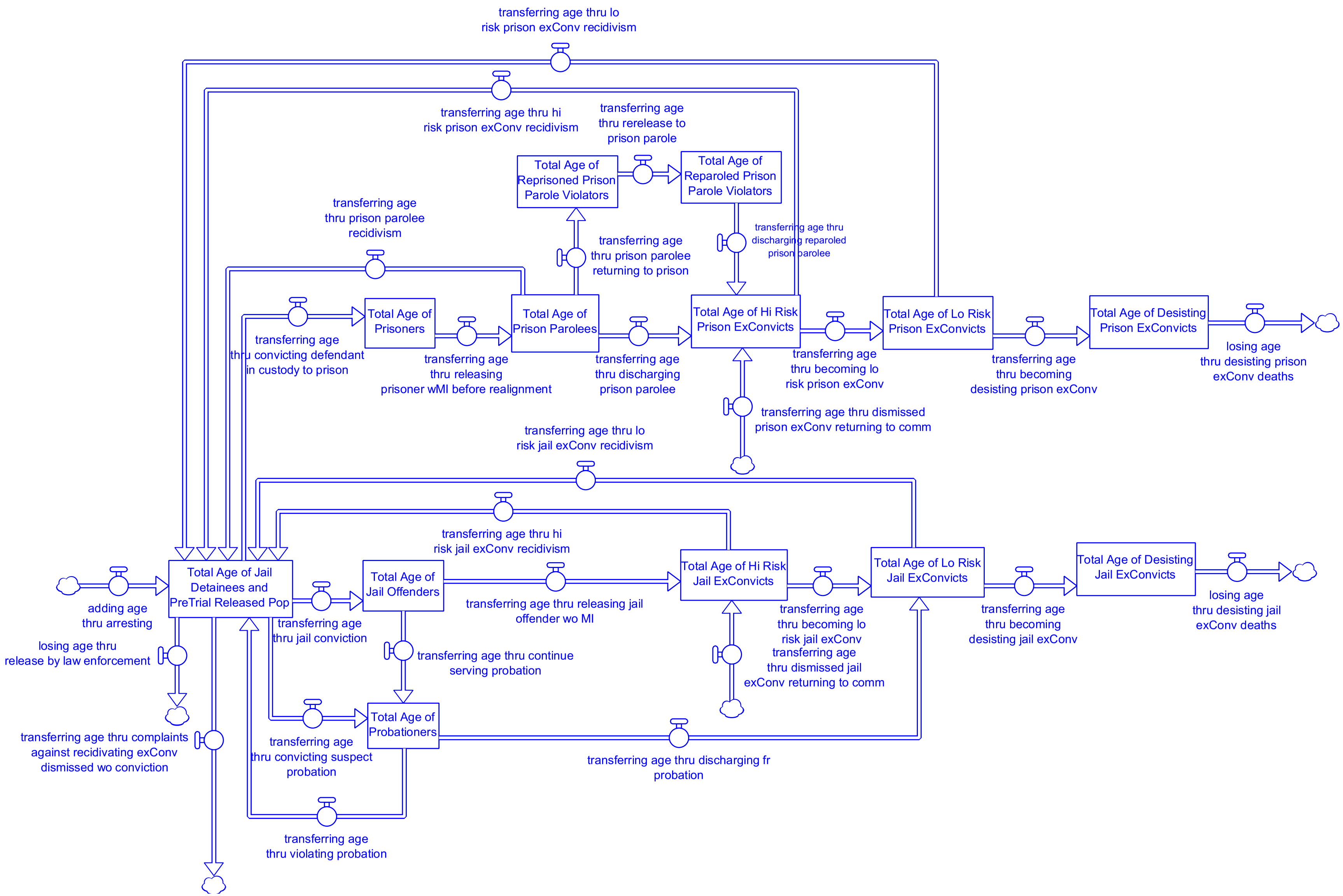


Figure 61 Overview of the Simplified Stock-and-Flow Structure in the Age Profile Module

3.2.3.1 Coflow Structure of the Age of Arrestees

Figure 62 presents the coflow structure of the age of arrestees. Arrestees are the individuals who are at the first contact point of the criminal justice system. There are three inflows to the Total Age of Arrestees stock. The first inflow is to increase the total age of arrestees through the arrest of individuals without criminal history, i.e. the first time arrestees. These are the individuals from the Innocent Population. The age of first commitment refers to *the age at which these individuals without criminal history are arrested*. The age at commitment is reported to be 28[54] in 1987 (CDCR, 1988). The recidivists bring with them the average age of recidivists when they reoffend and are arrested. For example, the prison ex-convicts wMI who reoffend bring the average age per prison ex-convict wMI into the Total Age of Arrestees stock. This structure is the same for jail ex-convicts who reoffend. Hence, the inflows of arrestees who are jail or prison recidivists contribute to the Total Age of Arrestee stock with different average ages. Then, these various average ages are blended in the stock.

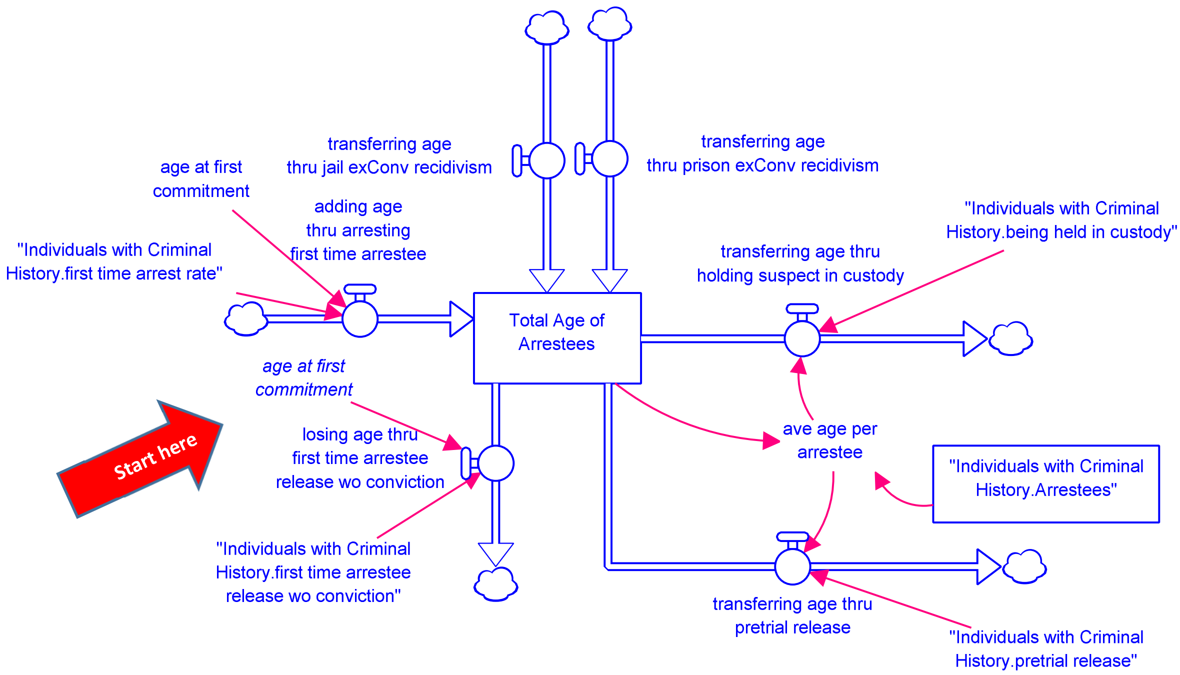


Figure 62 Formulation of Age Coflow of Arrestees

When the the first-time arrestees are released without conviction, they leave with the "age at first commitment" because they only stay in the jail for a few days. However, when the arrestees are arraigned, i.e. charges are pressed on these arrestees, the average age per arrestee leave the stock and enter the next relevant stocks corresponding to their status, i.e. either to being suspects in custody

[54] Only the median age at admission is reported.

or suspects in the community. "Ave age per arrestee" is the division of "Total Age of Arrestees" by the number of arrestees, which is a fundamental stock in the **Individuals with Criminal History** module.

3.2.3.2 Coflow Age Structure of the Prisoners wMI

Figure 63 shows the coflow structure of the age of prisoners wMI. As the convicted offenders enter prisons, each of them brings in an average age, which are either called "ave age per preSentencing convict in custody" or "ave age per preSentencing convict in community". When prisoners develop MI and flow into the "Prisoners wMI" stock, they bring in the average age per prisoner wo MI into the Total Age of Prisoners wMI stock.

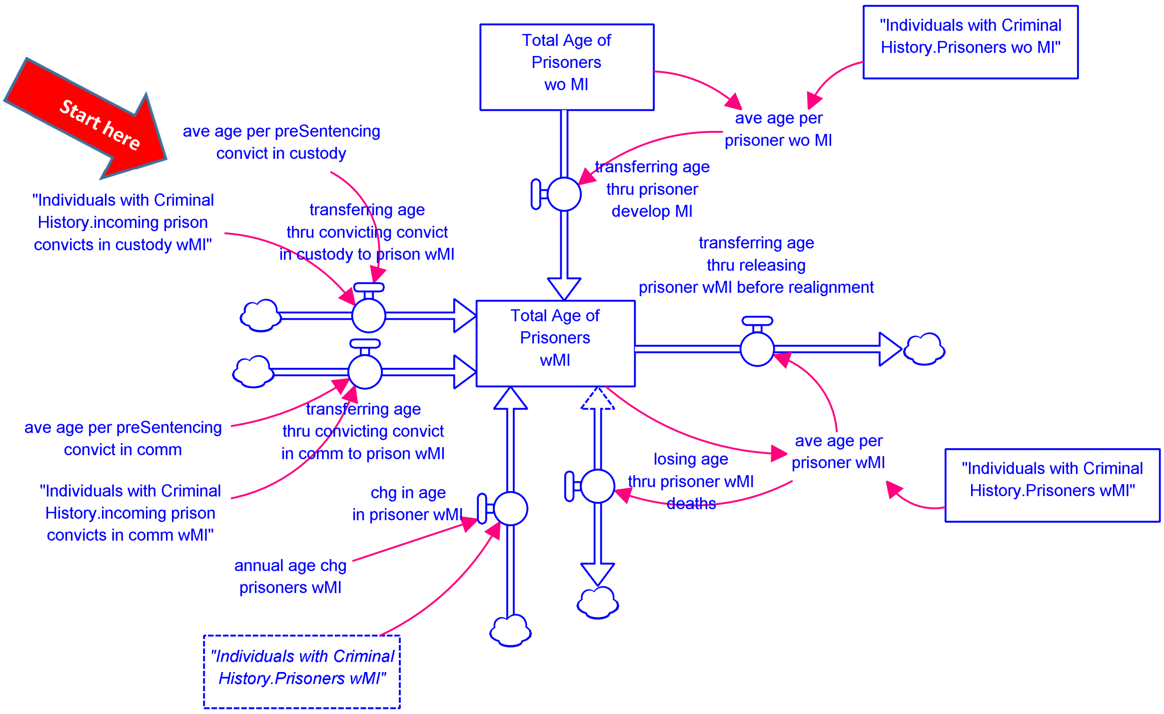


Figure 63 Coflow Structure of Age of the State Prisoners with Mental Illness

The two outflows from the stocks are deaths and release. These individuals leave the stock with the average age of prisoner wMI.

Note that there is an inflow that does not exist in the fundamental stock: "chg in age in prisoner wMI". This inflow captures the aging of prisoners. As long as the prisoners stay behind bars, each of them gains one year/person/year. This aging process is captured in most of the stocks in this module, except for stocks with average residence time less than one year, such as stocks in the adjudication and sentencing stage, and the jail offenders and reprisoned parolees stocks. For the rest of the structure in this module, the average ages of all individuals follow the progressions of each individuals to the relevant stocks.

3.2.3.3 Endogenous Mortality Rate

Figure 64 demonstrates the formulation of the endogenous mortality rate for prisoners wMI. The formulation for prisoners wo MI is identical.

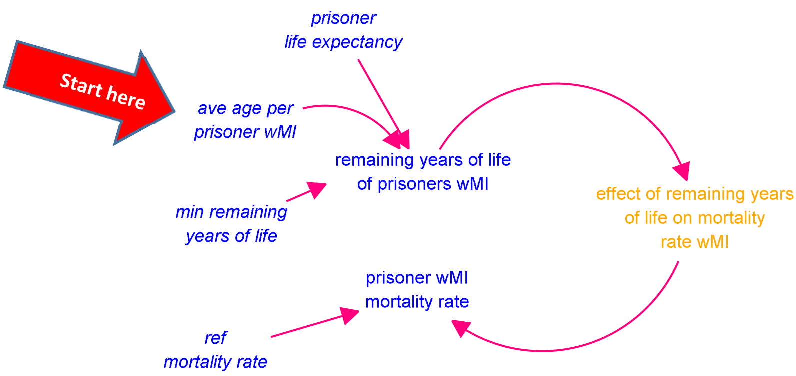


Figure 64 Formulation of the Endogenous Mortality Rate for Prisoners with Mental Illness

"Ave age per prisoner wMI" is a parameter obtained from the model (see Section 3.2.3.2). This parameter is compared against "prisoner life expectancy. Due to the pre-condition of prisoners' socio-economic status and the harsh prison environment, prisoners' life expectancy is 10-15 years shorter than the general population (Williams et al., 2014). The life expectancy at birth for California population has been increasing from 76 to 81 between 1990 and 2009. Thus, prisoner's life expectancy at birth is assumed to be 65 years old. "Remaining years of life of prisoners wMI" is expressed by the following equation.

remaining years of life of prisoners wMI =

MAX (prisoner_life_expectancy - ave_age_per_prisoner_wMI, min_remaining_years_of_life) (3-5)

Equation 3-5 reads that "remaining years of life of prisoners wMI" takes the minimum of two variables. These two variabels are the discrepancy between "prisoner life expectancy" and "ave age per prisoner wMI", and "min remaining years of life". "Min remaining years of life" is set as one year.

Prisoners' mortality rate has been increasing from 0.001 to 0.006 between 1987 and 2013 (CDCR, 1987-2010; Noonan et al., 2015). We take the middle value and set "ref mortality rate" as 0.003 per year. A table function is used to express the relationship between the change in average age of prisoners wMI and mortality rate (Figure 65).

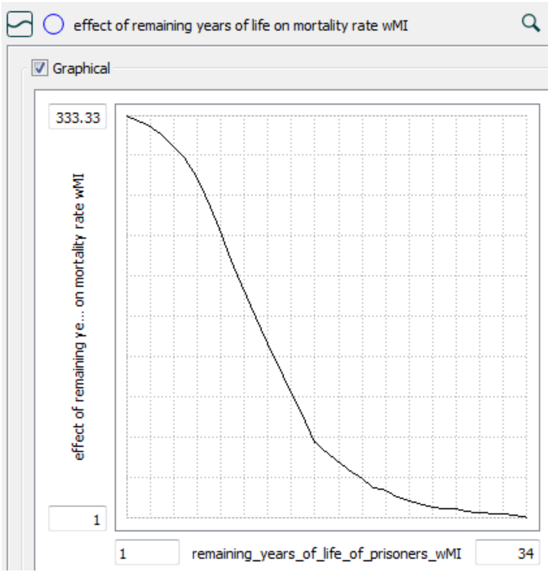


Figure 65 Effect of the Remaining Years of Prisoners with Mental Illness on Mortality Rate

The input parameter to the horizontal-axis to the table function is the remaining years of prisoners wMI. The values on the horizontal-axis range from one to 34. 34 is the initial value of "remaining years of life of prisoners wMI" (prisoner life expectancy minus the initial average age per prisoner wMI). The output of this table function is the effect on the mortality rate of prisoners wMI, which is reflected on the vertical-axis. The vertical axis contains values between one and 333.33. The maximum value on the vertical-axis multiplies "ref mortality rate" equals to one. The relationship in Figure 65 presents that when prisoners wMI only have one year remaining to live, the mortality rate will be one per year. If the remaining years of prisoners wMI remains at 34 as the initial value, the mortality rate for prisoners wMI is same as "ref mortality rate".

3.2.4 Mental Profile

This module describes the mental functions of individuals in the criminal justice system in the form of coflow. At the reception centers[55] , professionals screen new convicts' mental health with the Global Assessment Functioning (GAF)[56] diagnostic tool. The purpose of this assessment is to diagnose mental illness among the incoming prisoners. GAF is a scoring system that measures the impact of mental illness severity on individuals' psychological, social, and occupational functioning. In general, a score of 70 and above is considered as normal and acceptable symptoms that have minimal impact on an individual's functioning; 61-70 is characterized as mild symptoms; 51-60 falls within the range of moderate symptoms; scores of 31-40 indicate severe symptoms with suicidal ideation and major impairment in daily social life; any score under 30 suggest severe impairment that requires inpatient services.

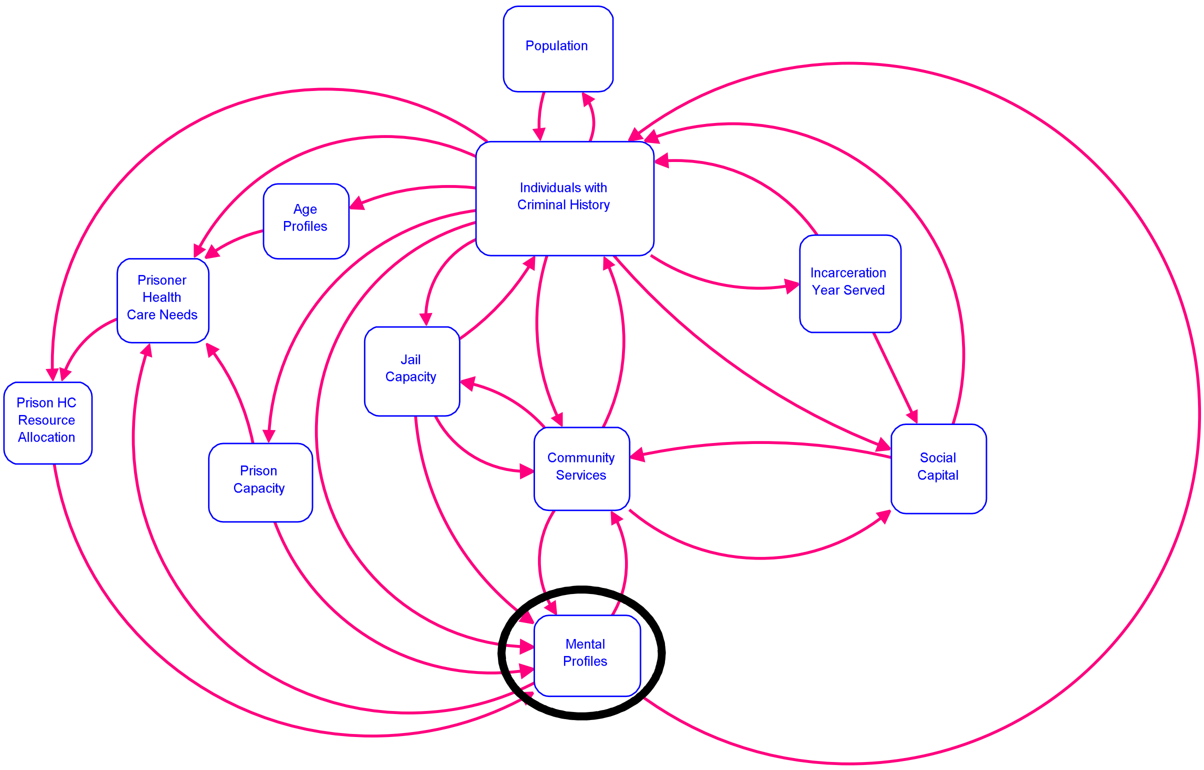


Figure 66 presents a highly aggregate structure similar to the overview of the core module, **Individuals with Criminal History**, shown in Section 3.2.2. In the following subsections, only the structures that are different from the core module will be illustrated in detail.

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[55] The missions of Reception centers stated on CDCR website are to safely and securely house and process incoming inmates by: (1) compiling and evaluating the inmates' criminal records, life histories, medical, dental, physiological and mental health histories, and social histories, and (2) determining the inmates' custody score, identify any specific placement needs, and assigning them to one of the 34 State prisons. Retrieved from http://www.cdcr.ca.gov/Adult_Operations/Reception_Center.html on June 07, 2017.

[56] Refer to Appendix D for further details.

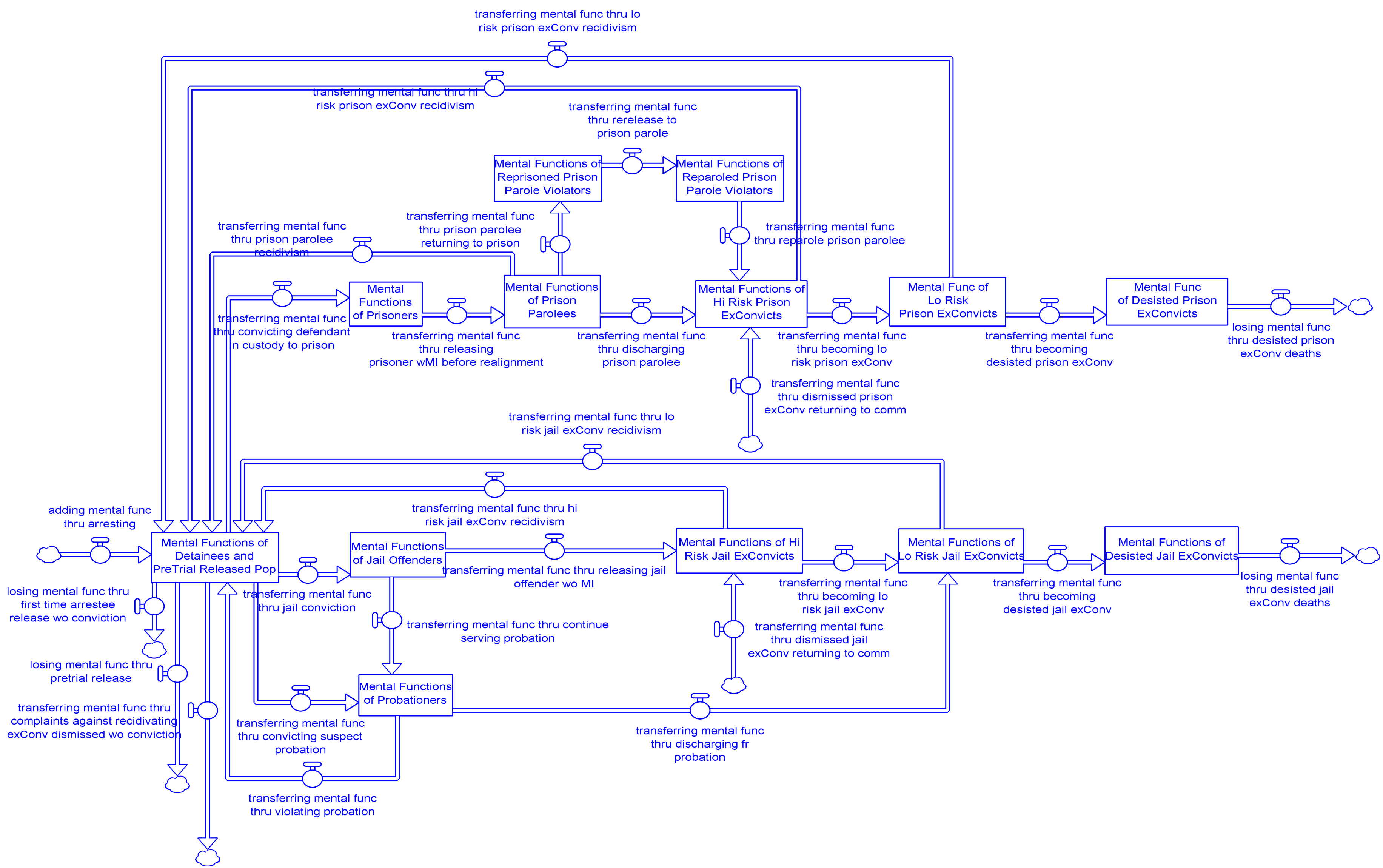


Figure 66 Overview of the Simplified Stock-and-Flow Structure in the Age Profile Module

3.2.4.1 Coflow Structure of Mental Functions of the Arrestees

Figure 67 presents the formulation of the cumulative mental functions of arrestees. As the Arrestees stock is the first contact point of the criminal justice system, the inflow of new suspects bring an average mental functions with them into the stock. The “mental func per first time arrestee” is an exogenous input that is measured with a score between 0 to 100. Trestman et al. (2007) report that the GAF score of incoming jail offenders who had history of MI is about 57 on average while those without MI is 72. Hence, we take the average of these two scores, i.e. 65 score/person, as the value for “mental func per first time arrestee”. Combined with the mental functions brought in by the recidivists, the mental functions of all the arrestees are blended in the stock. When the arrestees leave the stock through one of the three outflows, i.e. being held in custody, pretrial release, and release by law enforcement, they leave with the average mental functions per arrestee. The “average mental func per arrestee” is a division of the total mental functions of all arrestees by the number of arrestees.

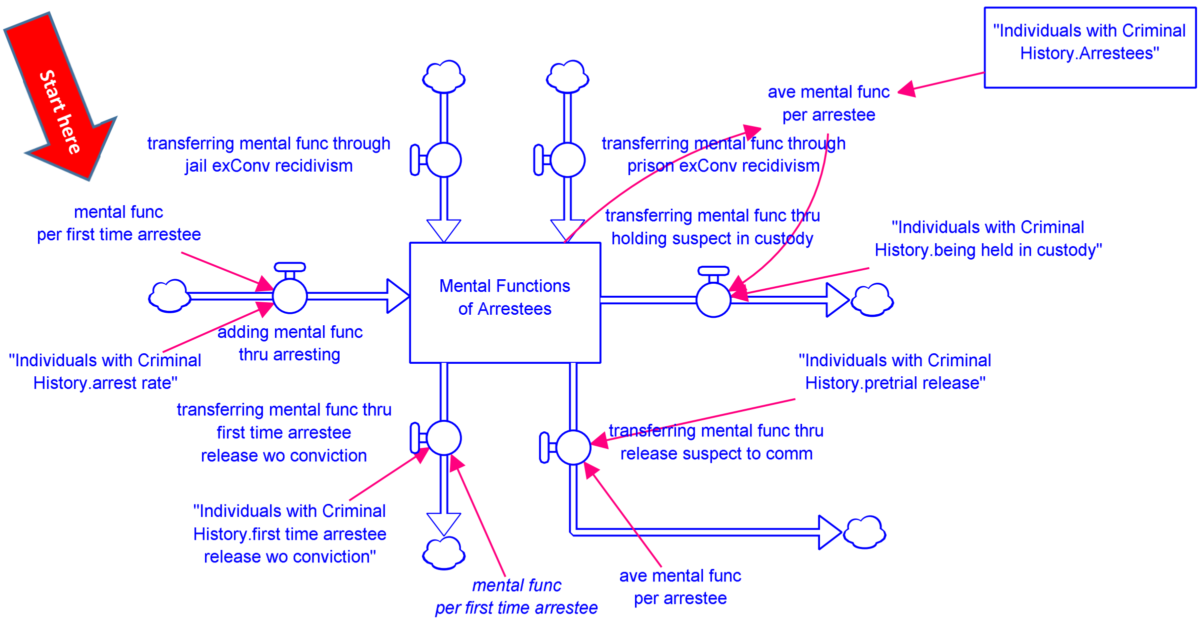


Figure 67 Coflow Structure of Mental Functions of the Arrestees

3.2.4.2 Coflow Structure of Mental Functions of the Prisoners with Mental Illness

Figure 68 depicts the formulation of mental functions of prisoners wMI. There are three inflows and three outflows in this structure. When defendants in custody and community being convicted to serve prison sentence, they enter the prison with the average mental functions per incoming prisoner in custody with mental illness and average mental functions per incoming prisoner in community with mental illness. In the prison, when prisoners develop MI, they become prisoners wMI. In such case, they bring along the average mental functions per prisoner wo MI to the Mental Functions of Prisoners wMI stock. The average mental functions per prisoners wo MI is higher than the average per prisoners wMI for two reasons. First, the prisoners wo MI enter prison with higher mental functions; second, prisoners wo MI move to the Prisoners wMI stock when their mental functions deteriorate to a certain level. Therefore, the average mental functions of prisoners wo MI will always stay above a certain threshold.

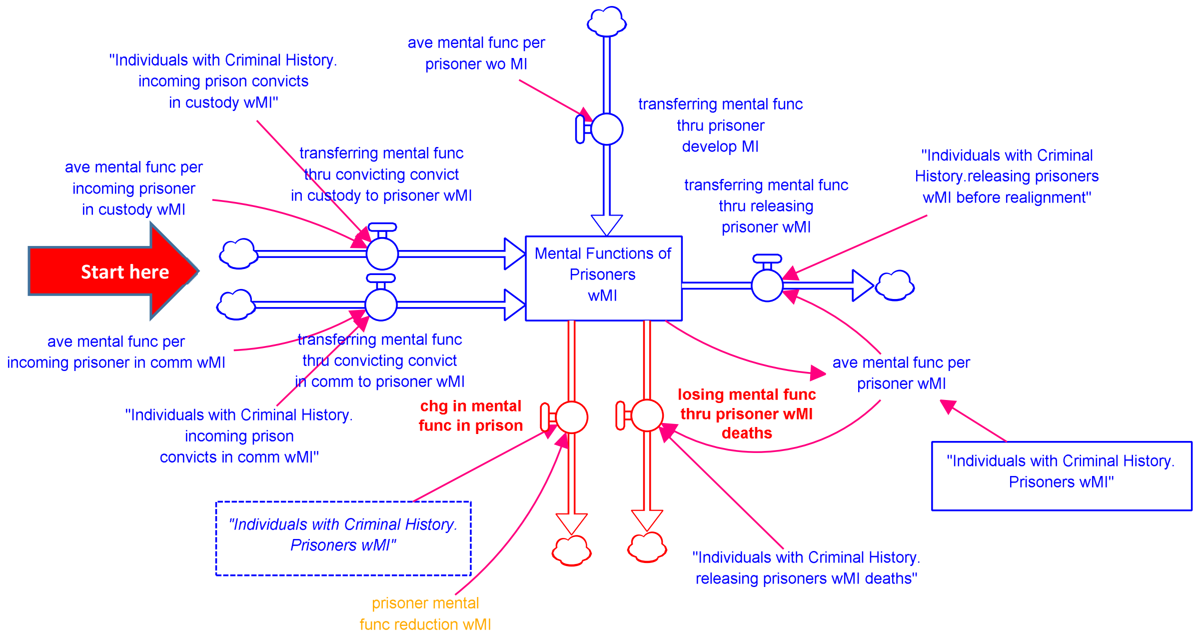


Figure 68 Coflow Structure of Mental Functions of the State Prisoners with Mental Illness

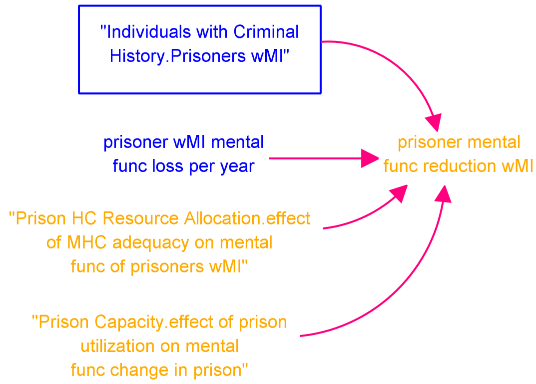


Figure 69 Formulation of Prisoner Mental Function Reduction of Prisoners wMI

The mental functions of prisoners wMI deteriote over time during custody. This process is captured by the outflow named "prisoner mental func reduction wMI". The total mental functions lost per year, which is a product of the total number of prisoners wMI, prisoner wMI mental function loss per year (Figure 69), and conditioned by the adequacy of prison mental health care and prison capacity utilization. "Prisoner wMI mental func loss per year" is defined as two score per year per person. This means that in the absence of mental health care and in an overcrowding prison, each mentally ill prisoners will lose mental functions per year. The effects of mental health care adequacy and prison overcrowding on prisoners' mental functions are illustrated in Sections 3.2.6.6 and 3.2.7.2 respectively.

The deterioration of mental functions also exists among jail offenders wMI. Hence, there is also an outflow from the stock of jail offenders wMI characterizing such process. However, mental health care in jail is nonexistent given the short stay of jail offenders. Jail offenders wMI will only experience mental function deterioration.

3.2.4.3 Mental Functions of Prison Parolees with Mental Illness Changed by Community Services

The "Mental Functions of Prison Parolee wMI" has a similar structure to the fundamental stock in the **Individuals with Criminal History** module. Hence, this section only focuses on the additional inflow in this coflow that does not exist in the core module: "increasing mental func of prison parolee wMI thru comm svcs" (Figure 70). Inadequate mental health care in prisons has a deleterious effect on mentally ill prisoners' mental function (see Section 3.2.6.6). Without proper treatment in prison, the parolees wMI are released from prisons with lower mental functions than it would have been.

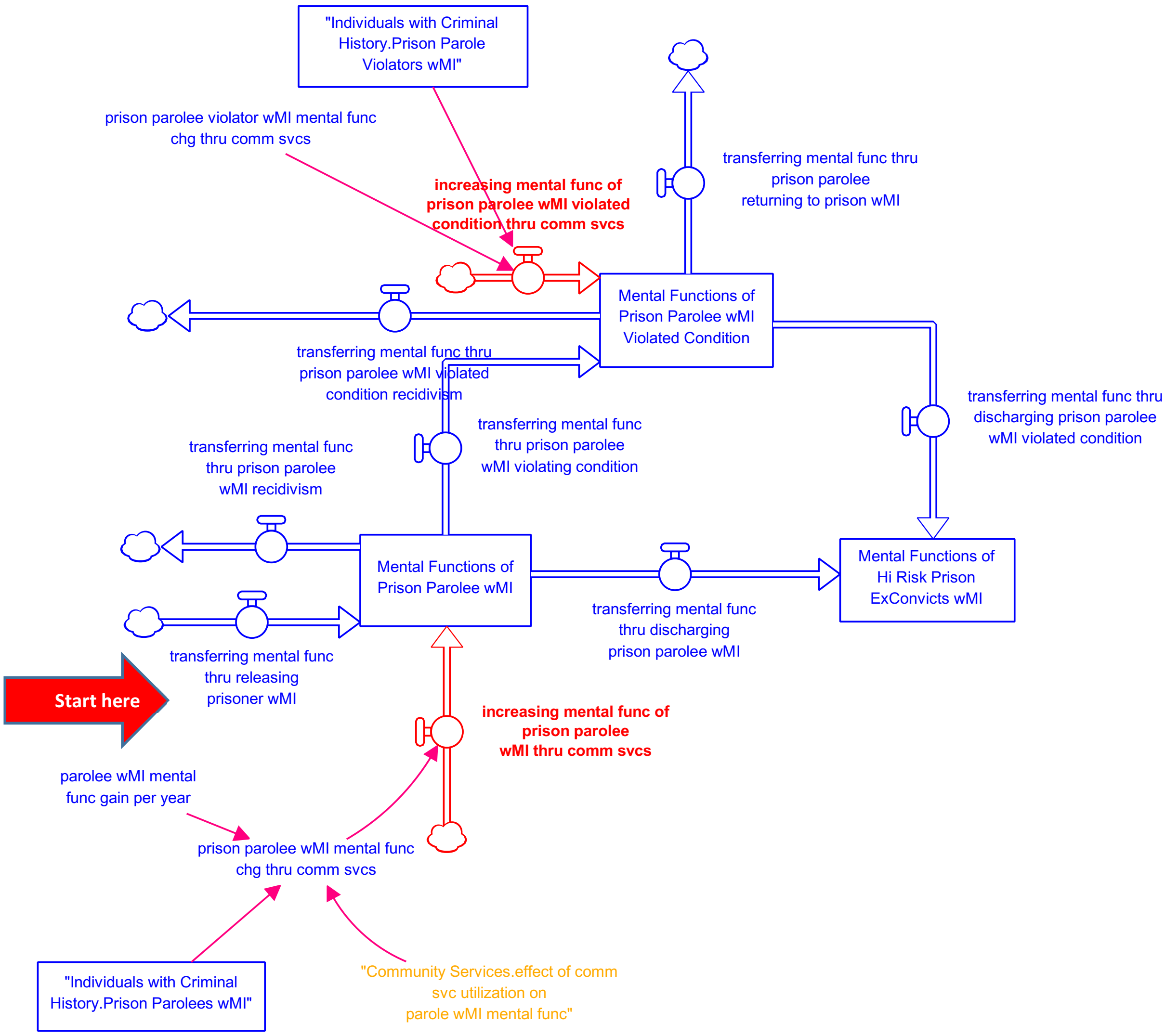


Figure 70 Change of Mental Functions of the Prison Parolees with Mental Illness and Parole Violators with Mental Illness through Community Services (simplified)

The inflow "increasing mental func of prison parolee wMI thru comm svcs" characterizes the process through which the mental functions of parolees wMI increase through assistance provided by community services. The flow is resulted from the function of three parameters: the stock of parolees wMI, mental function change per year, and the effect of community service adequacy. The “parolee wMI mental func gain per year” is defined as one score per year per person. In the prison, the prisoners wMI lose two score per year per person in the absence of mental health care. On the contrary, the parolees wMI gain mental functions if community service capacity is adequate. In this model, we assume that inadequate community service capacity does not directly contribute to the mental function deterioration among prison parolees wMI. At most, inadequate community services only leads to zero mental function gain among the prison parolees wMI. However, inadequate community services indirectly increases the probability of reoffending among the parolees. A higher probability of reoffending means more parlees wMI recidivate and return to prisons. The prison parolees wMI will likely be re-released with lower mental functions if prison mental health care is inadequate. The effects of community service capacity on parolees wMIs’ mental function gain is explained in Section 3.2.10.7.

When some of the parolees wMI violated parole condition and move into the “Prison Parolees wMI Violated Condition” stock, they transfer the average mental functions per parolees wMI with them. The mental function gaining process also take place among the parolees wMI who have violated the parole condition (Figure 70). The formulation for “prison parole violator wMI mental func chg thru comm svcs” is similar to the formulation for prison parolee wMI.

This process does not exist in the jail structure because jail offenders do not serve parole.

3.2.4.4 The *Effect of Mental Functions of Prisoners without Mental Illness on Mental Illness Development*

This section presents the inverse relationship between the mental functions of prisoners wo MI and the onset of MI in the prisons. This relationship is formulated with a table function (Figure 71).

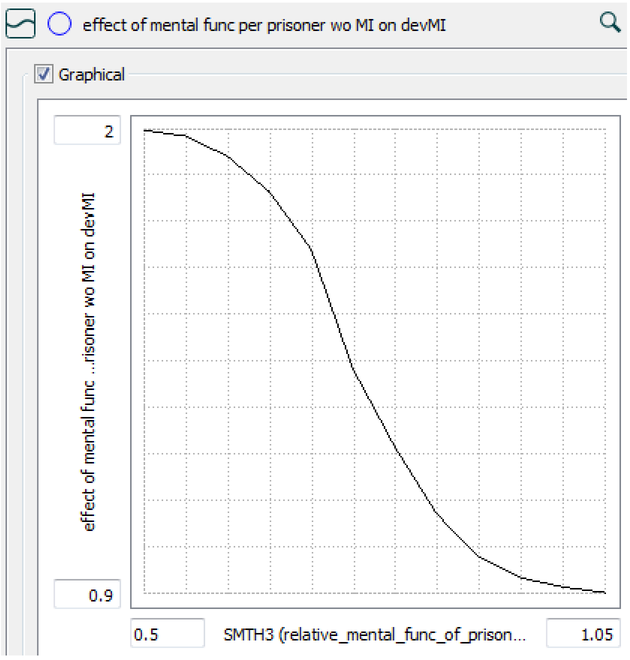


Figure 71 Effect of Mental Functions of Prisoners without Mental Illness on the Development of Mental Illness in Prison

The input parameter to the horizontal-axis of the table function is the relative mental functions of prisoners wo MI to the initial condition. A third order information delay built-in function, SMTH3, is used to reflect a delay in the observation and reporting of the change in mental functions of prisoners wo MI. The horizontal-axis contains values range between 0.5 to 1.05. The output is reflected on the vertical-axis, which ranges between 0.9 and two. The graph reads that when the average mental functions of prisoners wo MI remains unchanged, i.e. the mental functions of prisoners wo MI equals to the initial value, the effect on the fraction of prisoners wo MI develop MI also remains unchanged, which is one. If the relative mental functions of prisoners wo MI rises above one, which means the mental health state of prisoners wo MI improves, then the fraction of prisoners develop MI drops below one. Hence, fewer prisoners enter the stock of Prisoners wMI through this route. On the contrary, if the relative mental functions of prisoners wo MI declines to less than one, more prisoners develop MI. With this effect, the average mental functions of prisoners wo MI will always stay above a certain threshold because those with lower mental functions proceeds to Prisoners wMI stock. This threshold is the initial mental functions per prisoners wo MI, which is 62 score per person.

3.2.4.5 The *Effect of Mental Functions of Prison Parolee and Violator with Mental Illness on Community Service Cost*

The table function in Figure 72 depicts the inverse relationship between mental functions of parolees and community service cost. The input parameter to the horizontal-axis is the relative change in average mental functions of parolees. The average mental functions of parolees is the average mental functions of all parolees wMI including those who have not violated condition, those who have violated condition, and those who are reparoled. Under the normal condition, when the average mental functions of all parolees wMI equals to the initial condition, community service cost per prison parolee wMI remains unchanged. When the average mental functions of parolee wMI increases, the parolees wMI rely less community services. Hence, the community cost per parolee wMI decreases. If the relative average mental functions of parolees wMI drops below one, it costs more to provide community services to them.

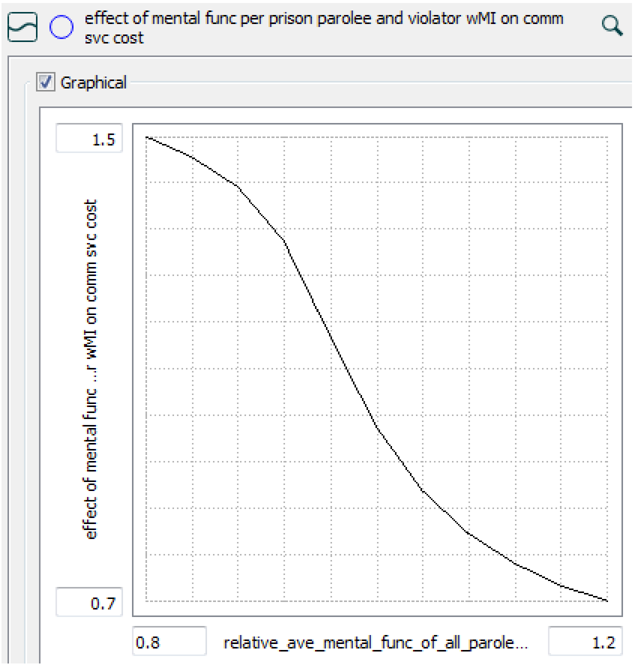


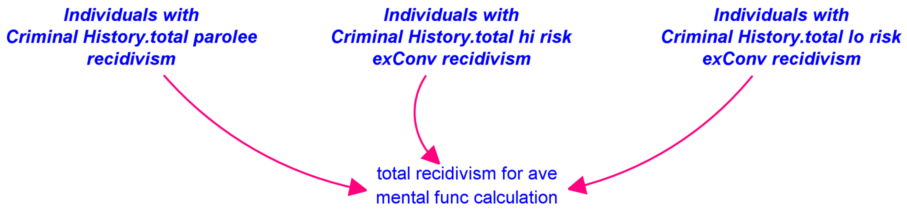
Figure 72 Effect of Mental Functions of Prison Parolee and Violator with Mental Illness on Community Service Cost

3.2.4.6 Calculation of the Average Mental Functions of All Parolees

This section describes the calculation of a weighted average of mental functions per recidivist. Weighted average is chosen over regular average because parolees have the highest recidivism rate within the first year post-release compared to the high-risk and low-risk ex-convicts. Thus, the influence of the recidivism by parolees is assumed to be greater than other ex-convicts. Therefore, the average mental functions of recidivists should carry more weight by the parolees.

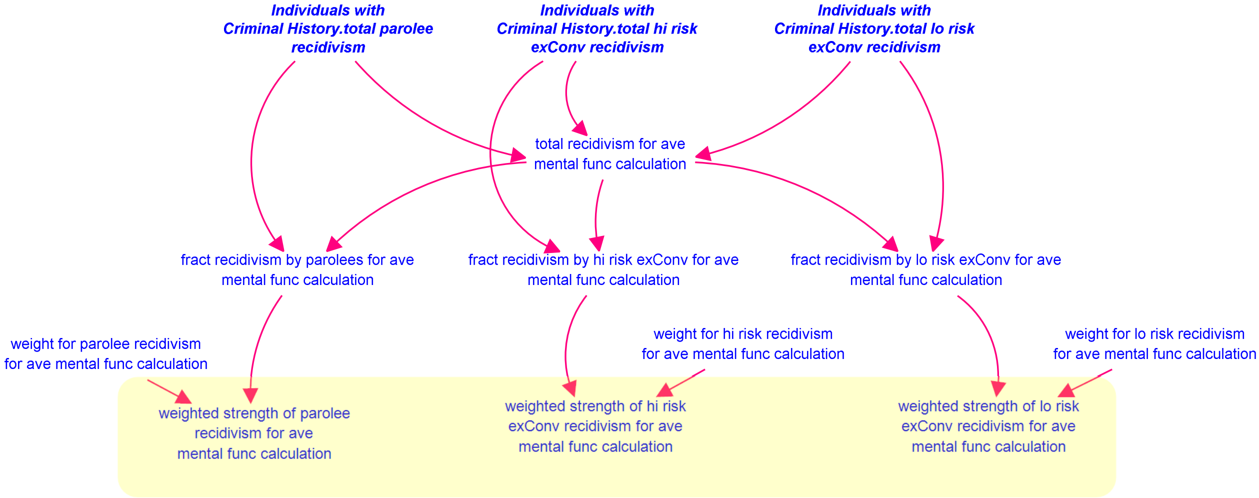
The calculation is explained step-by-step with the following explanation.

(1) The total recidivism rates of parolees, high-risk ex-convicts, and low-risk ex-convicts are obtained by summing up all recidivism flows in the model.

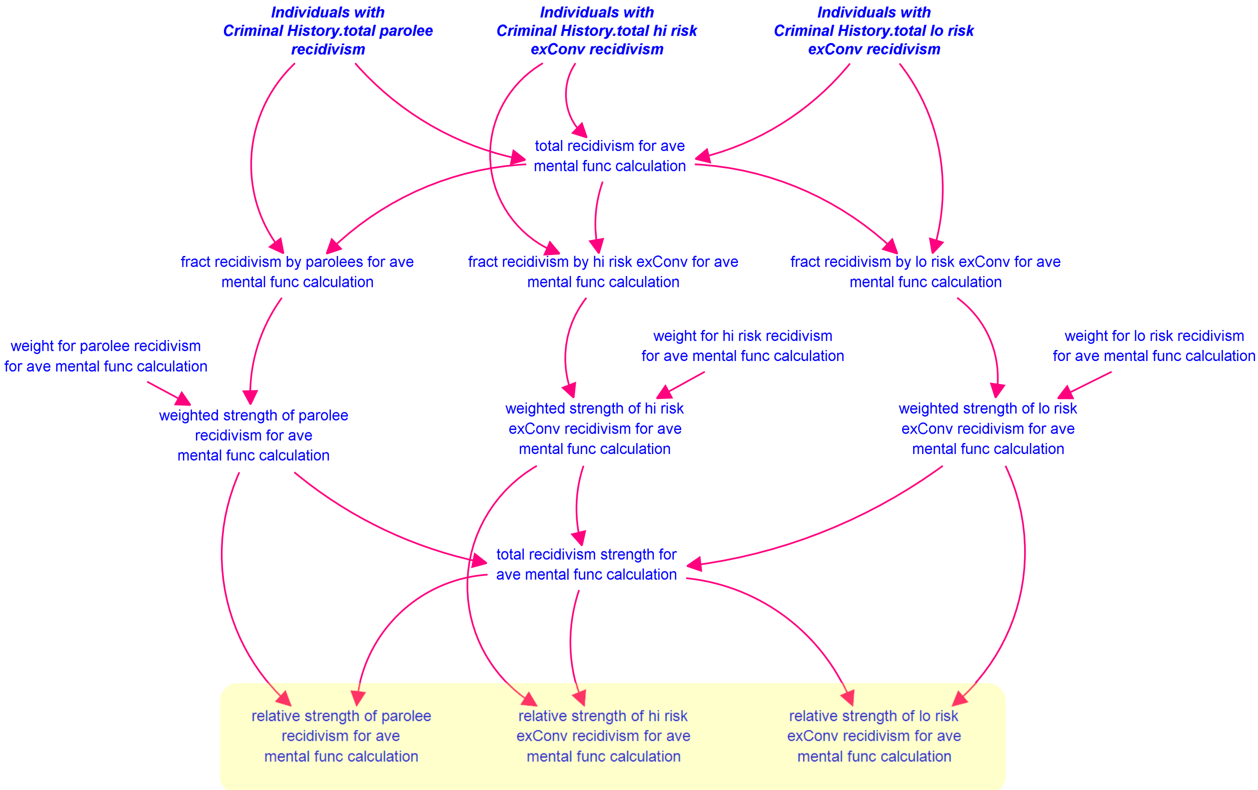


(2) Calculate the fraction of recidivism for each of group of recidivists.

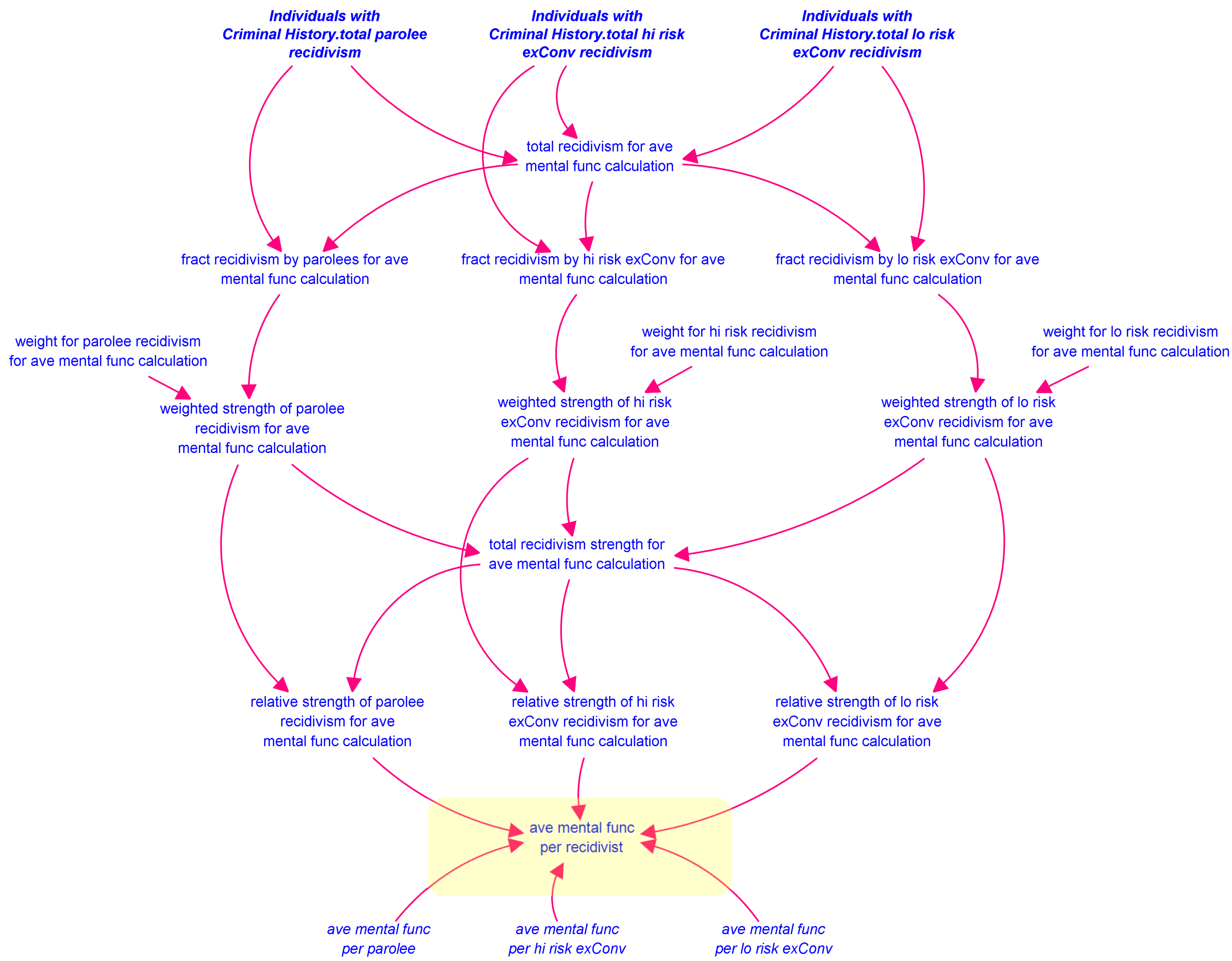
(3) Assign weights to different types of recidivism to obtain the weighted strength for each group of recidivists. This is because that the probability of recidivism of those who are released most recently is higher. The weights for each type of recidivism are estimated with the reference fraction of parolees wMI and ex-convicts wMI who reoffend. For example, reference fractions of reoffence for parolees wMI, high risk ex-convicts wMI, and low risk ex-convicts wMI are 0.2, 0.08, and 0.02 respectively. Thus, the weight for parolee recidivism is 0.2 / (0.2 + 0.08+0.02), which is 0.67. The weight for high-risk ex-convicts and low risk ex-convicts are 0.27 and 0.06 respectively. The weighted strength of each type of recidivism is the product of weight assigned to that particular type of recidivism and fraction of recidivism of that particular group.



(4) Calculate the relative strengths of recidivism for each group of recidivists by multiplying the weighted strength of each type of recidivism and the total recidivism strength. The total recidivism strength is the sum of all weighted strength.

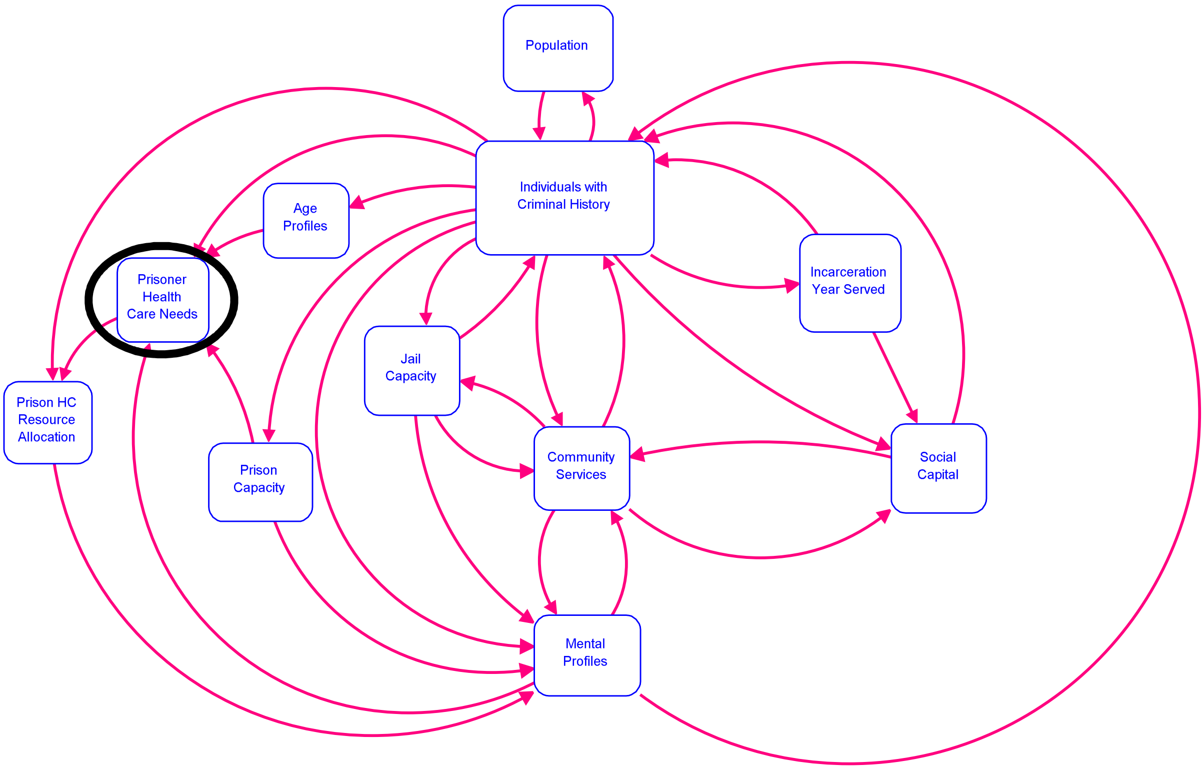


(5) Multiply the average mental functions of each group of recidivists and the relative strength of recidivism. Then, sum up the products to obtain the weighted average of mental functions per recidivist. With this formulation, the average mental functions per parolees has a larger impact on the average mental functions per recidivist than other ex-convicts.



3.2.5 Prisoner Healthcare Needs

This module integrates the output from the **Age Profile** and **Mental Profile** modules to evaluate the changing health profiles of prisoners. **Prisoner Healthcare Needs** describes the main disease patterns in the prison and needs for care. In our model, we consider the the three largest disease groups, i.e. infectious disease, chronic disease, and mental illness.



3.2.5.1 Needs for Infectious Disease (ID) Treatment

This section presents the calculation of the needs for infectious disease treatment. As prison capacity increases, the space between each prisoner reduces. Hence, the increasing density in prison contributes to the increase in infection rate (Figure 73). Consequently, a larger number of prisoners are infected with infectious diseases. The number of prisoners who need ID treatment is the product of "fract prisoners wID" and total number of prisoners, and conditioned by the effect of prison utilitlization. The total number of prisoners include those wMI and wo MI. We assigned the value of 0.03 to "ref fract prisoners wID" as the initial value for the fraction of prisoners with IDs. The estimation is explained later in this section. The effect of prison utilization on fraction of prisoners wID is explained in Section 3.2.7.3.

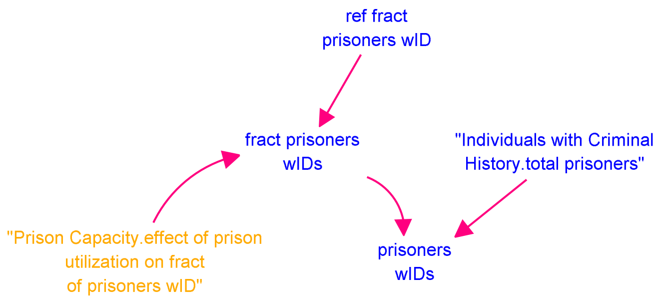


Figure 73 Formulation to Determine the Needs for Infectious Disease Treatment

Prison population expansion has profound effects on health profile and resource requirements. An overcrowding prison, which is a confined system, becomes a breeding ground for infectious diseases. The reported major infectious diseases (ID) in prisons are HIV/AIDS, tuberculosis, Hepatitis B and C (Nieto, 1998).

Correctional officials estimates that about 1,400 offenders in prisons were diagnosed with HIV (Nieto, 1998). The growth rate of prisoners with HIV is about 2% per year (Nieto, 1998). Prison medical staff suggests that the number of prisoners infected with HIV could be between 5,000 to 8,000 prisoners.

The second major ID is tuberculosis (TB), which is highly contagious. Incoming prisoners are required to be tested against tuberculosis at the reception center[57]. The incidence rates for tuberculosis in 1995 and 1997 were 18.1 and 12.1 per 100, 000 respectively (Nieto, 1998) . Treatment adherence is an

[57] *California Penal Code, Section 7570 et al.*

important factor to determine the success of TB treatment, which usually lasts for six to nine months[58]. The cost for a successful treatment for non-multidrug-resistant TB[59] is about $17,000 per person.

In 1994, 41% of the incoming prisoners entering the prison were tested positive for Hepatitis C, but only 3 percent developed end-stage or chronic symptoms that required treatment. For Hepatitis B, 34 percent were tested positive but only 2.2 percent were chronic[60] (Nieto, 1998). 20% of the 2.2 percent inmates who contracted chronic Hepatitis C develop end-stage liver disease die. Hepatitis B is treatable, but Hepatitis C is not (Nieto, 1998). Thus, the remaining prisoners with Hepatitis C may live up to twenty years to develop end-stage liver disease.

Based on the information presented previously, we perform several calculations to estimate the fraction of prisoners with infectious disease. As prisoners infected with Hepatitis B do not require treatment in general, this fraction of the population is omitted from the estimation of prevalence of prisoners with infectious disease. The estimated fraction of prisoners being infected by HIV/AIDS, TB, and Hepatitis C are presented in Table 6. Detailed calculations are presented in Appendix G.

Infectious Disease Type	Estimated Prevalence
HIV/AIDS	0.04000
Tuberculosis	0.00015
Hepatitis C	0.01000

Table 6 Estimated Prevalence of HIV/AIDS, Tuberculosis, and Hepatitis C in Prison

[58] According to the information published on Centers for Disease Control and Prevention (CDC) website (https://www.cdc.gov/tb/topic/treatment/tbdisease.htm). Access on May 24, 2017.
[59] Multidrug resistant TB refers to drug-resistant *Mycobacterium tuberculosis* (MDR). In the United States, only 1.0% - 1.5% of TB patients have MDR TB. But this disease requires lengthy and costly treatment (Suzanne et al., 2014).
[60] According to the information published on CDC website (https://www.cdc.gov/std/tg2015/hepatitis.htm), acute Hepatitis B is short-lived and will resolve on its own. Hence, treatment may not be needed. Only 1% of infected patients were reported to have developed liver failures or deaths.

3.2.5.2 Formulation of the Relative Age of Prisoners

This section presents the calculation of average age and relative age in prison.

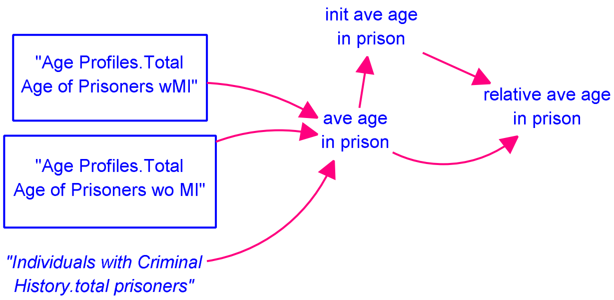


Figure 74 Formulation to Determine the Average Age in Prison

The average age in prison is the average age of prisoners wMI and prisoners wo MI. The change in the average age in prison leads to the change in "relative ave age in prison" over time (Figure 74). "Relative ave age in prison" is the input parameter to estimate the needs for chronic care in Section 3.2.5.3. Ever since the enactment of the Three-strikes Law in 1994, the striker population has been rising until the introduction of the Realignment policy in the end of 2012. The striker population increased from less than 5% in 1994 to 34% in 2016 (Figure 75). Striker population receives longer sentences. Consequently, the proportion of prisoners over age 55 has increased from 2% to 11% from 1994 to 2013 (CDCR, 1987 - 2010, 2011 - 2013). Accelerated aging is common among prisoners owing to the history of poverty, poor access to healthcare, or engagement in unhealthy lifestyle. The socially and medically vulnerable prisoners tend to develop chronic diseases and disability 10 to 15 years earlier than the general population (Williams et al., 2014). Thus, CDCR defines prisoners over 55 years old as older prisoners (LSPC, 2010).

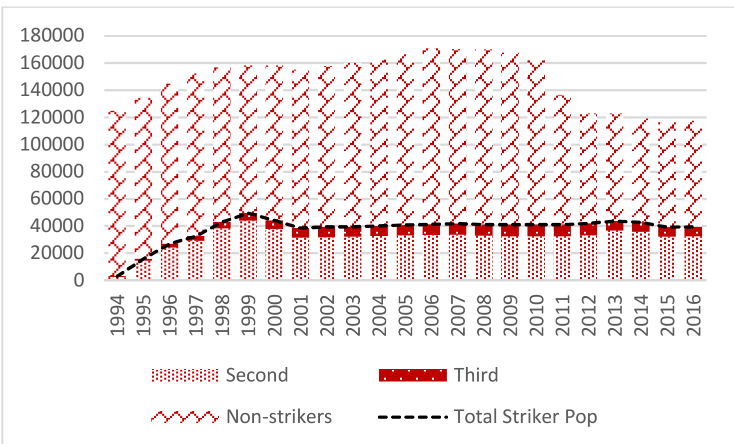


Figure 75 Historical Data: Striker and Non-striker Population in Prison

Source: 1994, 1996, 1998 - Austin et al. (2000); 1995 - LAO (1996); 1997 - LAO (1997); 1999 - LAO (1999b); 2000 – 2016 - CDCR Second and Third Striker Felons in the Adult Institution Population December Reports

3.2.5.3 Needs for Chronic Disease (CD) Treatment

The relative change in age becomes the input to the horizontal axis of the table function named "effect of age on fract of older prisoners" to reflect the effect of relative change on the proportion older prisoners (Figure 76). The relative change in age is also an input parameter to "effect of age on CD cost per prisoner".

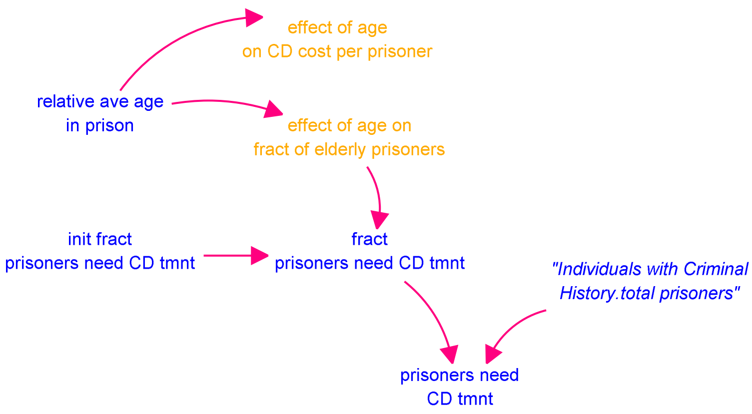


Figure 76 Effect of Relative Age of Prisoners on the Proportion of Elderly Prisoners and Chronic Disease Cost per Prisoner

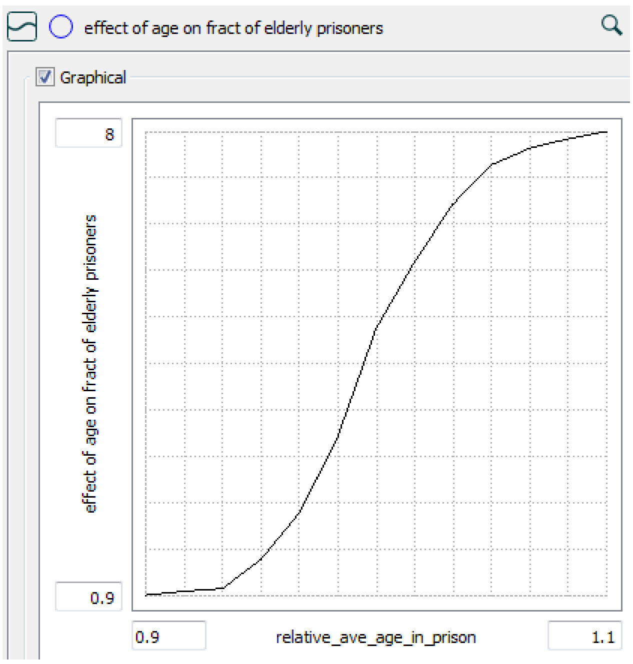


Figure 77 Effect of Relative Age of Prisoners on the Proportion of Elderly Prisoners

The input parameter to Figure 77 is the relative age of prisoners, which ranges between 0.9 and 1.1. The output parameter on the vertical axis is the effect of prisoners' aging on the fraction of elderly prisoners. The values on the vertical-axis range between 0.9 and eight. The shape in Figure 77 imitates the shape of the curve in the graph in Figure 78. Figure 78 demonstrates the corresponding data points of average age of prisoners and fraction of prisoners over 55 years old extracted from historical data. The purpose of this graph is to assess the shape of the graph of the change in the fraction of prisoners over 55 years old in relation to the change in the average age of prisoners. The presentation does not aim to defend the correlation between these two variables. Note that the horizontal-axis of Figure 78 shows the average age of prisoners whereas the horizontal-axis of the table function (Figure 77) shows the relative change in age.

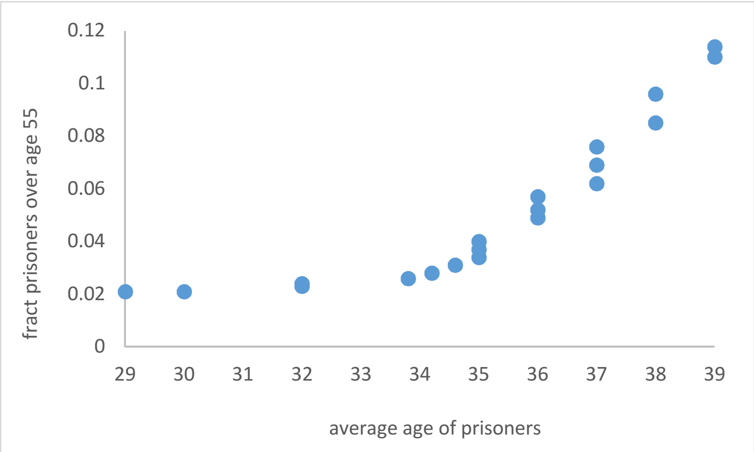


Figure 78 Calculated Data: The Change in Fraction of Prisoners over 55 Years Old in Relation to the Change in Prisoners' Median Age

Source: CDCR (1987-2010)

Figure 77 portrays a positive relationship between average age of prisoners and the fraction of elderly prisoners. When the relative age in prison remains unchanged, the proportion of older population also remains unchanged. As the average age in prison increases, the proportion of older population will increase nonlinearly. The nonlinear growth of older population will eventually level off due to higher deaths as the population growth older.

CD is defined by WHO[61] as an illness that lasts for at least three months, non-communicable, and progresses slowly. The prevalence of CDs increases with age (Ward et al., 2014). Therefore, the number of prisoners who need CD treatment increases when the number of prisoners over 55 years old increases.

Another effect of changing average age of prisoners is on the cost of CD treatment. As CD progresses with age, proper treatment may only reduce the symptoms but treatment can rarely cure the disease. The older the prisoners become, the more costly it is to maintain their body functions or mitigate their

[61] Retrieved from http://www.who.int/topics/noncommunicable_diseases/en/. Accessed on February 19, 2017.

conditions. The table function in Figure 79 outlines the relationship between the relative average age of prisoner on CD cost per prisoner.

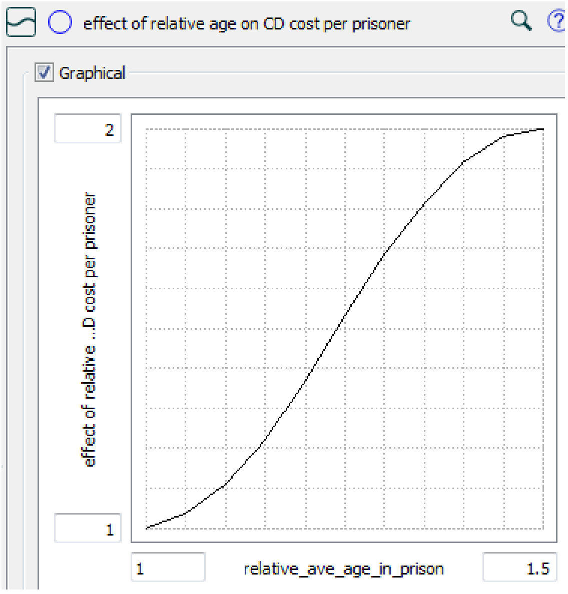


Figure 79 Effect of Relative Age of Prisoners on Chronic Disease (CD) Treatment Cost per Prisoner

The input parameter to the table function is the relative average age per prisoner. The output parameter is the effect on CD cost per prisoner with corresponding values on the vertical axis. When the prisoners start aging slightly, the upward pressure of CD cost per prisoner is less significant compared to the scenario when the prisoners become much older. Thus, when the average age of prisoners increases slightly, the CD cost per prisoner only increases moderately. However, when the average age in prison increases significantly, CD cost soars at a faster rate.

3.2.5.4 Needs for Mental Health Care (MHC) in Prison

This section explains the formulation of the need for mental health care (MHC). To estimate the needs for MHC, we take the prison population wMI and MI severity into consideration (Figure 80). The mental health care needs is not only estimated based on the number of prisoners who suffer from MI, it is also influenced by their MI severity. The "desired total mental functions in prison" is the acceptable level of mental functions of a normal person which the "actual total mental functions in prison" is compared against to determine the total discrepancies of mental functions among the prisoners. The total discrepancies indicates the "needs for MHC". "Actual mental functions" is obtained by combining the stocks of mental functions of prisoners wMI and prisoners wo MI.

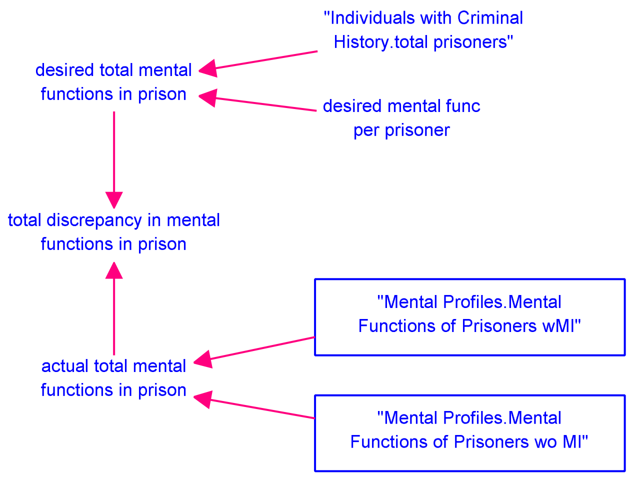


Figure 80 Formulation to Determine the Needs for Mental Health Care in Prison

Defining the needs for MHC has been difficult due to the inherent complexity of the concept of "needs". Prevalence of MI is an indicator evaluating the size of the affected population, but it is not an accurate indicator for the actual needs for MHC. A more accurate estimation of the actual needs for MHC is crucial for MHC capacity planning. Depending on the types of MI and severity, prisoners who suffer from MI require different treatments supported by various level of involvement from professional staff. Hence, we adopt the definition by Jeffers et al. (1971) in our study:

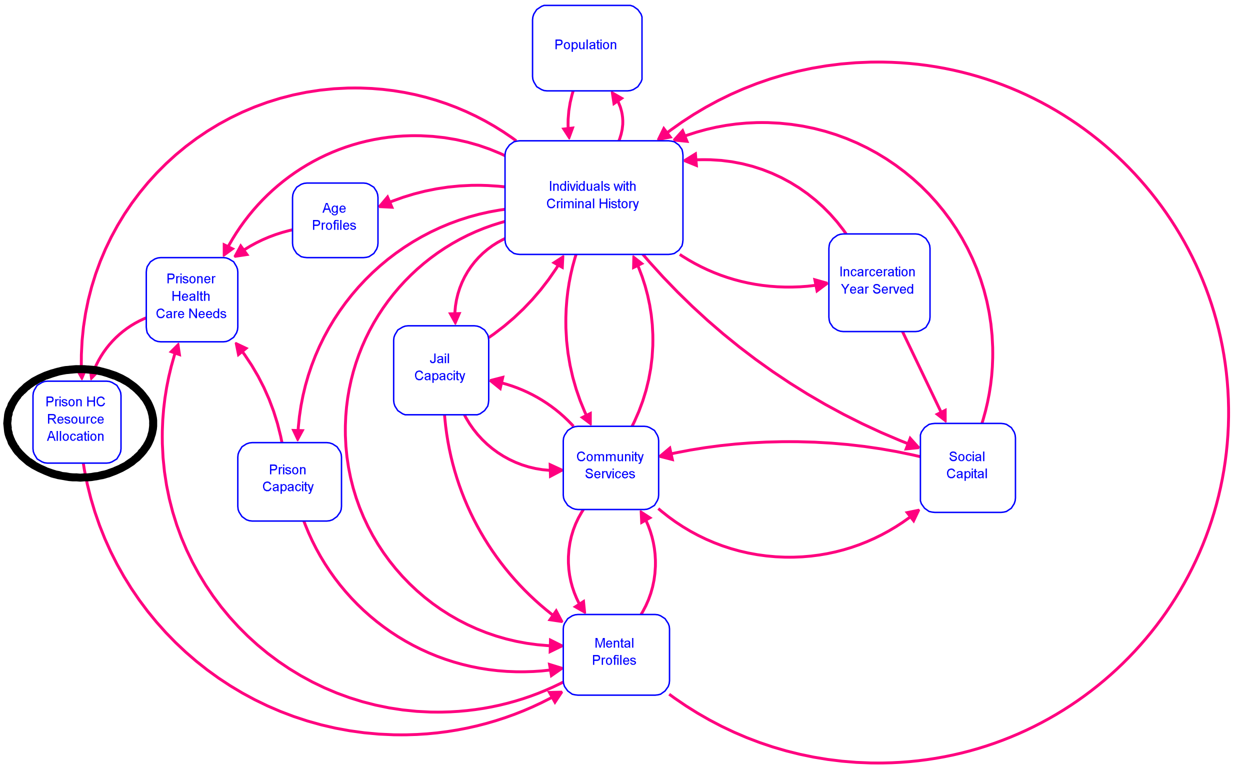
> *"[Q]uantity of medical services which expert medical opinion believes ought to be consumed over a relevant time period in order for its members to remain or become as 'healthy' as is permitted by existing medical knowledge* (p.46)."

"Become as 'healthy' as is permitted" is a relative concept. This expression implies a boundary for needs, which is limited by of technological advancement. As such, the medical professionals rely on a well-defined diagnostic standard to compare the prisoners' mental status to acceptable mental status.

As Global Assessment of Functioning (GAF) is used to assess the mental health status of incoming and existing prisoners (CDCR, 2009), we use the same scoring concept to estimate the needs for MHC. The needs for MHC is defined by the discrepancy between the average mental health status of the prisoners wMI and the acceptable level of mental health. We define the acceptable level in “desired mental function per person” as 70 score, which characterizes as mild symptom of mental illness.

3.2.6 Prison Health Care Resource Allocation

The Prisoner Health Profiles module forms the basis for the decision-making process of prison health care resource allocation. The Prison Health Care Resource Allocation module contains the health care resources adjustment and allocation, and treatment capacity adjustment processes.



3.2.6.1 Total Health Care Fund Adjustment Process

This section unfolds the total prison health care budget adjustment process. California adopts the budget change proposal process[62]. Under this budgetary process, the department prepares a proposal for budget change in the end of the year. This proposal will undergo a review process within CDCR before getting an approval from the overseeing agency. Then, the proposal will be submitted to the Department of Finance, followed by committee review and Legislative Analyst Office's recommendation . The final budget will be announced in the mid-year. In the following year, prison health care capacity can be adjusted with newly appropriated fund.

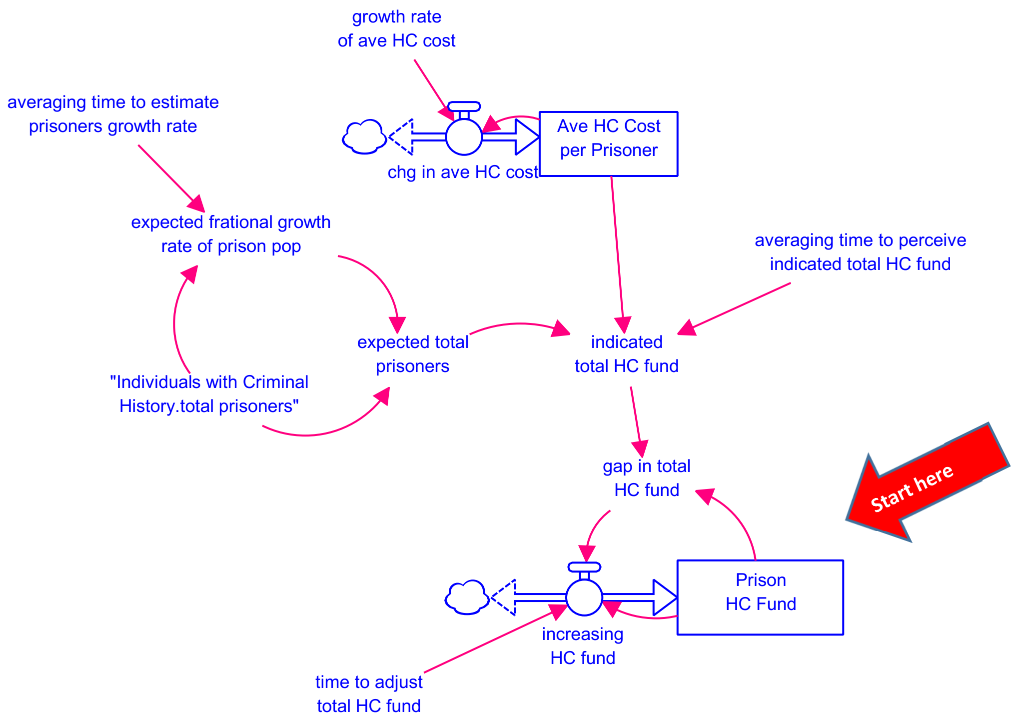


Figure 81 Prison Health Care Budget Adjustment Process

The Prison HC Fund stock characterizes the fund appropriated for the operation of prison health care (Figure 81). In 2000, the budget for prison health care was $714 million[63] (Figure 82). This translates into a $4,500 average health care cost per prisoner per year. Figure 82 shows that even when the prison population only grew slowly before 2006, health care budget increased considerably. When the prison population started to decline after 2010, health care budget plummet before the growth

[62] Refer to California Budget Process on http://www.dof.ca.gov/budget/Budget_Process/index.html for more details.

[63] Prison health care budget was not presented in the Governor's budget prior to year 2000. $714 million is adjusted for real price with 2009 as the base year. All the financial terms in this thesis is adjusted in real price with year 2009 as the base year with GDP deflator obtained from U.S. Bureau of Economic Analysis, Gross Domestic Product: Implicit Price Deflator [GDPDEF], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/GDPDEF, on January 21, 2017.

resumed. After 2010, prison health care budget continued to grow although prison population continued to drop. Based on CDCR's projection, the expected prison population is used as the input to estimate the budget adjustment for prison health care fund for the next fiscal year (LAO, 2000a). "Expected fractional growth rate of prison pop" is formulated with a built in TREND function[64] (Figure 81). The averaging time taken to adjust the expectated fractional growth rate of prison population is set as five years. "Expected total prisoners" is the product of total prisoners and expected fractional growth rate of prison population. "Indicated total HC fund" is the product of the expected total prisoners and average HC cost per prisoner. Due to high budget pressure and lack of systematic reporting system, the time taken to realize "indicated total HC fund" is set as 15 years. When the indicated total health care fund differs from the existing fund, a gap appears. The fund adjustment process takes about two years.

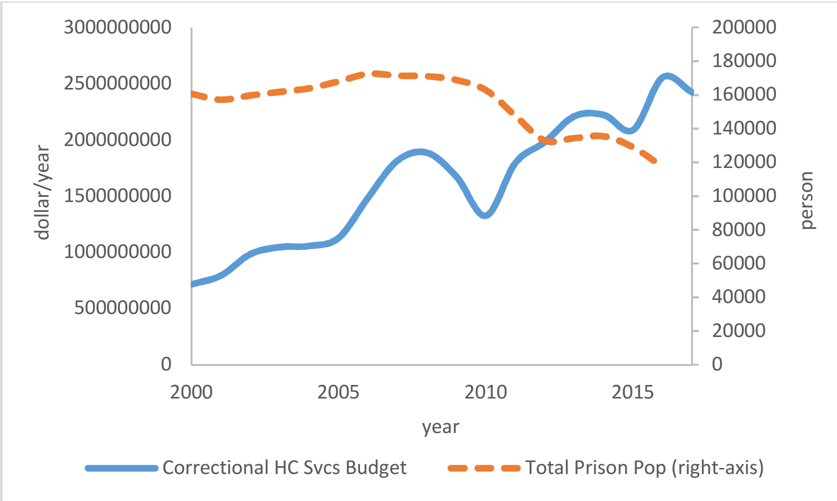


Figure 82 Historical Data: Correctional Health Care Services Enacted Budget and Total Prison Population

Source: California Department of Finance Enacted Budget 2000 – 2016

The drivers for the increasing health care spending include the size of the prison population, health status, and age of prisoners (PEW, 2014). However, health care spending is also driven up by medical cost inflation due to technological advancement, medical equipment, and pharmaceutical costs. The medical cost inflation is reported to be 4% in 2015 and 2016 (Aon Hewitt, 2016). Thus, the average health care cost per prisoner is modeled as a stock. The annual change in prison health care cost implies a general inflation encompasses the factors mentioned earlier on. The growth rate for average health care cost per prisoner is set at 0.05 per year to fit the historical data (Figure 83). Note

[64] TREND function is used to model growth expectation. This function take expectation formation process and average time people collect and analyze data, historic time horizon people use, and time required to react to changes into consideration. For further details, refer to Sterman (2000) p. 634-636.

that correctional health care costs (Figure 82) also consist of dental care, ancillary health care[65], and relevant management expenditures. Thus, the Ave HC Cost per Prisoner stock should be lower than the historical data in Figure 83.

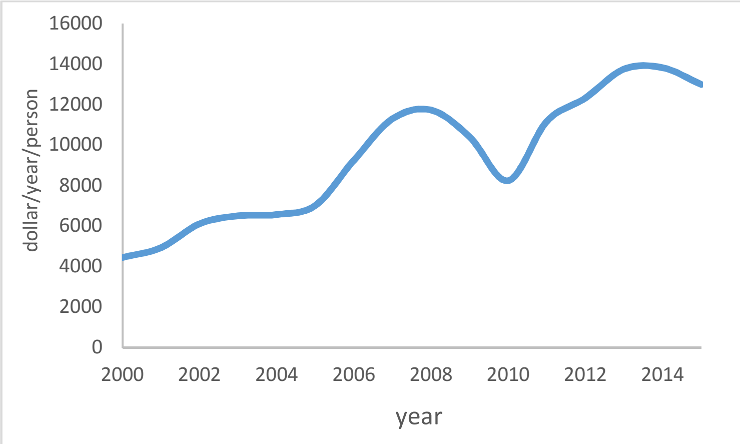


Figure 83 Calculated Data: Correctional Health Care Cost per Prisoner

Source: Author's calculation with California Department of Finance Enacted Budget 2000 – 2016 and Prison Population data from CDCR Annual Prisoners and Parolees Reports 1987 – 2010 and CDCR Monthly Pop Report (December) 2011 – 2015

3.2.6.2 Adjustment of Infectious Disease (ID) Treatment Capacity

This section presents the adjustment process of ID treatment capacity. After prison HC fund is allocated, resources are prioritized to adjust ID treatment capacity to contain possible outbreaks.

The Infectious Disease Treatment Capacity stock is defined as the number of prisoners can be treated under the given capacity (Figure 84). "Chg in capacity for ID" is a bi-flow because the capacity can increase or decrease according to the needs for such treatment. The bi-flow takes the lesser value of "funded ID tmnt capacity adjustment" or "gap in ID tmnt capacity". "Funded ID tmnt capacity gap" is contingent upon the availability of prison HC fund and the per capita cost of ID treatment. "gap in ID tmnt capacity" is the gap between the needs for ID treatment and the existing capacity. "Needs for ID tmnt" refers to the average number of prisoners wID smoothed over one year. The formulation of the bi-flow explains that even if the available prison HC fund to finance additional ID treatment capacity exceeds the capacity needed, only the capacity need will be added or vice versa.

[65] Refers to health care services provided to support the work of a primary physician. These services can be classified into three categories: diagnostic, therapeutic, and custodial.

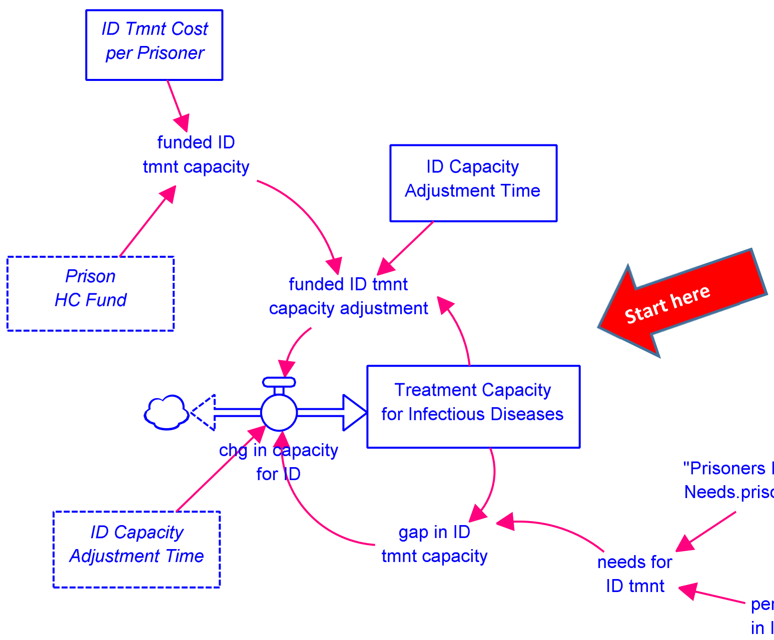


Figure 84 Fund Allocation and Capacity Adjustment Process for Infectious Disease Treatment

The delay in adjusting ID treatment capacity is set at four years because it takes time to observe, collect, report, and recruit medical personnel. The perception delay symbolizes the delay in perceiving actual needs due to inadequate screening, diagnosing, tracking, and follow-ups (Kelso, 2008). All capacity adjustment times are modeled as stocks because after the implementation of the Realignment policy (Section 3.3.4.2 to 3.3.4.4), all the capacity adjustment times will decline gradually. Before the Realignment policy, all the capacity adjustment times are constant.

Figure 85 shows that the medical cost[66] per prisoner has been increasing over time. As medical costs inflate over time, so is the treatment cost for ID.

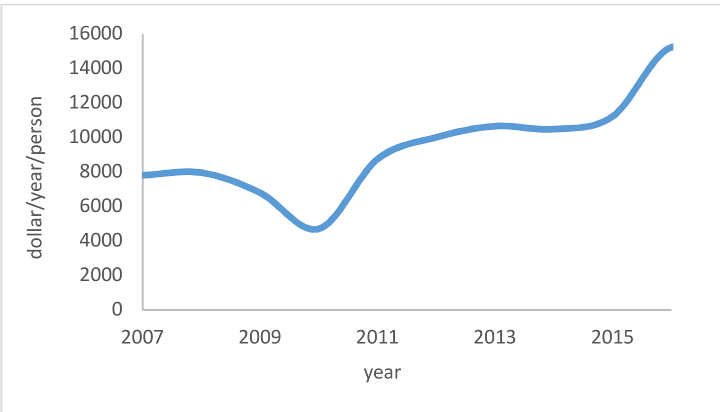


Figure 85 Medical Cost per Prisoner

Source: California Department of Finance Enacted Budget 2007 - 2016

[66] Refer to Appendix J for a comprehensive definition for CDCR medical services for inmates.

The stock-and-flow structure in Figure 86 models the ID treatment costs adjustment process. The bi-flow, "chg in ID cost per prisoner", is the product of the growth rate of average HC cost and the effect of ID treatment capacity. We expect that ID treatment cost per prisoner inflates at the same rate as the HC cost. ID treatment capacity adequacy, which is a ratio of Infectious Diseases Treatment Capacity and "needs for ID tmnt", has an inverse relationship with ID treatment cost. "Needs for ID tmnt" is the perceived prisoners wIDs with a delay because it takes time to observe and collect information, especially the reporting structure in prison HC is incomplete. The perception delay in ID treatment needs is set as one year.

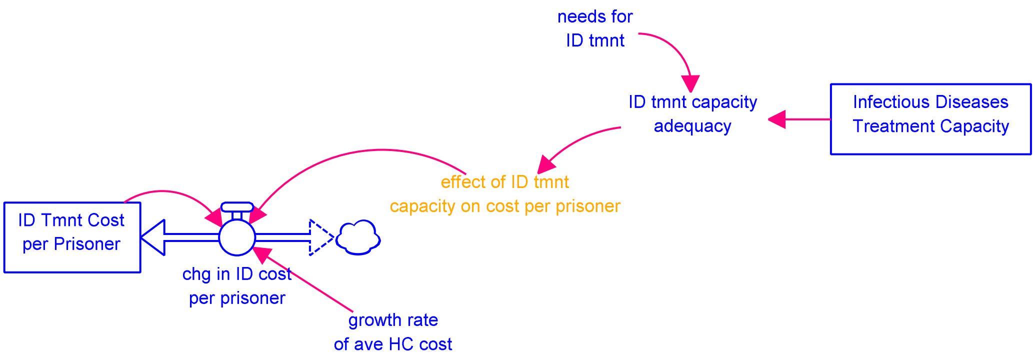


Figure 86 Adjustment Process of Infectious Disease Treatment Cost per Prisoner

The effect of ID treatment capacity on treatment cost is expressed with a table function (Figure 87).

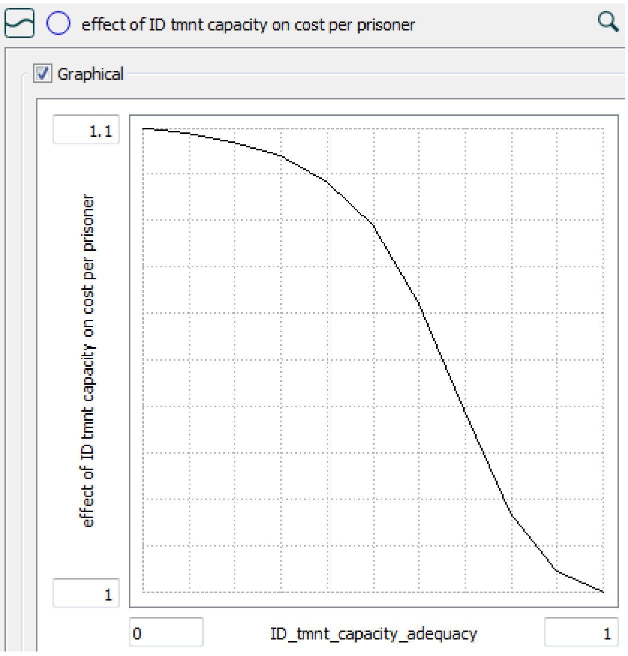


Figure 87 Effect of Infectious Diseases Treatment Capacity on Treatment Cost per Prisoner

The input parameter to the horizontal-axis of table function in Figure 87 is "ID tmnt capacity adequacy". The horizontal-axis ranges between zero and one. The output is reflected on the vertical-axis, which ranges between one and 1.1. This graph reads that when ID treatment capacity adequacy equals to or exceeds one, the ID treatment cost per prisoner remains unchanged. If the treatment capacity falls below one, the treatment capacity fails to meet the needs. Then, the cost per prisoner rises.

3.2.6.3 Adjustment of Chronic Disease (CD) Treatment Capacity

This section explains the capacity adjustment process for CD treatment. After distributing prison HC fund to ID treatment, the remaining prison HC fund is then allocated to fund CD treatment capacity (Figure 88).

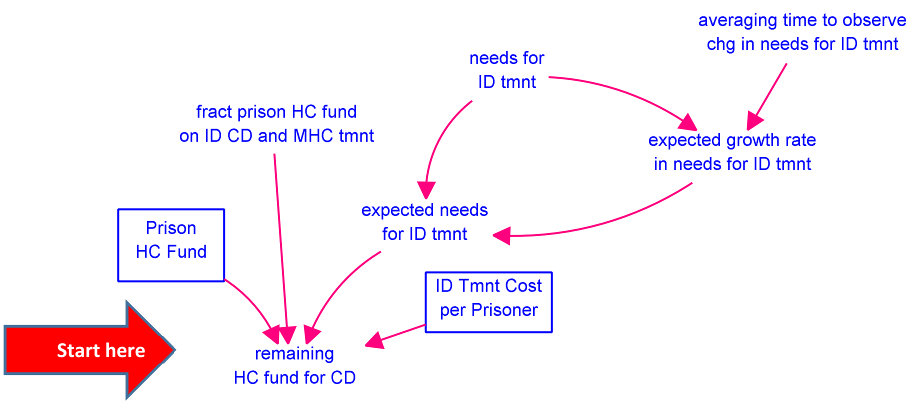


Figure 88 Budget Allocated to Chronic Disease Treatment after Funding Infectious Disease Treatment

“Remaining HC fund for CD” is expressed with the following equation.

MAX (Prison_HC_Fund - (expected_needs_for_ID_tmnt * ID_Tmnt_Cost_per_Prisoner * fract prison HC fund on ID CD and MHC tmnt), 0) (3-6)

where,

expected needs for ID tmnt
= needs_for_ID_tmnt * (1 + expected_growth_rate_in_needs_for_ID_tmnt)

Expected growth rate in needs for ID tmnt
= **TREND** (needs_for_ID_tmnt, averaging_time_to_observe_chg_in_needs_for_ID_tmnt, 0)

Averaging time to observe chg in needs for ID tmnt = 1 year

fract prison HC fund on ID CD and MHC tmnt = 0.9

Equation 3-6 reads that “remaining HC fund for CD” either takes remaining HC fund after allocation for ID treatment or zero. Fund allocated to ID treatment is estimated based on the expected needs for ID treatment and ID treatment cost per prisoner. Expected needs for ID treatment is the estimated with built-in TREND[67] function. The TREND function estimates the fractional growth rate in “needs for ID tmnt” with one year averaging time. As mentioned in Section 3.3.6.1, the reported correctional HC fund also includes spending on dental care, ancilliary care, and management overheads. Hence, only 90% of correctional health care fund is allocated to fund prison HC (Finance, 2006).

[67] TREND is used to estimate the fractional growth rate of a variable. The function reflects how people form expectations, the time taken to collect and analyze data, historic time horizon people use for reference, and the time taken to react to changes in the growth rate (Sterman, 2000).

As indicated in Section 3.2.5.3, a chronic disease is diagnosed if symptoms persist longer than three months. The Chronic Diseases Treatment Capacity is defined as the number of prisoners can be treated for chronic diseases (Figure 89). The capacity is changed through the bi-flow, termed as "chg in capacity for CD". "Chg in capacity for CD" takes the value of either "funded CD tmnt capacity adjustment or "gap in CD tmnt capacity", whichever with a lesser value, divided by the adjustment time. The CD capcity adjustment time is set as four years. "Funded CD tmnt capacity" is the division of the remaining HC fund for CD by CD treatment cost per prisoner. Given the lack of health care capacity in prison, the assessment and diagnosis process will likely take longer. Based on these assumptions, we set the "perception delay in CD tmnt needs" as two years.

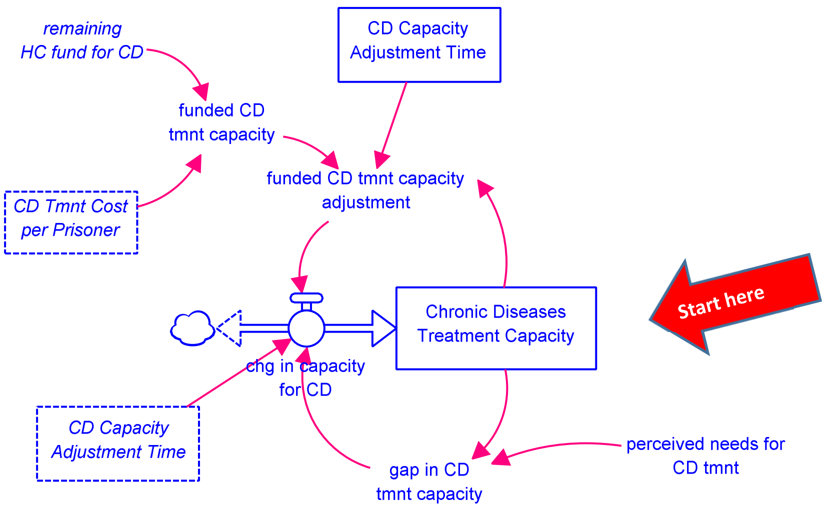


Figure 89 Capacity Adjustment Process for Chronic Disease Treatment

"Timely access is not assured. The number of medical personnel has been inadequate, and competence has not been assured. Accurate and complete patient records are often not available when needed. Adequate housing for the disabled and aged does not exist. The medical facilities, when they exist at all, are in an abysmal state of disrepair. Basic medical equipment is often not available for use. Medications and other treatment options are too often not available when needed. Custody resources needed to facilitate access to care and provide the security necessary to deliver health care safely in a prison setting are inadequate, lacking both the personnel and structure to ensure timely access to health care services (Kelso, 2008, p. 2)."

According to the Receiver's Turnaround Plan, the leading cause of preventable deaths, which was 17% in 2006, were due to chronic condition (Kelso, 2008). The reasons cited for the lack of treatment for chronic conditions are personnel's incompetence and inadequacy, and reporting system failure.

The cost to care for elderly prisoners is nearly three times of the cost of the younger prisoners (Kinsella, 2004). Figure 90 shows that CD treatment cost per prisoner grows at the same rate as prison HC cost. The growth in CD treatment cost per prisoner is also influenced by the change in average age in prison. "Effect of relative age on CD cost per prisoner" is illustrated in Section 3.2.5.3.

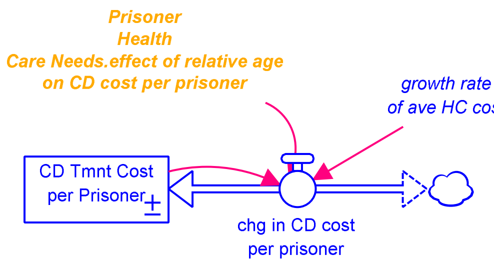


Figure 90 Adjustment Process of the Chronic Disease Treatment Cost per Prisoner

3.2.6.4 Adjustment of Mental Health Care (MHC) Capacity

This section presents the adjustment process of MHC capacity. It has a similar structure to the adjustment process of CD treatment capacity except that the definition of MHC capacity is based on severity instead of number of persons (Figure 91). The change in MHC capacity hinges on the available of prison HC fund after the allocation to ID and CD treatment capacity.

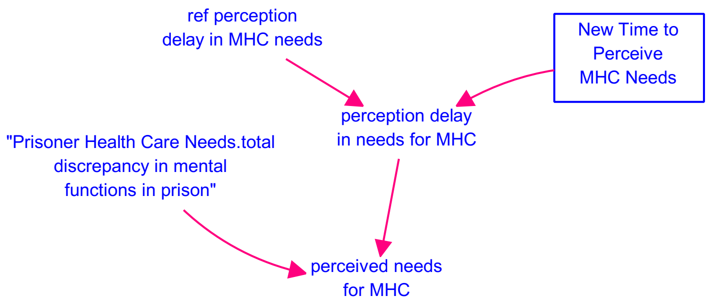


Figure 91 Determination of the Needs for MHC

Figure 91 shows that the perceived needs for MHC is determined by the discrepancies of mental functions of prisoners wMI with a perception delay. Considering that the definition of and difficulty in MI diagnosis, the time taken to update the perceived needs for MHC is thus set at four years. Considering that the perception delay in perceiving the needs for ID and CD treatment needs, which are one and two years, the perception delay in perceiving needs for MHC is considerably longer.

As the needs for MHC is defined by severity, the cost for MHC will be assessed by mental function improvement per financial resources invested (Figure 92). Under the assumption that the treatment at MHC is effective, each mental function discrepancy reduced costs $24 per score[68].

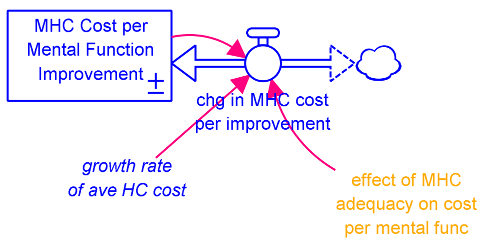


Figure 92 Adjustment Process of Mental Health Care Cost per Mental Function Improvement

As in the previous two sections, cost for MHC grows consistently with the health care cost inflation. MHC treatment capacity adequacy affects MHC cost negatively. The lower the MHC capacity

[68] Refer to Appendix H for detailed calculation.

adequacy, the faster MHC cost increases. When prisoners wMI fail to receive treatment, their illnesses progress. This inverse relationship between MHC capacity and treatment cost is presented in the table function in Figure 93.

3.2.6.5 The *Effect of Mental Health Care Adequacy on Cost per Mental Function*

The relationship describes that when the MHC capacity is below one, the cost per mental function improvement (or per mental function discrepancy reduced) will increase (Figure 93). MHC capacity adequacy is defined as the ratio of MHC treatment capacity and the perceived needs for MHC. When the capacity adequacy gradually approaches one, the cost per mental function improvement will be returning to the initial value. The lack of adequate MHC capacity leads to the increase in MI severity. More severe MI leads to higher treatment cost.

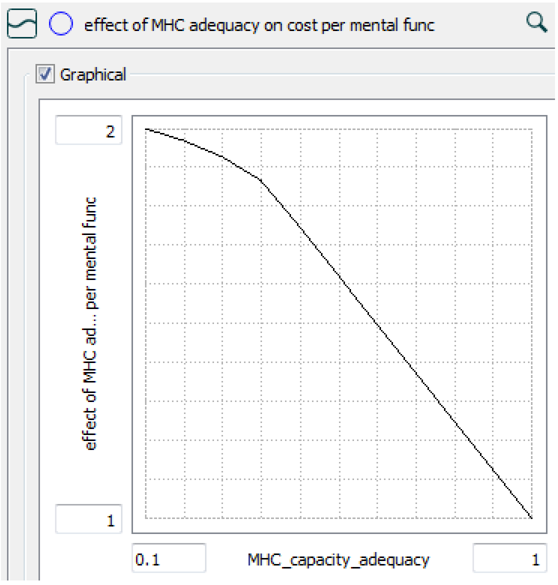


Figure 93 Effect of Mental Health Care Adequacy on Mental Health Care Cost per Mental Function Improvement

3.2.6.6 The *Effect of Mental Health Care Adequacy on Mental Functions of Prisoners with Mental Illness*

MHC adequacy also affects the mental functions of prisoners wMI (Figure 94). In the **Mental Profiles** module (see Section 3.2.4.2, Figure 68), there is an outflow named "chg in mental func in prison". MHC adequacy has a negative effect on the reduction in mental functions of prisoners wMI. When MHC capacity is inadequate to treat the prisoners in need of treatment, i.e. when "MHC capacity adequacy" is less than one, the mental functions of prisoners wMI deteriorate at a faster rate than it would have been. Thus, the mental functions stock of prisoner wMI depletes at a higher rate. On the contrary, if MHC capacity is adequate, i.e. when it is one or above, the effect on the outflow will be a negative. This means that the outflow of mental functions becomes an inflow of mental functions.

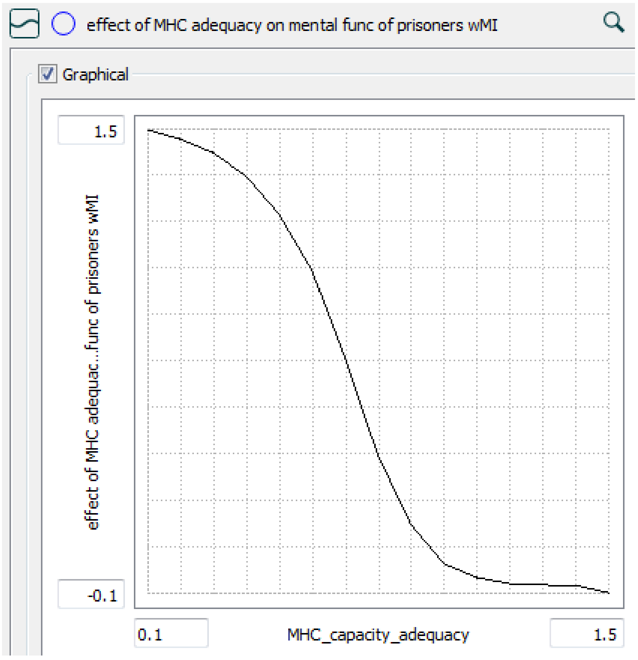


Figure 94 Effect of Mental Health Capacity Adequacy on Mental Functions of Prisoners with Mental Illness

3.2.6.7 The *Effect of Mental Health Care Capacity Adequacy on Mental Illness Screening in Prison*

This section explains the effect of MHC capacity adequacy on MI screening effectiveness in the prison. The table function in Figure 95 presents the positive relationship between these two parameters. The input parameter to the horizontal-axis of this table is MHC capacity adequacy. The values on the horizontal-axis ranges between zero and one. The output is reflected on the vertical-axis with a range of values between 0.2 and 0.9. The nonlinear positive relationship in the graph describes that when MHC adequacy falls below one, the effectiveness in screening and identifying the onset of MI will be lower than 0.9. The maximum screening effectiveness is set at 0.9 owing to the possibility of misdiagnosis. When MHC adequacy becomes zero, the screening effectiveness in prison will reduce to 0.2. This means that only 20% of the fraction of prisoners wo MI who develop MI are diagnosed and move into the Prisoners wMI stock. Undiagnosed prisoners wo MI remain in the Prisoners wo MI stock. Despite the deterioration of mental functions, prisoners wo MI who suffer from mental illness do not receive MHC.

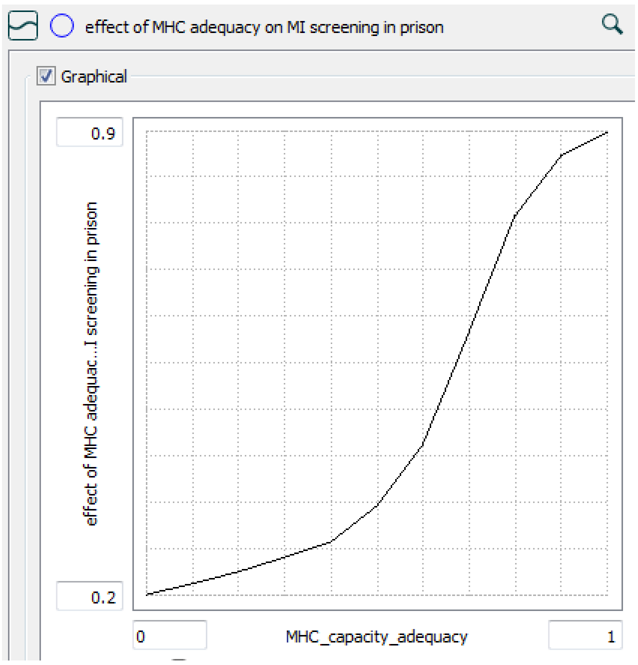
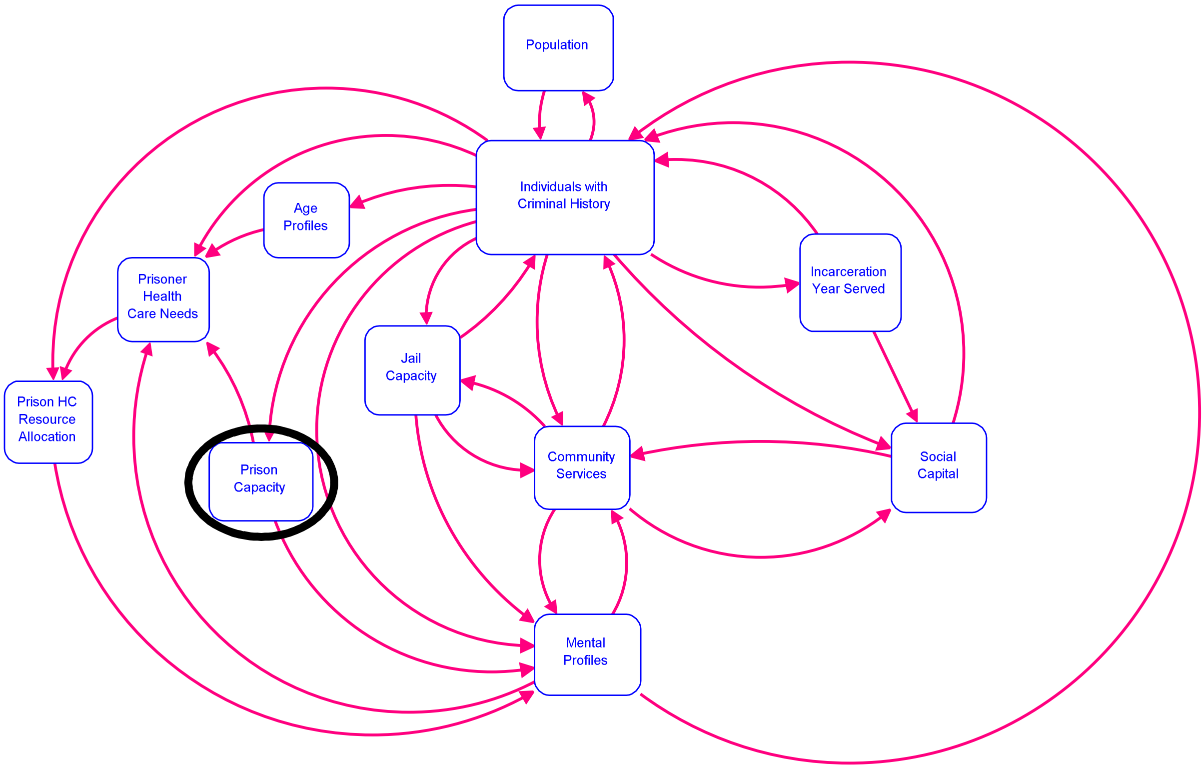


Figure 95 Effect of Mental Health Care Treatment Capacity Adequacy on Mental Illness Screening in Prison

3.2.7 Prison Capacity

This module explains the adjustment process of prison capacity and the effects of prison utilization on three areas: mental illness development in prisons, mental functions deterioration, and infectivity of infectious diseases in prisons.



3.2.7.1 Adjustment Process of Prison Capacity

Figure 96 shows the prison capacity adjustment through a first-order structure with a negative feedback loop. This structure will generate a goal-seeking behavior with the total number of prisoners as the goal of the structure. Usually "bed" is the unit used for prison capacity. As each prisoner is assigned to one bed, our model adopts "person" as the unit for prison capacity to be consistent with the unit used for the stocks of prisoners in other part of the model. When the gap appears because the prison capacity is below the actual number of prisoners, prison capacity increases through the "chg in prison capacity" bi-flow to meet the goal over a delay. The bi-flow increases or decreases the stock, depending on the gap. If the gap is negative due to an excess of capacity, prison capacity will be reduced by converting some facilities for other use. The "time to adjust prison capacity" represents the delay in perceiving the need for prison expansion, acquiring new budget, pre-planning, and actual construction process. The budget acquiring process takes about two years[69]; the construction of a new

[69] As stated in Section 3.2.6.1, "California adopts the budget change proposal process. Under this budgetary process, the department prepares a proposal for budget change in the end of the year. This proposal will undergo a review process within CDCR before getting an approval from the overseeing agency. Then, the

prison may take up to a year for pre-construction planning and two years to build the prison (Kelso, 2008). Depending on the length of the perception delay, adjusting prison capacity may take more than four years. Martin et al. (2014) report that jail construction projects usually takes five to seven years. Considering that California is under immense financial pressure, the size and security requirements for prison are higher than jail, the time to adjust prison capacity may be longer than the adjustment time for jail. Hence, we set "time to adjust prison capacity" as 12 years.

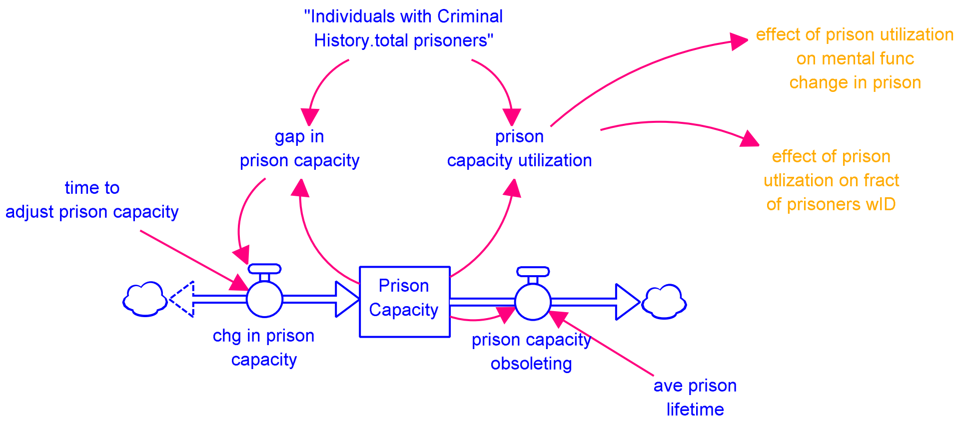


Figure 96 Prison Capacity Adjustment Process and the Effects of Prison Capacity Utilization

The outflow from Prison Capacity characterizes the natural wear-and-tear of prison facility. Through the survey, O'Connor (2004) discloses that the largest concentration of buildings in her sample, which was 227 buildings, fell in the age category of 76-100 years. Most of the public schools in the United States were abandoned by the age of 60. With these information as a proxy, we assign 60 years as the value for "ave prison life time".

proposal will be submitted to the Department of Finance, followed by committee review and Legislative Analyst Office's recommendation. Then the final budget will be announced in the mid-year." After fund allocation, prison expansion project starts.

3.2.7.2 The *Effect of Prison Utilization on Mental Functions Deterioration among Prisoners wMI*

In 1987, California's prison utilization was 173% of the design bed capacity (Section 3.2.2.1, Figure 30). Due to the delay in new capacity expansion, the prison capacity constantly lagged behind the prison population. Consequently, prison capacity utilization rose to almost 200% from end of 1990s to early 2000s.

Prison overcrowding causes more stress to the prisoners wMI, whose mental functions are already deteriorating. Increasing capacity utilization leads to further deterioration in mental functions. Figure 97 shows the effect of prison capacity utilization on the change in mental functions among prisoners. Normally, prisoners wMI and prisoners wo MI lose two score per person per year and 0.5 score per person per year. This effect influences the outflows from Mental Functions of Prisoners wo MI and Mental Functions of Prisoners wMI stocks in the **Mental Profiles** module (see Section 3.2.4.2).

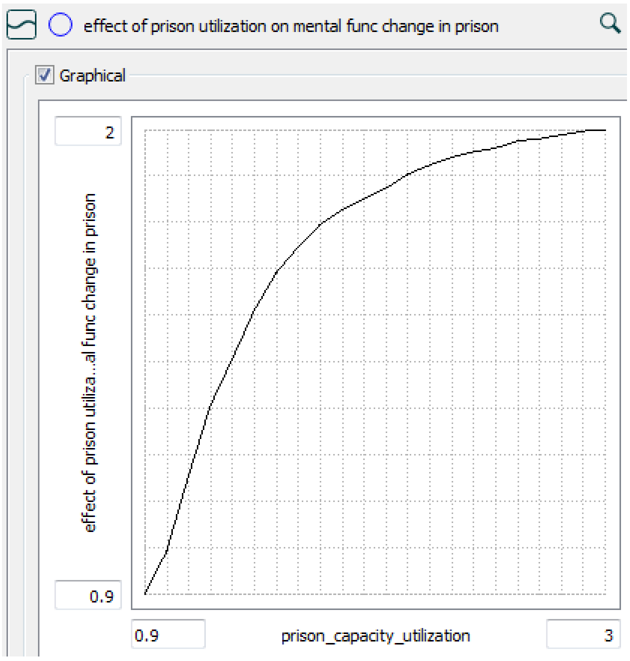


Figure 97 Effect of Prison Utilization on Mental Functions Change in Prison

The input parameter to the horizontal-axis of the table function in Figure 97 is prison capacity utilization. The horizontal-axis ranges between 0.9 and three. The output yields the corresponding value on the vertical-axis, which ranges between 0.9 and two. This graph describes a positive relationship between prison capacity utilization and prisoners' mental function loss. When prison capacity meets the prison population size, prison capacity utilization equals to one. Then, the mental function loss per prisoner equals to the normal mental function loss per year. However, when prison capacity utilization increases and exceeds one, mental function loss per prisoner increases. If prison capacity utilization reaches three, each prisoner loss twice the normal mental functions per year than it would otherwise have been. On the contrary, if prison capacity becomes excessive, utilization level falls below one. In such case, mental function loss per prisoner reduces slightly.

3.2.7.3 The *Effect of Prison Utilization on Infectious Disease Development*

Prison capacity utilization affects the infectivity of infectious diseases. The more crowded the prison is, the higher the chances for infectious diseases to spread. Figure 98 captures this relationship.

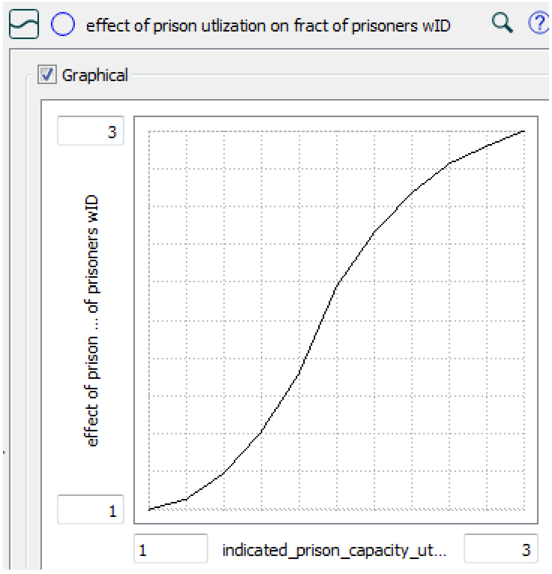
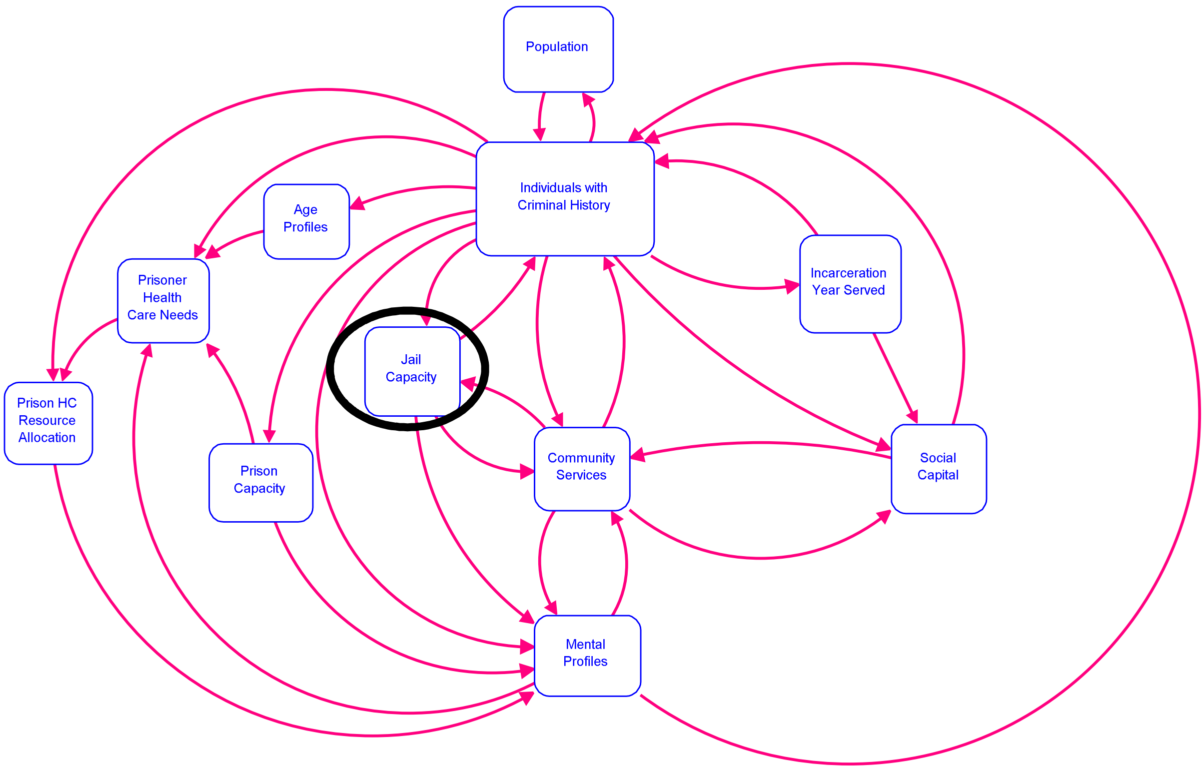


Figure 98 Effect of Prison Capacity Utilization on the Development of Infectious Diseases (ID)

The input parameter to the table function in Figure 98 is prison capacity utilization. The output parameter, which is the effect on fraction of prisoners contracted ID, is shown on the vertical axis with corresponding numerical values. When prison capacity equals to the prison population, i.e. one on the horizontal axis, the fraction of prisoners infected remains at the normal value. As the prison utilization increases and over the designated capacity, the fraction of prisoners being infected increases.

3.2.8 Jail Capacity



3.2.8.1 Adjustment Process of Jail Capacity

The adjustment process of jail capacity is similar to that of the prison capacity. 33% of California county jail systems that are operating under court-ordered population cap are housing 65% of the jail population (Lawrence, 2014). Contrary to the widely held belief, the jail population did not increase as much as expected over time. Statewide jails are operating at 105% of the rated capacity[70]. Overcrowding is not as prevalent in jails as in prisons mainly due to two reasons: (1) increased state spending on jail facilities expansion and (2) the use of early release to regulate jail offender population. The State allocated grants under AB 900 and SB 1022 for $1.2 billion and $500 million in 2007 and 2015 respectively for jail capacity expansion. These construction funds may add a total of about 12,000 jail beds upon completion (Martin et al., 2014).

Some counties see the population cap as a benefit as it becomes the basis to request for funds from the state government to expand jail capacity. At the same time, the court grants the sheriffs

[70] According to American Jail Association, "rated capacity refers to the number of inmates or beds determined by an official body and often based on architectural design and construction. Rated capacity represents the number of inmates at which a facility can operate safely. This number is usually determined by the agency head or facility supervisor." Retrieved from https://members.aja.org/About/StatisticsOfNote.aspx on June 07, 2017

discretionary rights to release jail detainees or offenders earlier[71]. Given the long delay in planning for and construction of jail facilities, i.e. about five to seven years (Martin et al., 2014), early release becomes a convenient measure to regulate jail capacity.

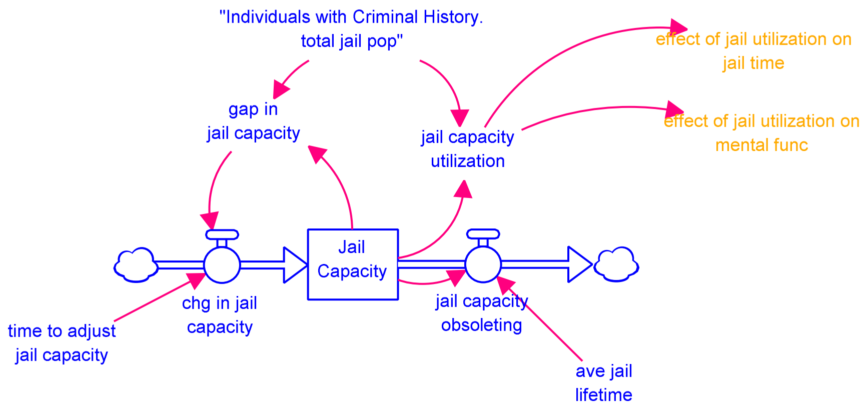


Figure 99 Jail Capacity Utilization and Jail Release

The formulation in Figure 99 presents a simple first-order structure with a negative feedback loop to model the jail capacity adjustment process. "Jail capacity utilization" is the ratio of jail capacity and total jail population. When jail capacity fails to accommodate the growing jail population, jail utilization increases. The use of early lease of jail offenders is attributable to the overutilization of jail capacity. Consequently, this coping mechanism shortens the jail time served by jail offenders.

[71] Generally, the detainees or offenders are released earlier based on the following priority adapted from Lawrence (2014):

- Unsentenced/unconvicted persons charged with misdemeanors;
- Sentenced misdemeanants in descending order of the percentage of their sentence already served;
- Unsentenced persons charged with felonies, in ascending order of the amount of bail; and
- Sentenced felons in descending order of the percentage of their sentence already served for felons sentenced for crimes against property and felons sentenced for crimes against persons.

3.2.8.2 The *Effect of Jail Utilization on Jail Time*

Figure 100 displays the inverse relationship between of jail utilization and jail time. The input parameter to the horizontal axis is "jail capacity utilization". The output is the effect on jail time showing on the vertical axis. Under normal circumstances, when jail capacity utilization equals to one, capacity is sufficient to accommodate the number of jail offenders. Then, jail offenders serve the normal jail time. When jail utilization increases above one, the effect on jail time becomes smaller. Thus, jail offenders serve smaller fraction of their sentences in jail.

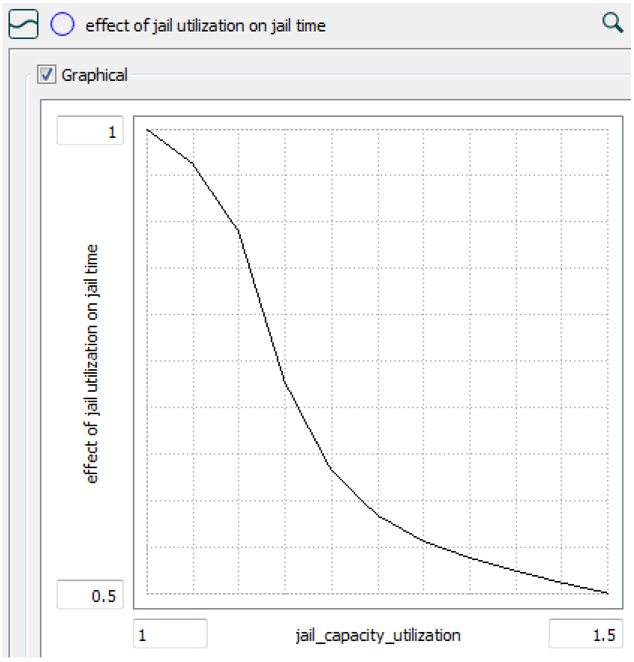


Figure 100 Effect of Jail Capacity Utilization on Jail Time Served by Jail Offenders

3.2.8.3 The *Effect of Jail Utilization on Mental Functions Deterioration among Jail Offenders*

Jail incarceration also influences mental functions of jail offenders albeit a relatively shorter jail time served compared to prisoners. Figure 101 demonstrates the relationship between jail capacity utilization and mental function loss of jail offenders. Since this effect is similar to the effect of prison capacity utilization on prisoners' mental functions loss in Section 3.2.7.2, explanation is omitted in this section.

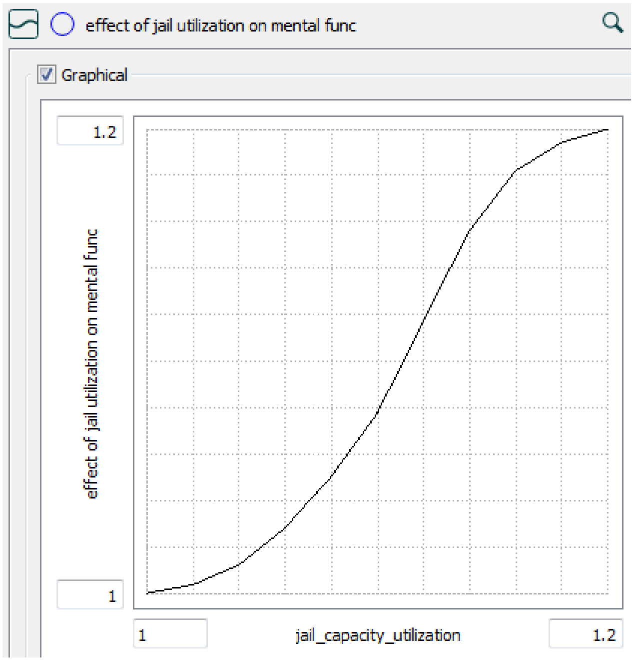
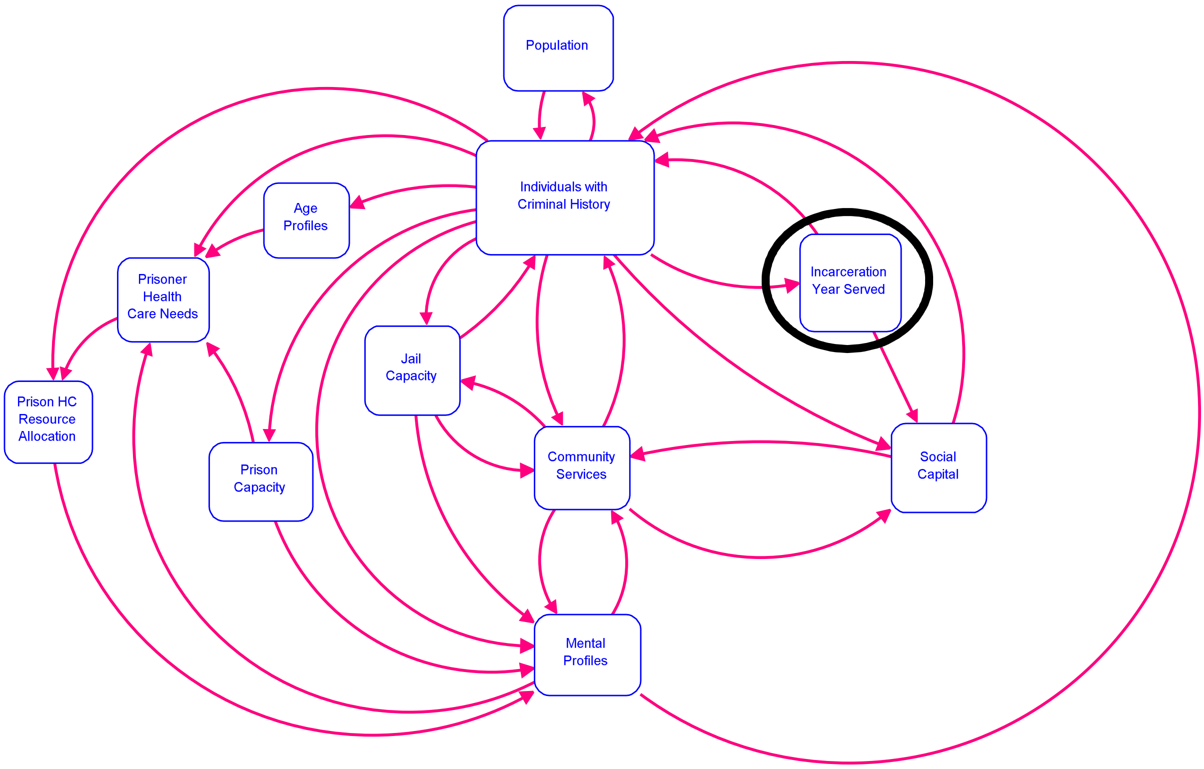


Figure 101 Effect of Jail Capacity Utilization on Mental Function Change of Jail Offenders

3.2.9 Incarceration Year Served

This module presents the accumulation process of incarceration years of individuals with criminal history and the effects of imprisonment on various aspects of the criminal justice system. The formulation in this module intends to capture the dynamics associated with the Three-strikes Law and its effects on various aspects of the criminal justice system and public health.



Ever since the implementation of the Three-Strikes Law in 1994, the average total incarceration years of prisoner is increasing. Additionally, the high return-to-prison (RTP) rate also contributes to the increment of incarceration years. It is important to distinguish the actual time served in prison or jail from sentence length. Time served in prison or jail refers to the total time offenders actually spend during incarceration, whereas sentence length is decided by the court at the end of the adjudication process. Time served in prison is usually shorter than the sentence granted due to the availability of various credit-earning programs to incentivize offenders to abide to the prison rules and to participate in rehabilitative programs. The comparison of sentence length and actual incarceration time served is presented in Figure 32 in Section 3.2 .2.1.

Figure 102 presents an overview of the structures in this module. Most of the structure in this module resembles the **Individuals with Criminal History** module, which is the core module. Thus, only the differences between these structures will be illustrated.

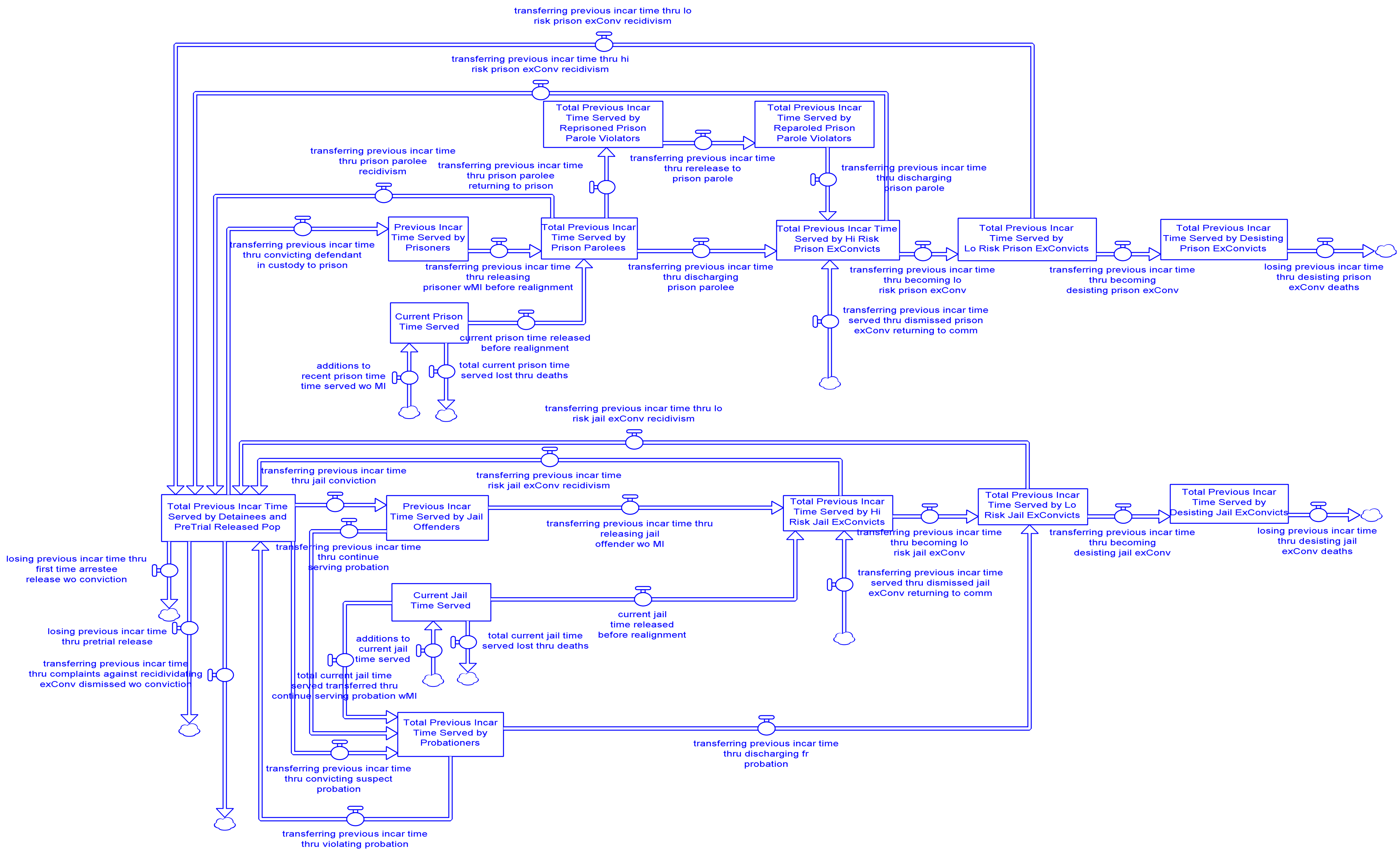


Figure 102 Overview of the Simplified Stock-and-Flow Structure in Incarceration Year Served Module

3.2.9.1 Current Prison Time Served by Prisoners with Mental Illness

This section presents the coflow structure of the time served by prisoners wMI for the current sentence. There are two inflows to the stock: “current time served transferred thru devMI” and “additions to recent sentence time served wMI” (Figure 103).

“Current time served transferred thru devMI” characterizes the transfer of the average time prisoners wo MI have served *up until* they become mentally ill when they move to the stock of Prisoners wMI. The second inflow to the stock, “addition to current prison time served wMI”, characterizes an annual increase in current prison time served. This inflow symbolizes the accumulation process in which each prisoners wMI gains one year in prison time served for each year they stay behind bars. The prison time served accumulation process for each of the prisoner will only cease after they leave the prisons.

When the prisoners wMI are released to serve parole, they leave with the time they finish serving in the prisons to the “Total Incarceration Time Served by Prison Parolees wMI” stock. The time served transferred by these prisoners is termed as “ave current prison time served wMI”, which is a ratio of the Total Incarceration Time Served by Prison Parolees wMI stock and the number of prisoners wMI from the **Individuals with Criminal History** module (see Section 3.2.2.1). The “prison time served wMI” from the **Individuals with Criminal History** module differs from the “ave current prison time served wMI” in this section as the former refers to the average time that *has been served* while the latter refers to the average time that the prisoners who *are still serving*. Therefore, when prisoners wMI die, the average time that prisoners wMI are serving prior to their deaths is deducted through the “total current prison time served lost thru deaths wMI” outflow.

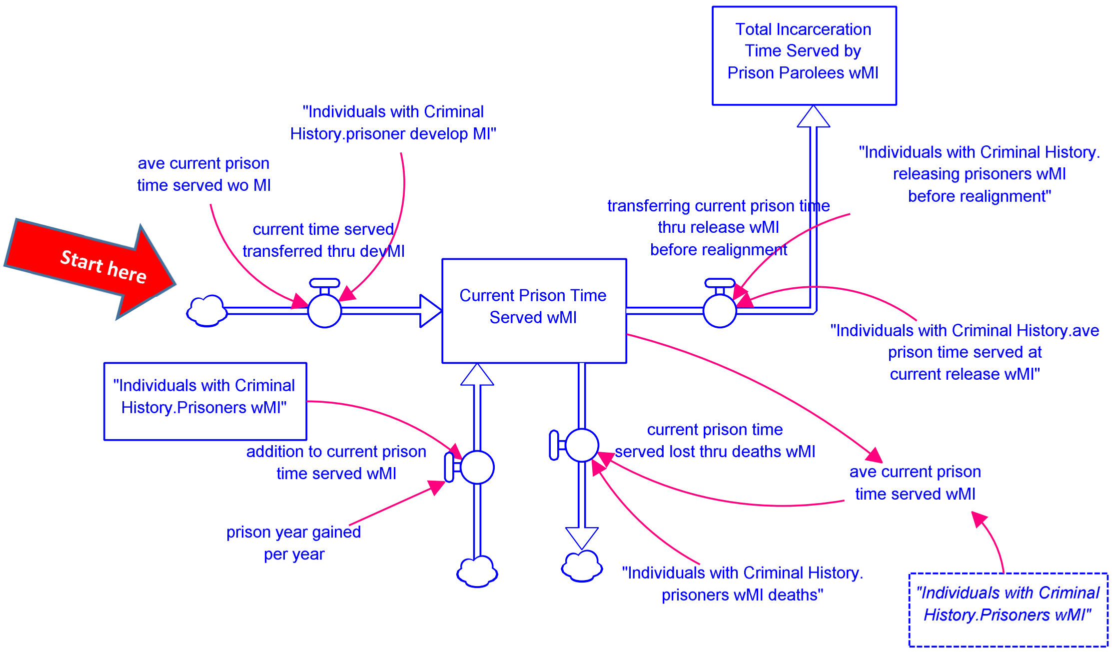


Figure 103 The Accumulation Process and Transfer of Current Prison Time Served by Prisoners with Mental Illness from Prison to Parole

3.2.9.2 Previous Incarceration Time Served by Prisoners with Mental Illness

The Previous Incarceration Time Served stock represents the cumulative previous incarceration year prisoners wMI that have accumulated before they enter prisons (Figure 104). Previous incarceration year served is defined as *any time the convicts have previously served in prison or jail, including the time spent in jail before conviction*.

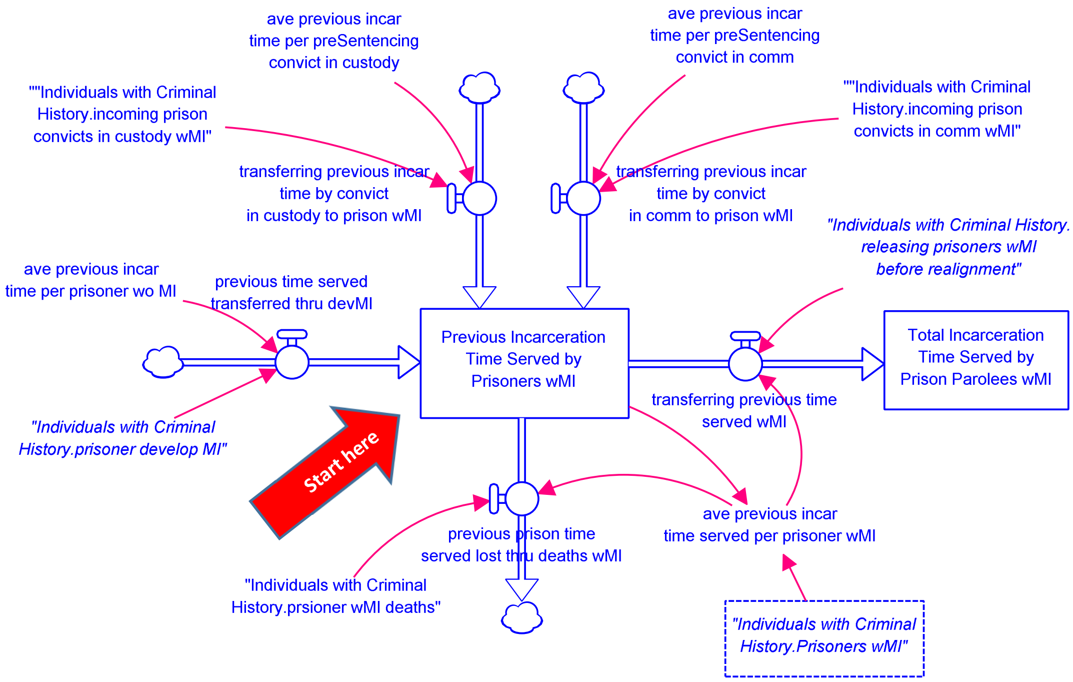


Figure 104 Accumulation Process and Transfer of Previous Incarceration Time Served by Prisoners with Mental Illness from Prison to Parole

The previous incarceration time served of each prisoners wMI is blended in the stock. When these prisoners leave the prison due to deaths or release, each of them leave with the average previous incarceration time served per prisoner wMI.

The Previous Incarceration Time Served by Prison Parolees wMI stock integrates the previous and current time served by the prisoners when they become parolees. When these parolees leave the parolee stock, they leave with an average previous incarceration year served that reflects their incarceration history. The incarceration history implies the magnitude of prisoners' criminal history. The longer the average previous incarceration year served signifies the increase in recidivism or fraction of prisoners committing more serious offences.

The prisoners wo MI, jail offenders wMI, and jail offenders wo MI have similar structures to that of prisoners wMI, except that jail offenders do not serve parole. Similarly, the Total Incarceration Time Served by High Risk Jail ExConv wMI and Total Incarceration Time Served by High Risk Jail ExConv wo

MI stocks integrate the previous incarceration years with the current prison time served of each jail offenders.

3.2.9.3 Total Previous Incarceration Time Served by Arrestees

This section demonstrates that accumulation process of total previous incarceration time as an endogenized process. The Arrestees stock is the first contact point the individuals establish with the correctional system. Unlike other coflow structure, the Total Previous Incar Time Served by Arrestees does not have an inflow that depends on exogeneous input because first-time arrestees bring zero previous incarceration time served with them when they are arrested (Figure 105). The cumulative incarceration time served behind bars increases through the increasing time served in prison or jail. The longer the offenders stay in prison or jail, the more the incarceration time served accumulates. When these individuals recidivate through new crime commitment, they transfer the total previous incarceration time served to the Total Previous Incar Time Served by Arrestees stock. Owing to the Three-strikes Law, the circulation has an reinforcing effect on the average previous incarceration time served by individuals with criminal history. This average previous incarceration time served per individual continues to increase as long as they recycle between custody and community because each time the recividists are convicted, the subsequent sentence lengtht that the recidivists receive will likely be disporportionately longer.

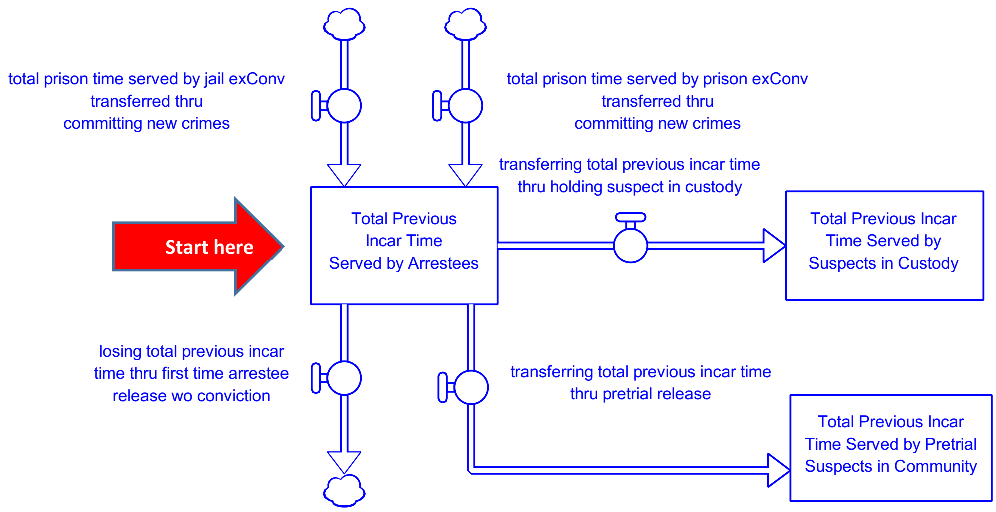


Figure 105 Simplified Accumulation Process of Total Previous Incarceration Time Served by Arrestees

As these arrestees progress through the correctional system, the average previous incarceration time served also moves through the system until they leave the criminal justice system through deaths or desistance.

The average previous incarceration time per prisoners or jail offenders will not increase indefinitely under the Three-strikes law because the maximum time an ex-convict can circulate is two times[72]. For the third offence, the ex-convict will receive a 25-year sentence or life sentence. Figure 75 in Section 3.2.5.2 shows that the size of the second and third striker populations remain relatively stable after 2002. The average prison sentence length also exhibits a steady trend (Section 3.2.2.1, Figure 32). Hence, the increase in average previous incarceration time per prisoners or jail offenders is expected to be moderate for now because the first offenders convicted as third-striker will only be released in 2019. At the time of this study, we do not know the recidivism patterns of the third-strikers.

3.2.9.4 The *Effect of Incarceration Time on Fraction Prison Sentence Conviction*

Previous incarceration time served by recidivists has a positive relationship to the fraction of prison sentence conviction. This relationship is expressed in the table function in Figure 106.

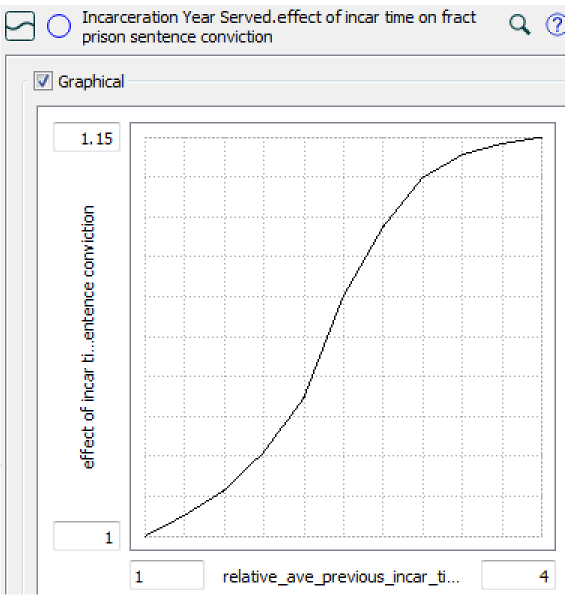


Figure 106 Effect of Average Previous Incarceration Time Served by Recidivist on Fraction of Prison Sentence Conviction

The input parameter to the horizontal axis is the relative average previous incarceration time served per recidivist (see Section 3.2.9.6 for calculation). Recidivists include reoffenders from the parolees, prison and jail ex-convicts stocks. Relative average previous incarceration time served per recidivist is the change in average previous incarceration time served relative to the initial value. The effect of the change in average previous incarceration time served is reflected on the vertical axis. The values of the

[72] Only if the ex-convict has two previous felony convictions. A misdemeanor conviction is not counted as a strike. Theoretically, jail ex-convicts can circulate the system indefinite times that lead to the increase in average previous incarceration time without becoming strikers if they are convicted for misdemeanor offenses. However, jail time is relatively shorter than prison time. Hence, multiple misdemeanor convictions do not increase average previous incarceration time significantly.

horizontal-axis range between one and four whereas the values of the vertical-axis range between one and 1.15. The curve of the graph reads that when the relative average previous incarceration time served equals to the initial value, there will be no effect on the fraction of convicts serving prison sentence. However, when the average previous incarceration time served rises, the fraction of convicts receiving prison sentence also increases.

3.2.9.5 The *Effect of Average Previous Incarceration Time Served by Recidivist on Prison Time Served*

This formulation captures the positive relationship between the average previous incarceration time served by recidivist and prison time served upon the prisoners' release (Figure 107). As the "average previous time per recidivist" increases relative to the initial value, the prison year served per prisoner increases. This formulation accounts for the dynamics between the Three-strikes Law and its impact on the lengthening of imprisonment for the second and third strikers.

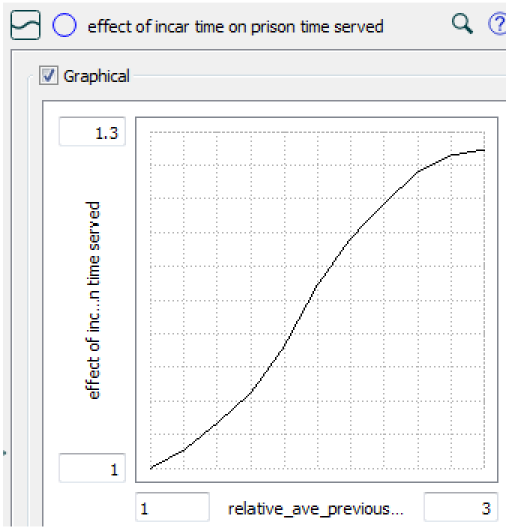


Figure 107 Effect of Average Previous Time Served per Recidivist on Prison Time Served

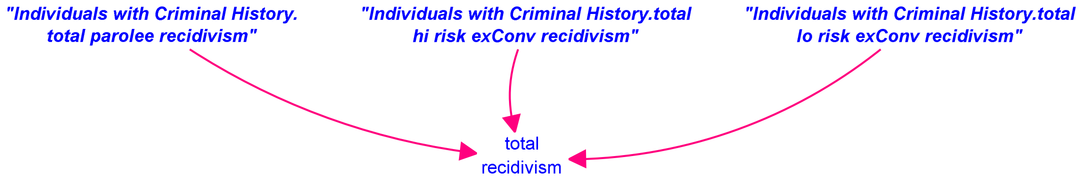
The table function in Figure 107 depicts a reinforcing effect of relative average previous incarceration time per recidivist on the average prison time served. Under the normal condition and assuming that the distribution of types of commitment by the prisoners remain the same, when the average previous incarceration time served per recidivist remains unchanged, the prisoners serve the normal prison time. As the previous incarceration time served increases over time, the average prison time served by prisoners also increases due to Three-strikes Law even if the distribution of types of commitment by the prisoners remain the same.

3.2.9.6 Calculation of Average Previous Time Served per Recidivist

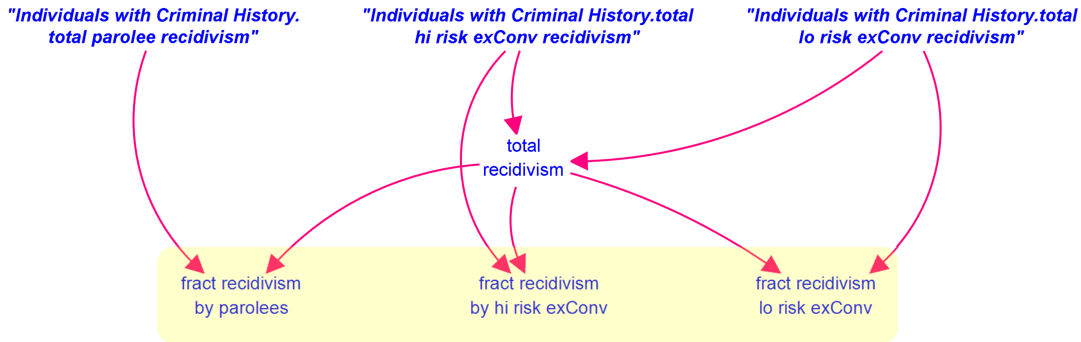
This section describes the calculation of a weighted average of previous time served per recidivist. Weighted average is chosen over regular average because paroleess have the highest recidivism rate within the first year post-release compared to the high-risk and low-risk ex-convicts. Thus, the influence of the recidivism by parolees is assumed to be greater than other ex-convicts. Therefore, the previous time served by parolees contributes more weight in affecting other parts of the system.

The calculation is explained step-by-step with the following explanation.

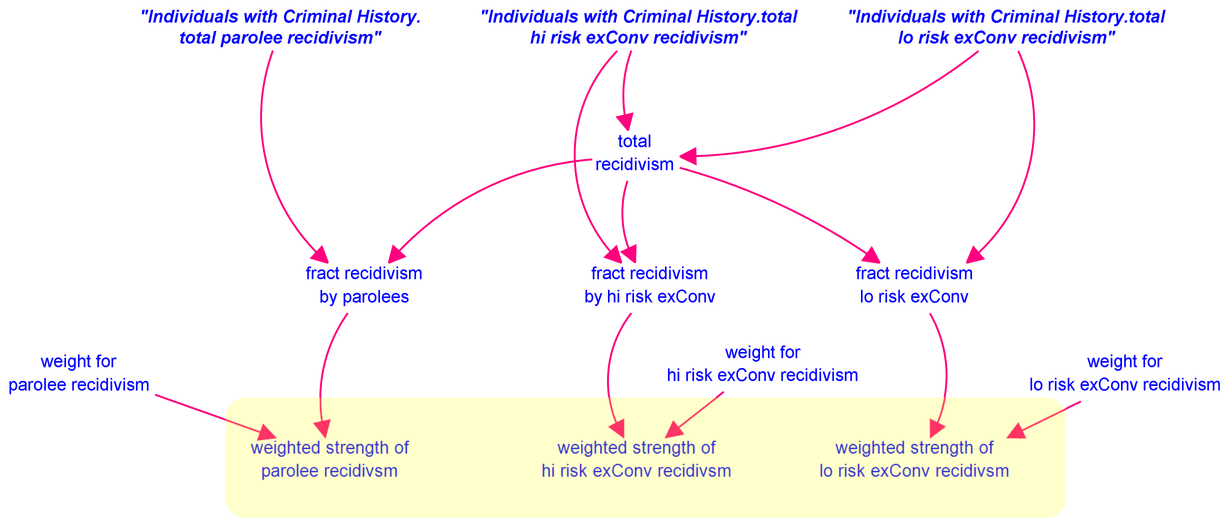
(1) The total recidivist from the stocks of parolees, high-risk ex-convicts, and low-risk ex-convicts are obtained by summing up the relevant stocks.



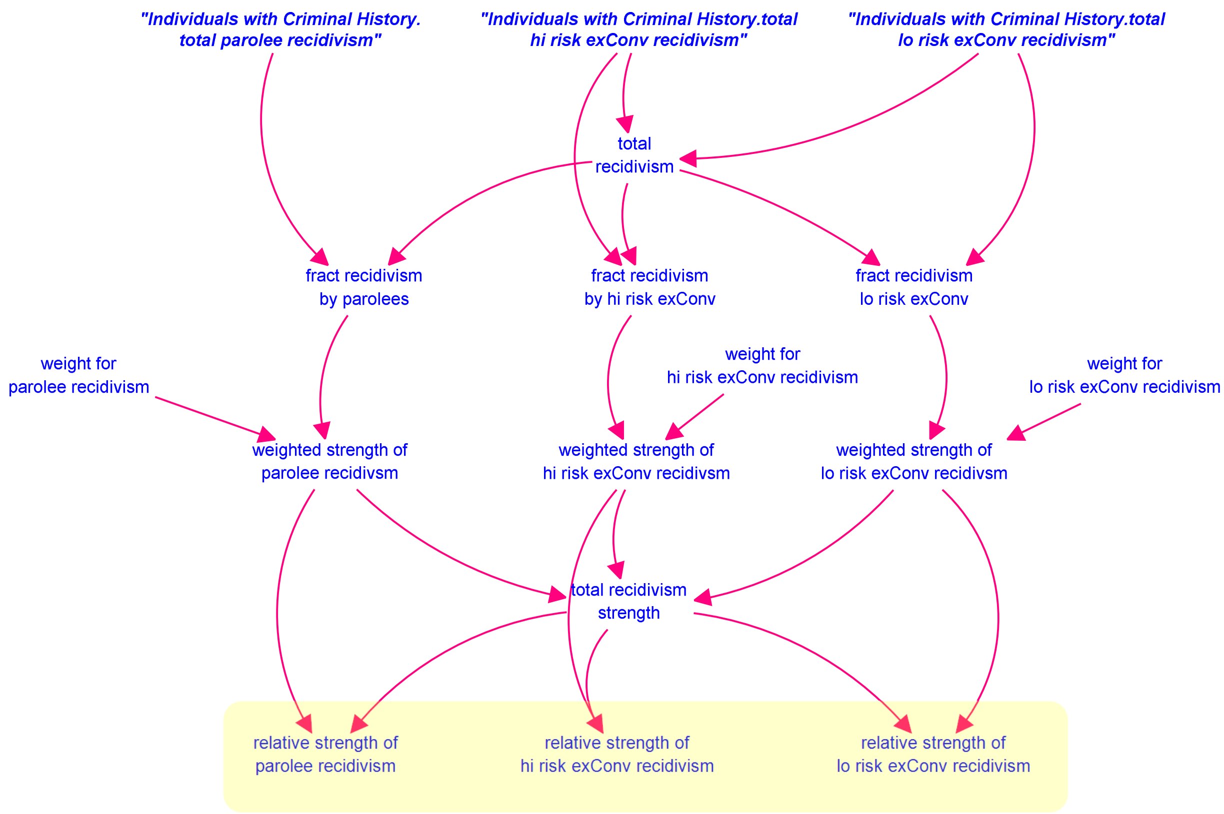
(2) Calculate the fraction of recidivism for each of group of recidivists.



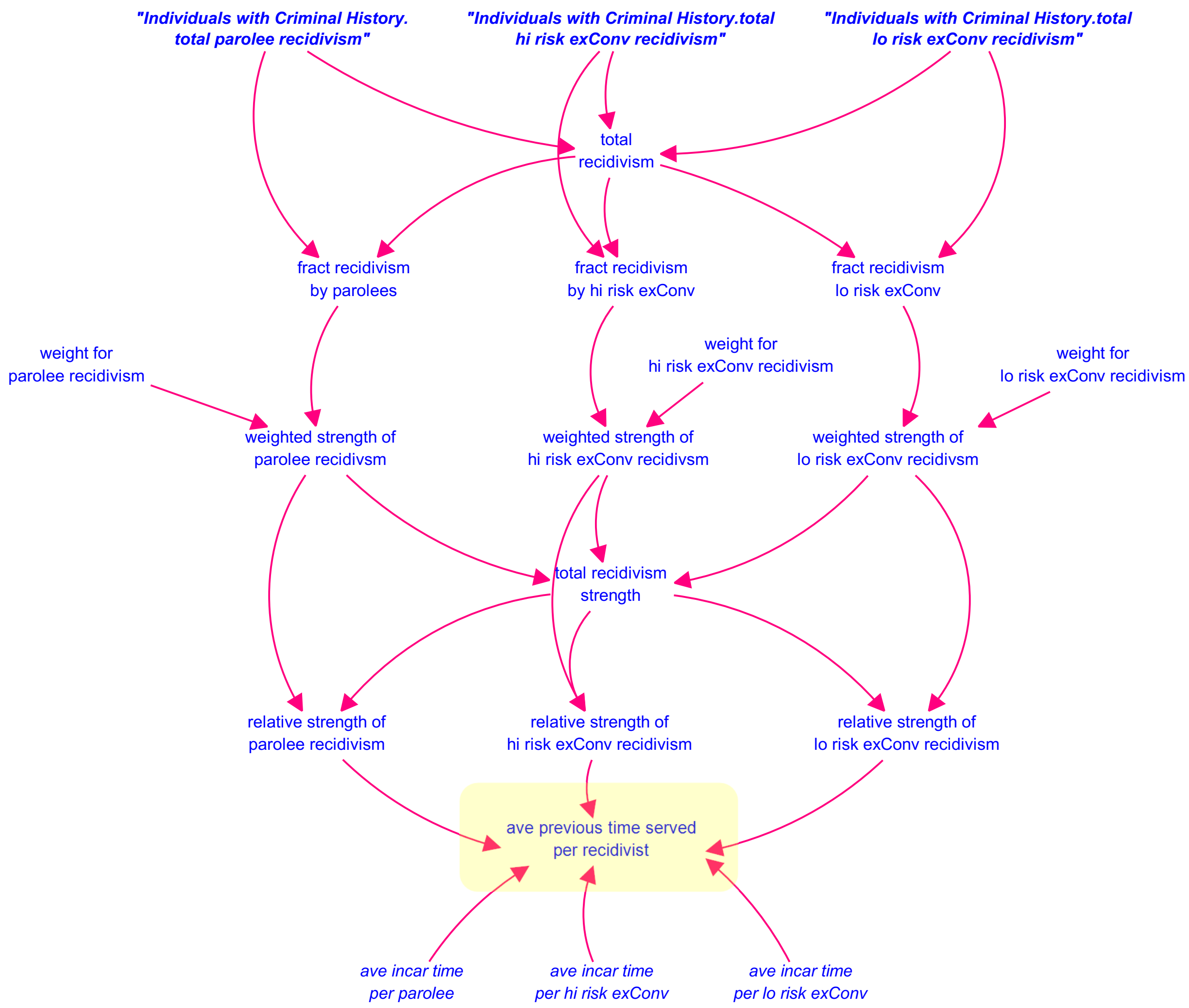
(3) Assign weights to different types of recidivism to obtain the weighted strength for each group of recidivists. This is because that the probability of recidivism of those who are released most recently is higher. The weights for each type of recidivism estimated with the reference fraction of parolees wMI, high-risk ex-convicts, and low-risk ex-convicts who reoffend. For example, reference fractions of reoffence for parolees wMI, high-risk ex-convicts wMI, and low-risk ex-convicts wMI are 0.2, 0.04, and 0.015 respectively. Thus, the weight for parolee recidivism is 0.2 / (0.2 + 0.02+0.008), which is 0.88. The weight for high-risk ex-convicts and low-risk ex-convicts are 0.09 and 0.03 respectively. The weighted strength of each group of recidivists is the product of weight assigned to that particular group and fraction recidivism of that particular group.



(4) Calculate the relative strengths of recidivism for each group of recidivists by multiplying the weighted strength of each type of recidivism and the total recidivism strength. The total recidivism strength is the sum of weighted strength of all recidivist groups.



(5) Multiply the average previous incarceration time of each group of recidivists and the relative strength of recidivism. Then sum up the products to obtain the weighted average of previous time served per recidivist. With this formulation, the previous incarceration time served by parolees has a larger impact on the average.



3.2.9.7 The *Effect of Average Previous Incarceration Time Served by Recidivists on Fraction Suspects Held in Custody*

This section presents the effect of average previous incarceration time served by recidivists on the fraction of suspects being held in custody. The court decides on pretrial release based on several criteria (see Section 3.3.2.4). One of the criteria is previous conviction or arrest. Hence, the average previous incarceration time served, which is used as a proxy to quantify the criminal history of the recidivists, becomes the input to the table function in Figure 108 to estimate the impact on pretrial release. When the average previous incarceration time served increases, the fraction of arrestees being released on bails decreases. As pretrial release reduces, the number of suspects held in custody increases.

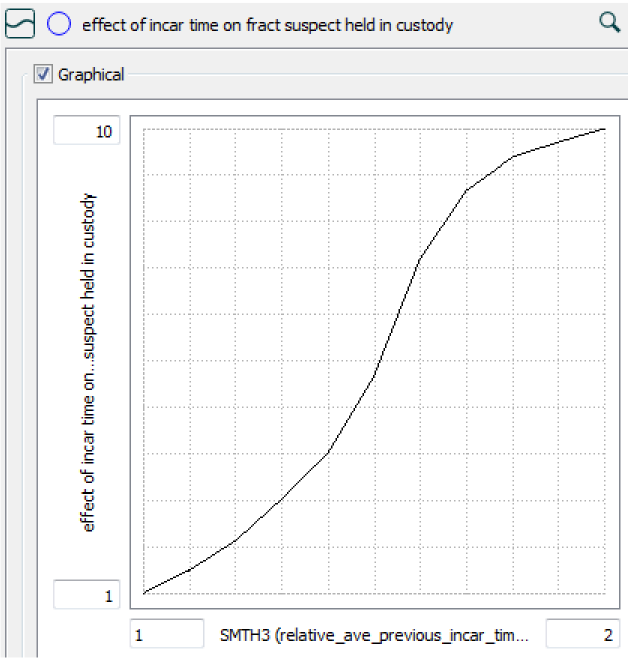


Figure 108 Effect of Average Previous Incarceration Time per Recidivist on Fraction of Suspects Being Held in Custody

3.2.9.8 The *Effect of Average Previous Incarceration Time Served by Prisoners on Prisoners with Mental Illness's Social Capital (SC) Loss*

This section demonstrates the effect of the incarceration history of prisoners wMI on their social capital loss. "ave previous incar time served per prisoner wMI" represents the average incarceration history the prisoners wMI carry with them when they are admitted to the prisons. As the average incarceration history of the prisoners wMI increases relative to the initial value, prisoners wMI encounter larger SC loss while serving sentence (Figure 109).

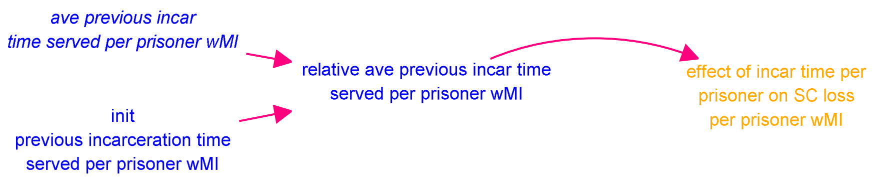


Figure 109 Formulation of the Input Parameter to the Effect of Previous Incarceration Time Served per Prisoners with Mental Illness on Prisoners with Mental Illness' Social Capital Loss

The following table function demonstrates the positive relationship between previous incarceration year served per prisoner wMI and SC loss (Figure 110). The input parameter to this table function is "relative ave previous incarceration time served per prisoner wMI". This ratio represents the change in average previous incarceration time served by each prison relative to the initial value. As the average previous incarceration time served per prisoner wMI increases over time, the effect on SC loss also increases. If the previous incarceration duration continues to increase, the returning prisoners who spend more time being isolated from the community are projected to have larger needs for community services to reintegrate to the society (Petersilia, 2001). Normally, each prisoner is losing two scores of SC per year. As the previous incarceration served accumulates when ex-convicts recycle in and out of the criminal justice system, these individuals experience greater loss in SC. Although the prisoners wo MI also experience SC loss, their SC loss rate per person is set as a constant at two score per person per year. This is to distinguish that prisoners wMI are more vulnerable to SC loss.

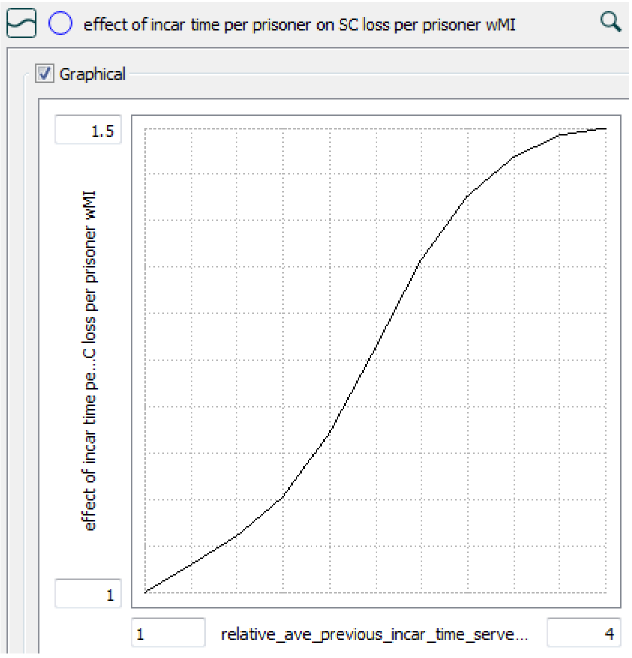


Figure 110 Effect of Relative Previous Incarceration Time Served per Prisoner wMI on Social Capital Loss per Prisoner wMI

3.2.9.9 The *Effect of Average Previous Incarceration Time Served by Parolees with Mental Illness on Return-to-prison (RTP)*

This formulation shows the formulation of the input parameter to the effect of incarceration time of prison parolees wMI on the return-to-prison rate (Figure 111). "Relative ave previous incar time per prison parolee wMI" is the average incarceration time each parolee wMI relative to the initial value. This parameter is the input to the "effect of incar tme per prison parolee wMI on RTP" table function. When the average rises higher than the initial value, more parolees wMI will be returned to prison for parole violation (see Section 3.2.2.2).

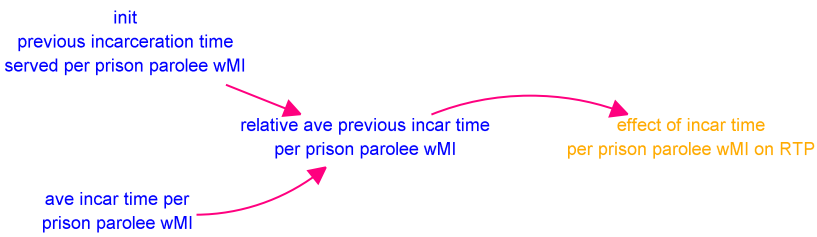


Figure 111 Formulation of the Input Paracmeter to the Effect on Parolees with Mental Illness' Return to Prison (RTP) Rate

The table function in Figure 112 outlines the nonlinear relationship between the average previous incarceration time served per parolee wMI and the fraction parolees wMI return to prison. As the incarceration history per parolee wMI rises, more parolees wMI who have violated parole condition will be sent back to prison. This is because that the more intensive supervision leads to higher parole revocation (Petersilia, 1993 #306). The intensity of supervision is decided based on the seriousness of crimes the parolees are convicted for, previous committed felonies, and behavioral pattern (such as mental illness) (Grattet, 2008 #255).Previous incarceration time served implies the magnitude of habitual offenders and prior convictions for serious offense. Habitual offenders or offenders with prior conviction associated with serious offense are under intensive parole supervision. Intensive supervision leads to a higher probability of being reported to the parole board by the parole officers when the parolees violate condition (see Section 3.2.2.2.).

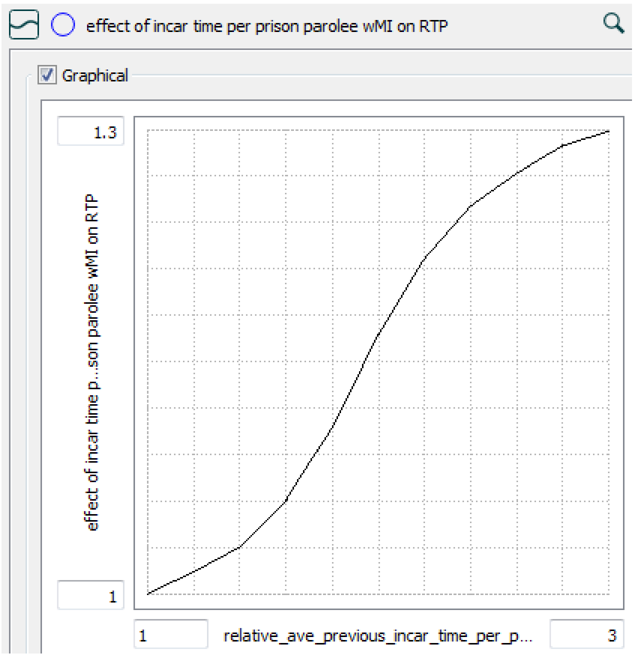
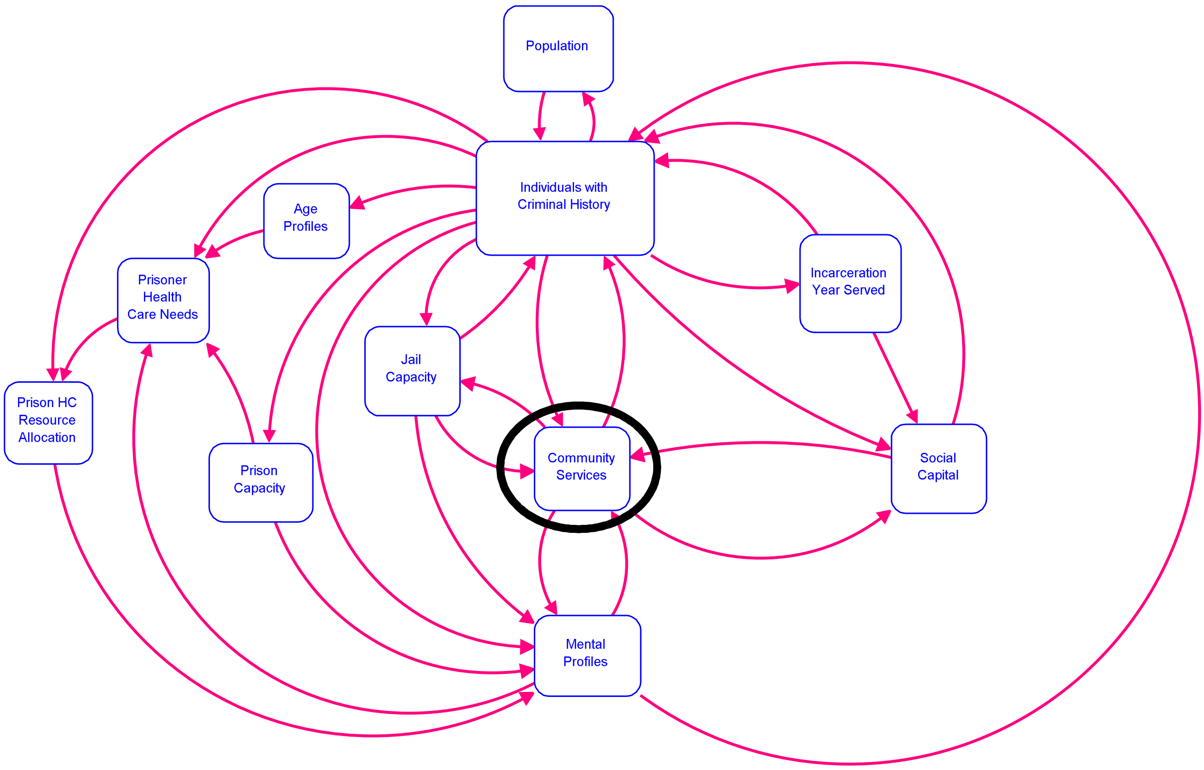


Figure 112 Effect of Relative Average Previous Incarceration Time per Parolee with Mental Illness on Return-to-prison (RTP) Rate

The input parameter to the table function is the relative average previous incarceration time served per parolee wMI. The output is the effect on parolees wMI's RTP rate. This reinforcing relationship emphasizes that higher average previous incarceration time served leads to higher RTP rate among the parolees who have violated condition.

3.2.10 Community Services

This module presents the fund allocation and capacity adjustment process of community services. Community services are essential in assisting parolees to reenter the society. "Reentry" refers to *programs or activities aim to assist individuals who have been incarcerated to return to the society and live as law-abiding citizens* (Travis, 2001). In our model, community services refers to *a collective reentry programs or activities targeted on parolees*. This is because parolees have the highest RTP within the first year post-release.



The number of parolees in California increases from about 40,000 in 1987 and peaks at 120,000 in 2008 (Section 3.2.2.2, Figure 35). Two years after the Realignment, the parolee population dropped significantly to 47,000. After their release, 80% of the parolees are not financial independent within the first year. Only about 40% of the parolees are supported with "frequent" employment in the first year post-release (Williams et al., 2000). However, only 20% of the parolees' primary source of financial support is from employment. This means that only 8% of the newly released parolees are financially independent. It is estimated that incarceration leads to a 15-30 % decline in subsequent employment rates (Freeman, 1991). 75% of the parolees live with their families or someone they know in the first year after their release (Williams et al., 2000). 6.5% of the parolees were homeless in the first year (Williams et al., 2000). 86% of the parolees had previous arrest history (U.S. Department of Justice-Bureau of Justice Statistics, 2016).

Since data on parolees are limited, we use prisoners' profile as a proxy to gain insights to the possible profiles of the parolees. Albeit an imperfect proxy given that prisoners are still serving their sentences while the parolees have left the prison, prisoners' profile still provides an indication for parolees' characteristics. Many California prisoners have long histories of criminal and few marketable skills (Little Hoover Commission, 2000). Prior to incarceration, the average education attainment and working experience of the parolees are lower than the average individuals in the community. Only 60% of the prisoners had high school diploma or GED (U.S. Department of Justice-Bureau of Justice Statistics, 2016). In conjunction with the long idle time during incarceration, the human capital of these parolees deteriorates further. The study conducted by the U.S. Department of Justice-Bureau of Justice Statistics (2016) shows that 69% of the parolees are employed in the month prior to arrest; 63% receive income through employment in the month prior to arrest. During incarceration, only half of the prisoners have work assignments or participate in rehabilitative program. Less than 25% enroll in education or vocational training (Petersilia, 2000). Also, there is only 5% of the prisoners complete a reentry program prior to release (Petersilia, 2000).

In county jails, 10 – 15% of jail offenders are reported to be mentally ill (Nieto, 1999). LAO (2000a) acknowledges that on average, 12,000 of prisoners released to parolee have history of psychiatric problem. However, the Parole Outpatient Clinics (POCs) only manage to care for 9,000 parolees. LAO further indicates that the POCs' resources have been misused because under statutory requirement, CDCR is required to register sex-offenders to POCs even though they are not mentally ill. This practice strains POCs' resources and turns away those parolees who need mental health care (MHC). Consequently, community mental health care (CMHC) clinicians struggle to handle caseloads as high as 160 to 1. Mentally ill parolees only receive infrequent and inadequate CMHC. Being homeless further exacerbates the situation. Homeless ex-convicts wMI are neglected in the community mental health system (LAO, 2000a). Very often, ex-convicts receive initial treatment, but they fail to adhere to treatment and medication due to the lack of follow-up. Thus, they encounter a higher probability of relapsing into problematic behavior.

Inadequate provision of CMHC has severe consequences on parolees' recidivism. 94% of the parolees who have received MHC in prisons return to prisons within two years (LAO, 2000a). CMHC has a serious provision gap. The two major reasons for the provision gap are the lack of after-care transition capacity and CMHC (LAO, 2000a). With inadequate transition capacity that connects the parolees with CMHC and insufficient funding, CMHC and other relevant community services for parolees wMI have not been built up (LAO, 2000a). Additionally, the local and state government have difficulty in defining who should bear the responsibility for caring the mentally ill patients with mental illness (LAO, 2000a).

Thus, the lack of well-defined responsibilities and commitment in reentry program provision leave the vulnerable parolees exposed to re-engaging in criminal activities.

3.2.10.1 The *Adjustment Process for the Community Services Budget*

This section presents the fund allocation process for community services for parolees wMI. The community services here refers to the crucial programs, activities, and assistance that parolees wMI require for successful reentry, such as healthcare (Travis & Petersilia, 2001), employment, and housing (Denny et al., 2014).

About 7% and 60% of the parolees need residential and financial assistance respectively (Williams, 2000 #189). Past criminal history, mental illness, and the lack of sociodemographic assets (such as social networks and employability) are the major contributing factors to homelessness (Greenberg et al., 2008). Housing is critical for the success of reentry for the parolees wMI because it is the requirement for the access to treatment and other services (Administrative Office of the Courts, 2011), and participation in community life (O'hara, 2007). Higher unemployment rate is also associated with homeless offenders (Greenberg et al., 2008). Greenberg et al. (2008) speculate that older age and longer criminal history among the homeless offenders are the risk factors. To summarize, incarceration has adverse effects on community and family ties, straining employment opportunities, and access to supported housing (Travis, Solomon, et al., 2001).

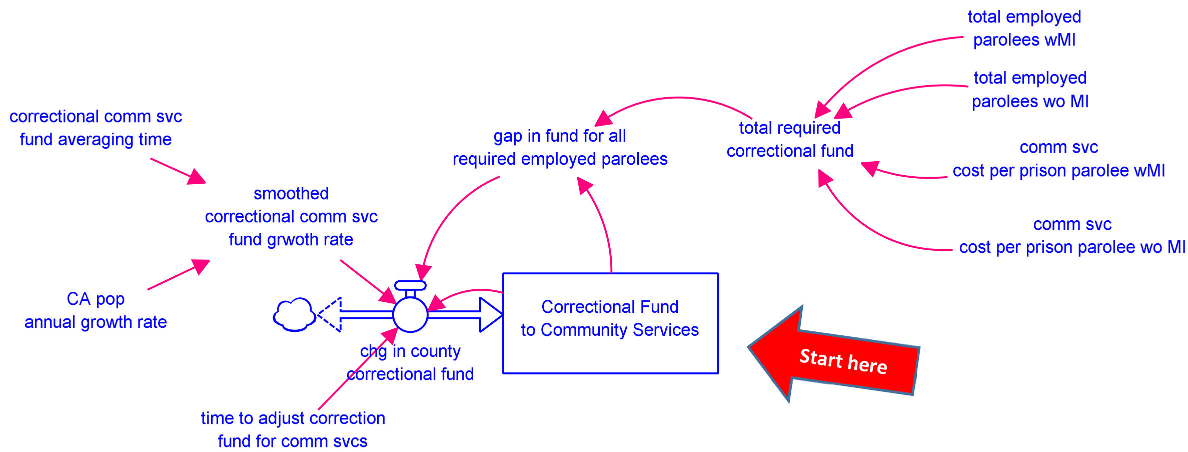


Figure 113 The Adjustment Process of Correctional Fund Allocation for Community Services

Figure 113 illustrates the adjustment process for correctional fund to community services. The Correctional Fund to Community Services stock is the fund allocated to support community services for parolees wMI and wo MI. The bi-flow, “chg in county correctional fund”, adjusts the Correctional Fund to Community Services stock to close a gap. This gap is defined by the required correctional fund or the annual growth in correctional fund. “total desired correctional fund” is the sum of fund required by the county governments to provide sufficient community services reach a designated employment level among the parolees. The existing number of employed parolees represents the existing community service capacity. Currently, the correctional fund to community services is adjusted annually based on the expected growth of county population. Due to the lack of county population growth data, we use California’s population growth rate as a proxy. California population growth rates are smoothed with a ten-year averaging time and then it becomes the input to “smoothed correctional comm svc fund growth rate”. The long averaging time symbolizes a slow fund adjustment process. “Chg in county correctional fund” takes the lesser value of additional correctional fund based on county population growth or the gap defined by the desired parolee employment level.

3.2.10.2 The *Budget and Capacity Adjustment Process for Community Service Capacity for Parolees with Mental Illness*

This section explains the budget adjustment process for community services for parolees wMI. The formulation for community services for parolees wo MI is similar, so the explanation for the adjustment process for community services for parolees wo MI is omitted in this section.

Figure 114 outlines the budget adjustment process specifically for community services for parolees wMI.

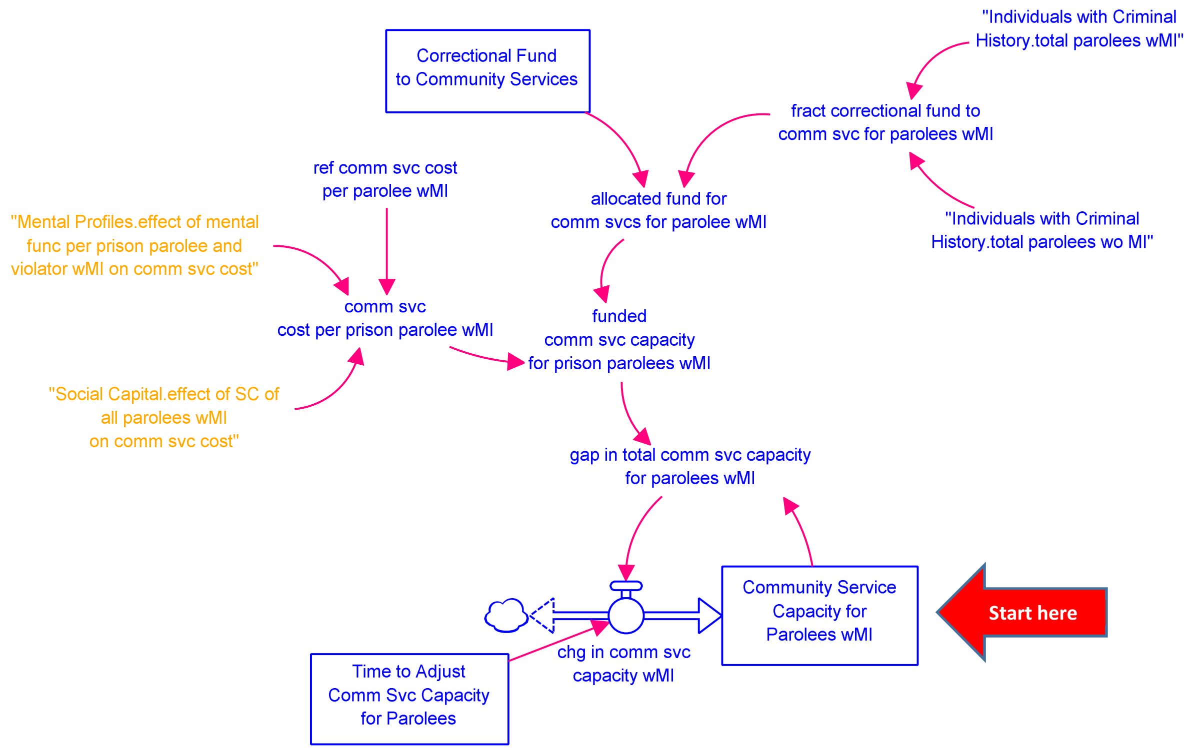


Figure 114 Capacity Adjustment Process for Community Services for Parolee with Mental Illness

Community Services for Parolees wMI stock includes basic services provided to parolees wo MI plus community mental health care (CMHC). The stock unit is defined as “person”. It is adjusted through the bi-flow named “chg in comm svc capacity wMI”. Whe the gap in community services for parolees wMI appears, the gap will be corrected over the capacity adjustment time.

“Gap in total comm svc capacity for parolees wMI” represents the discrepancy between the existing capacity and the funded capacity. The funded capacity is determined by the fund allocated to community services for parolees wMI and community service cost per prison parolee wMI. This formulation distinguishes prison parolees from county parolees. County parolees is a separate population after Realignment. This structure is explained further in Section 3.3.6.1. The average community cost per prison parolee wMI hinges on the mental functions and social capital (SC) of these parolees. These two effects are explained in Section 3.2.4.5 and 3.2.11.6. Fund is allocated to community services for parolees wMI according to the fraction of parolees wMI. All together, counties spent about $194 million per year on community services for parolees wMI in 1987[73]. The additional cost for supervising a mentally ill parolee is $7,900 (Romano, 2017). Simerman (2009) reports that government housing subsidy is about $850 per month. This translates into $10,200 per year. Work-related community services cost about $500 per parolee per year (North Carolina Department of Public Safety, 2011). The average cost to the county government to provide work and housing assistance and CMHC to a parolee is estimated to be $18,600 per year. Excluding community MHC, the community service costs to serve a parolee who need both housing and work-related assistance (i.e. assistance to parolees wo MI) is estimated to be $10,700.

[73] In 1995-96, the spending on community services is reported to be $41 million per year (LAO, 2000a). Using this figure and population growth rate, we estimated the community service spending in 1987 to be $35,066,267. The annual population growth rates between 1987 and 1995 decreased from 2% to 0.5%. In 1987, there were 39,183 parolees. Thus, the community service cost per parolee wMI in 1987 is $985/person/year. But the community service cost per parolee wMI grew to $4,200/person/year in 1995-96.

3.2.10.3 The *Formulation of Community Service Utilization Level by Parolees with Mental Illness*

This section presents the formulation of community service utilization level by parolees wMI. The utilization level is a ratio of "desired employed parolees wMI" to the Community Service Capacity for Parolees wMI stock (Figure 115). This ratio is an indicator of the sufficiency of community services. When the ratio is above one, the need for community services exceeds its capacity. "Desired employed parolees wMI" is the product of "desired fract parolee work" and the total number of parolees wMI. Achieving the desired employment level among parolees wMI is the goal of community services. Hence, the utilization level, which is the indicator for community service sufficiency, is measured by the capacity available for the desired number of parolees to be employed.

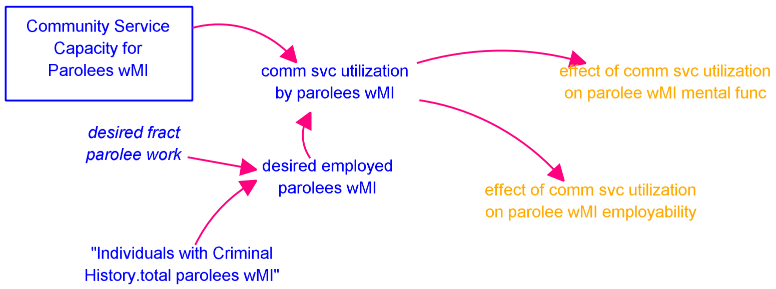


Figure 115 Formulation of Community Service Utilization by Parolees with Mental Illness and Its Effects

Community service utilization is the input parameter to two effects: the "effect of comm svc utilization on parolees wMI mental func" and "effect of comm svc utilization on parolee wMI employability".

3.2.10.4 The *Effect of Community Service Utilization on Parolee with Mental Illness' Employability*

This section maps the effect of community sevices on the employment level of parolees wMI. The effect of community service utilization on parolee wo MI has a similar structure. Figure 116 shows the inverse relationship between community service adequacy and employability of parolees wMI in a table function. The input parameter to the horizontal-axis is the community service utilization by parolees wMI. Community service utilization by parolees wMI ranges between one and 15. The output yields the corresponding values on the vertical-axis range between 0.2 and one. When community service utilization equals to one, community service capacity meets the needs. If the utilization increases above one, community service capacity falls short of the needs of parolees wMI. Then, the fraction of parolees wMI being employed reduces. As indicated in the previous section, community services include mental health care, employment and housing assistance. When the parolees wMI receive appropriate mental health care and have a permanent place to live, the chance of getting employment increases.

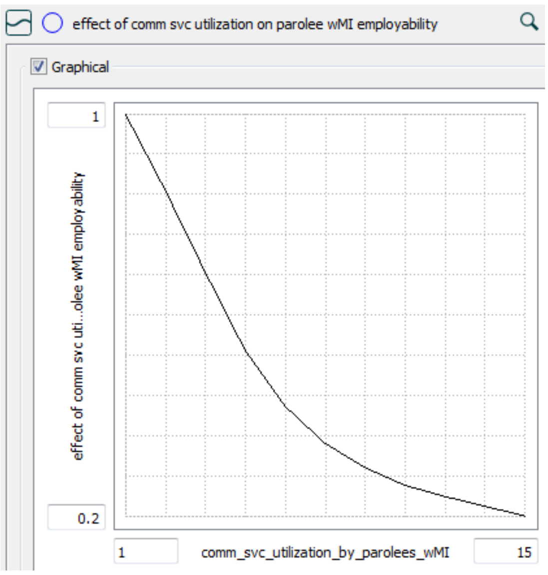


Figure 116 Effect of Community Service Utilization on the Fraction of Parolees with Mental Illness Employed

Figure 117 presents the formulation of the effect of community services on parolee's employability.

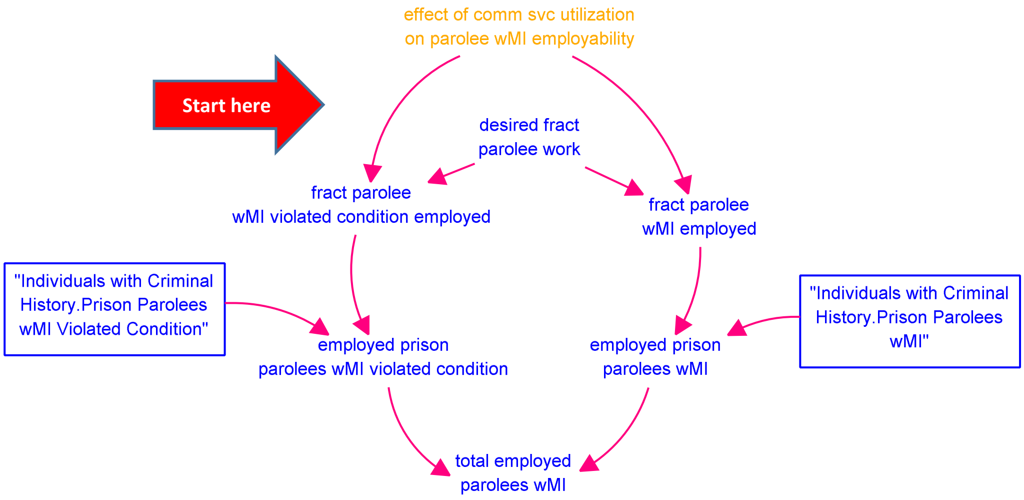


Figure 117 The Formulation of the Effect of Community Services on the Employability of Parolees with Mental Illness

The "desired fract parolee work" is set as a constant at 0.6 to align with the historical employment rates[74] (Figure 118). Community service utilization level affects the employability of parolee wMI inversely (Figure 116). As the community service utilization level increases above one, fewer parolees wMI receive adequate services. The "fract parolee wMI employed" and "fract parolee wMI violated condition employed" decrease and become smaller than the desired fraction. Consequently, the total number of employed parolees wMI is smaller than it would otherwise have been.

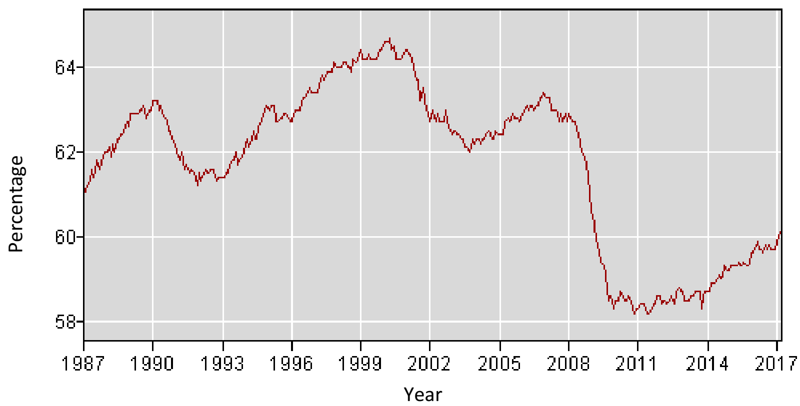


Figure 118 Historical Employment Rate of the United States (1987-2017)

Source: United States Department of Labor retrieved from https://data.bls.gov on May 29, 2017

[74] The range of employment percentage ranged between 64% to 58%. Averaging the two numbers obtains 61%. Hence, the constant take 60%, which is 0.6 as a fraction.

3.2.10.5 The *Effect of Community Service Utilization Level on Parolee without Mental Illness' Employability*

This section shows the table functions used to model the effect of community service utilization level on the employability of parolee wo MI (Figure 119). The formulation of the table function is similar to the table function in Figure 116. Note the difference in shape between the effects of community service utilization level on parolees wMI and parolees wo MI. The purpose of this comparison is to demonstrate the different effect of community service utilization on parolee wMI and parolee wo MI. In both cases, community service utilization level has an inverse relationship with the fraction of parolees who work. The higher the utilization level, the smaller the fraction of parolees work. However, the curves for these two groups of parolee differ slightly. Figure 116 (effect on parolee wMI) shows a steeper downward slope than Figure 119 (effect on parolee wo MI). This is to emphasize the sensitivity of community service adequacy on the employment ratio of parolees wMI. Parolees wMI rely community support much more compared to parolees wo MI because parolees wMI need mental health care, housing, and jobs. Lacking any one type of assistance renders lower employability among the parolees wMI. As community service utilization level rises above one, the fraction of employed parolees wMI drops at a faster rate compared to that of the parolees wo MI. The opposite is also true; when the capacity of community services rises and utilization level drops, a larger fraction of parolees wMI work.

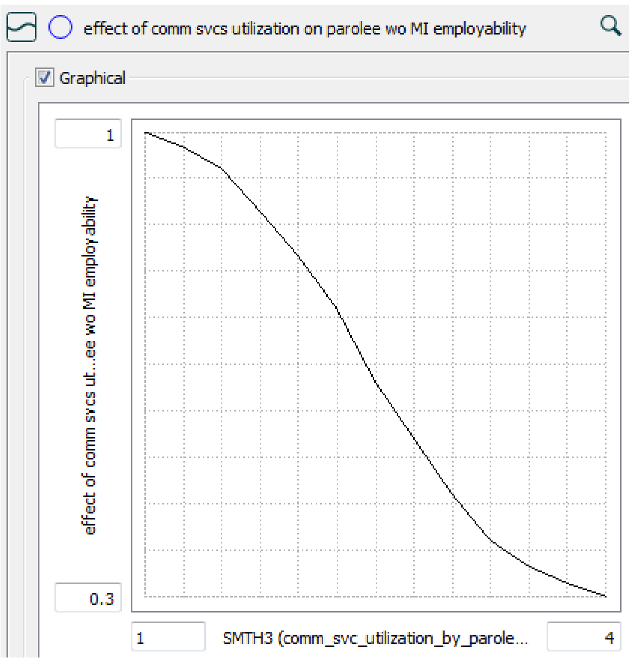


Figure 119 Effect of Community Service Utilization on the Employability of Parolees without Mental Illness

3.2.10.6 The *Effect of Employment on Parolee with Mental Illness' Social Capital (SC) Gain*

This section demonstrates the formulation of the effect of employment ratio of parolees wMI on their SC gain. When parolees are employed and becoming financially independent, their social networks expand. Figure 120 illustrates this effect.

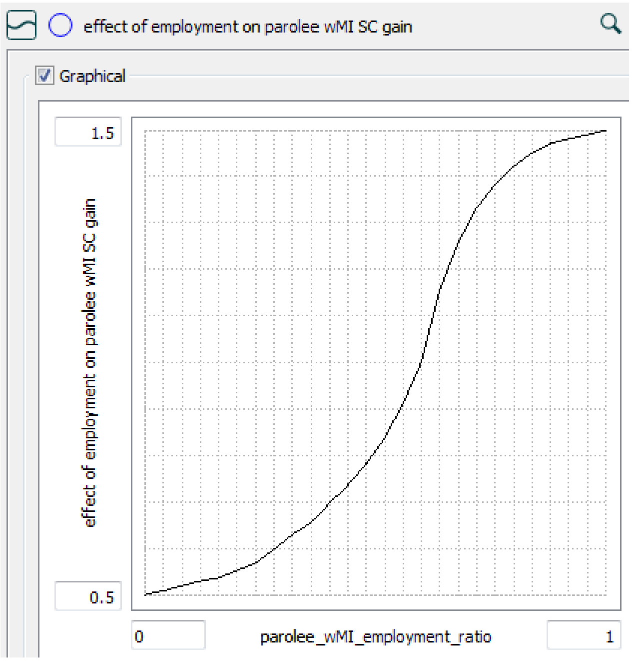


Figure 120 Effect of Employment Ratio on Parolee with Mental Illness Social Capital Gain

Parolees' SC will only increase when the annual SC gain per parolee increases. Among all other drivers, employment is the major contributing factor to the growth in parolees' social capital. When employment ratio equals to zero, the annual SC gain per parolee is only half of the normal SC gain. "Parolee wMI employment ratio" represents the fraction of parolees wMI who work. As employment ratio increases and reaches 0.6, which is the desired fraction of employed parolees, annual SC gain equals the reference annual parolee SC gain per parolee. "Ref annual parolee SC gain" is set at two score per person per year. If employment ratio reaches one, each parolee wMI gains 50% more on SC annually.

3.2.10.7 Effect of Community Service Utilization on Parolees wMI's Mental Function Gain

This section explains the inverse relationship between community service adequacy and parolees wMI's mental function gain (Figure 121). The input parameter to the horizontal-axis of the table function is "comm svc utilization for parolee wMI". The horizontal-axis ranges between one and 15. When community service utilization increases beyond one, the capacity fails to meet the needs. This also implies inadequate community mental health care provision. Consequently, parolees wMI gain zero or lower mental functions. When community services are adequate, parolees wMI gain one score per person per year. The output parameter on the vertical axis represents the corresponding effect in numerical values on parolees wMI's mental function gain. If "comm svc utilization for parolee wMI"reaches 15, parolees wMI do not benefit from any mental function gain given the little community services they receive.

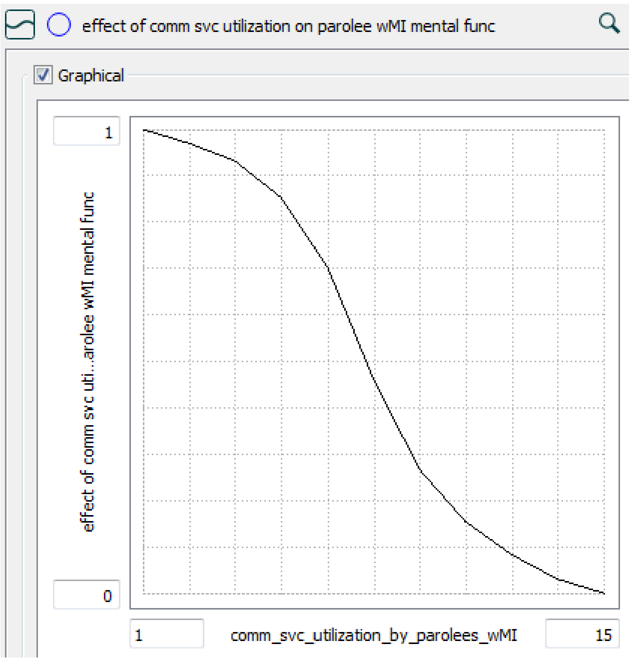
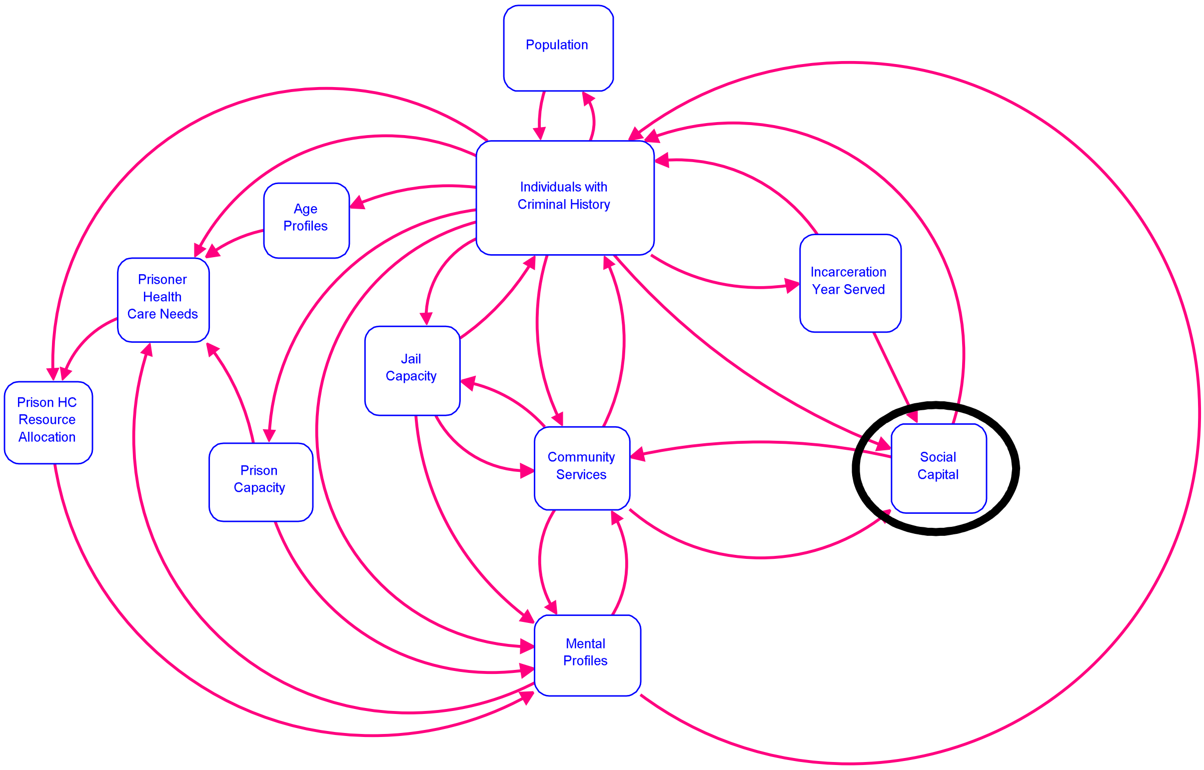


Figure 121 Effect of Community Service Adequacy on Parolees with Mental Illness' Mental Function Gain

3.2.11 Social Capital (SC)

This module contains the structure of social capital in the form of the coflow to **Individuals with Criminal History** module.



Social capital is "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of mutual acquaintance and recognition" (Bourdieu, 1986b) (pp.51). Bourdieu reasons that SC is conversable, convertible, and reproducible. Individuals invest time and labor to maintain and reproduce social relationships. Thus, the accumulation of SC is the outcome of time and labor, to which are transformed from the economic capital. The economic capital is the accumulation of assets defined by monetary form. In other words, to maintain or increase social connection in order to expand SC, ones need to invest resources, which may be represented in monetary terms. The "convertibility of the different types of capital is the basis of the strategies aimed at ensuring the reproduction of capital" (Bourdieu, 1986b)(pp. 54). On the contrary, SC may deteriorate as social bonds weaken (Putnam, 1995). Summing up Bourdieu and Putnams' views, resources are needed to maintain and grow social capital, otherwise SC declines.

Coleman believes that SC consists of some social structures that assist the actors of the structure to perform actions. Therefore, the purpose of SC is to serve certain functions. He depicts family as the core social control within the social structure. The erosion of family's role leads to a long-term deterioration of SC, which the societal functioning depends on.

Putnam (2001) considers SC as an outcome of multiple-dimensional factors, such as participation in civic, community, and organizational activities, volunteerism, informal sociability, and social trust. As SC is an abstract concept, Putnam analyzes vast amount of community-level, cross-level, and longitudinal data to understand the factors that influence social capital. In turn, these factors serve as indicators to conceptualize social capital in his research. Of the data he analyzes, several predictors are particularly relevant to our study. Violent crime and tax evasion have negative association with the level of SC (Putnam, 2001). On the other hand, health, tolerance, and economic equality have positive relationships to SC (Putnam, 2001). In general, criminality appears to be higher in areas where people have lower interaction and cohesion (OECD, 2001). The variation of crime rate is also explained by economic inequality and social trust (Halpern, 2001). In areas with strong networks, the communities have high respect for the law enforcement agencies. The cooperation between communities and law enforcement agencies generates an informal tie to control crime. Hence, this reinforces the accumulation of SC.

Social capital are crucial for ex-convicts' successful reintegration. Although there has not been a widely acceptable measurement to quantify SC, omitting this structure due to data limitation is equivalent to professing zero effect of social capital on individuals affected by criminal histories (Sterman, 2000). Ex-convicts gain confidence through family acceptance (Nelson et al., 2011). Eventually they find new jobs, make new friends, and continue making plans. Another function of social capital is the role as informal social control. Ex-convicts express that social support is a major aspect that has been neglected in most reentry program (Denney et al., 2014). As much as they can obtain assistance in getting housing and employment from community services, social support is difficult to secure. As (Denney et al., 2014) put it:

> "*Among the most frequently expressed desired forms of social support were a mentor to guide them to make everyday decisions, peers with whom to share struggles, and a support system to hold them accountable for their lifestyle and behavior* (p. 47)."

Positive social ties do not only serve as a network for the ex-convicts to get jobs and housing, they also serve as a type of informal social control that guides ex-convicts to live as law-abiding citizens. Hence, higher SC is expected to contribute in lowering recidivism in the long run.

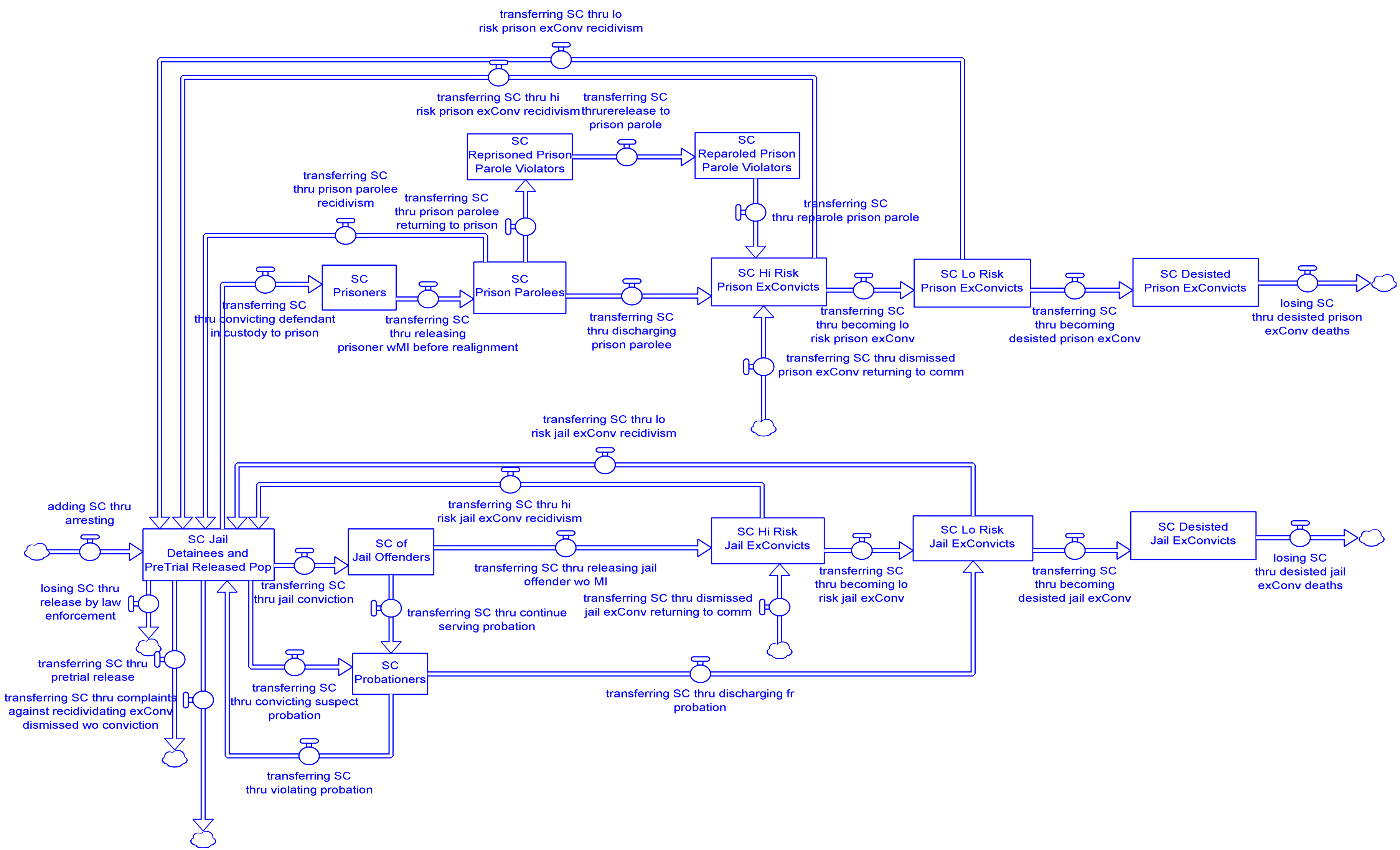


Figure 122 Overview of the Simplified Stock-and-Flow Structure in the Social Capital Module

3.2.11.1 Social Capital (SC) of Prisoners wMI

This section presents the structure of SC of prisoners wMI. Measuring SC has long been a challenge. SC measurement is crucial because measurement difficulty coincides with quantification; the social capital stock can only be quantified with valid measurement vehicles. Putnam (2001) proposes a composite index based on thirteen indicators to measure SC. As most indicators involve trust, engagement and interaction in social groups, these are "…tacit and relational, defying easy measurement or codification (pp. 43)" (OECD, 2001). However, such data for prisoners have not been collected. Siegler (2014) proposes a framework to measure social capital from four aspects. These aspects are personal relationships, social network support, civic engagement, trust and cooperative norms. Given the lack of data, in order to operationalize the SC concept in our model, we take a narrower definition of SC. We adopt partial framework by Siegler and define "social capital" stock as the structure and nature of individuals' personal relationships and the supports can be received from such relationships. These relationships are embedded in the networks of family, friends, colleagues and communities. The assumption is that the average SC each individual without criminal history cis 100 scores. Individuals with criminal history or MI have a relatively lower SC (Albert et al., 1998; Walker et al., 2014). Lower than 100 scores is considered as sub-optimal and thus the goal of the system is to bring the social capital stock of ex-convicts to the ideal standard, which is 100 score per person.

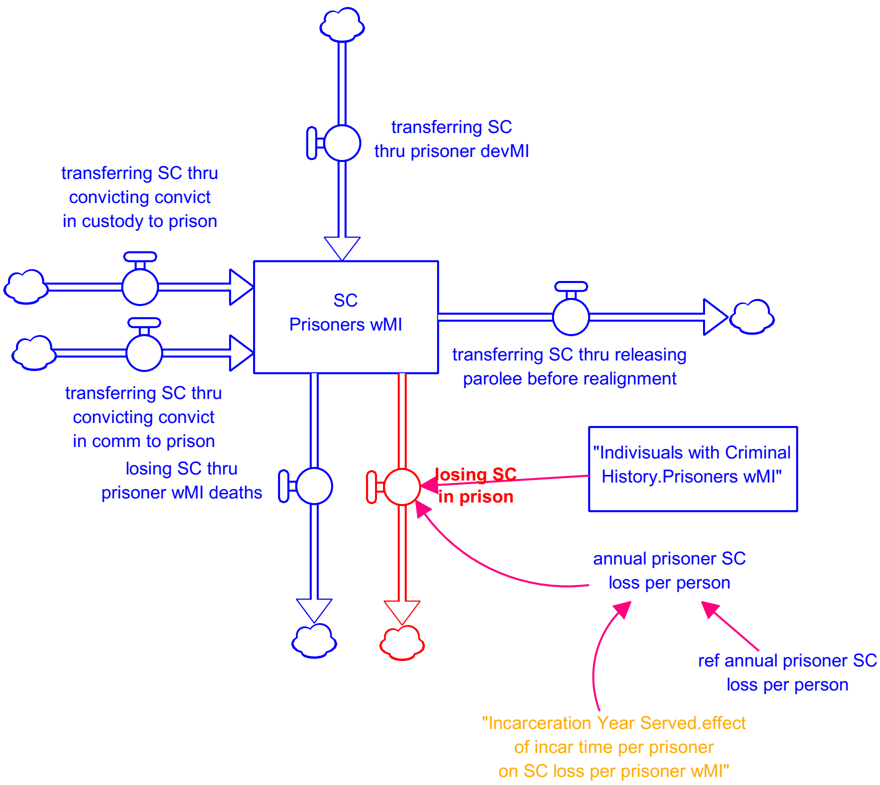


Figure 123 Simplified Stock and Flow Structure of Social Capital of Prisoners with Mental Illness

Figure 123 shows the stock and flows of SC of prisoners wMI. The inflows includes the transfers of SC of convicts in custody and community who are convicted to prison sentence and one inflow represents the transfer of SC of prisoners who develop MI. These individuals bring along the average SC from the stock they are leaving from into the stock of SC of prisoners wMI. When the prisoners wMI leave prison, either through deaths or release, they leave with the average SC of the stock. The average SC of prisoners wMI is the ratio of SC per prisoner wMI.

The outflow, "losing SC in person", represents the total amount of SC of prisoners wMI loss each year while staying behind bars. Both prisoners wMI and prisoners wo MI are expected to lose two scores of SC per person per year because they are unlikely to build their networks while being isolated from the community. The loss of SC is also influenced by the incarceration history of the prisoners. Longer average previous incarceration leads to larger loss in SC. It is a significant challenge for the prisoners to continue investing resources to maintain or reproduce social ties (Walker et al., 2014). A study shows that after imprisonment, some individuals' networks shrink through losing their friendships and only rely on family ties after release (Volker et al., 2016). The "effect of incar time per prisoner on SC loss per prisoner wMI" is explained in Section 3.2.9.8.

3.2.11.2 Social Capital of Parolees with Mental Illness

This section shows the transfer of SC from the stock of SC of Prisoners wMI to the stock of SC of Parolees wMI (Figure 124).

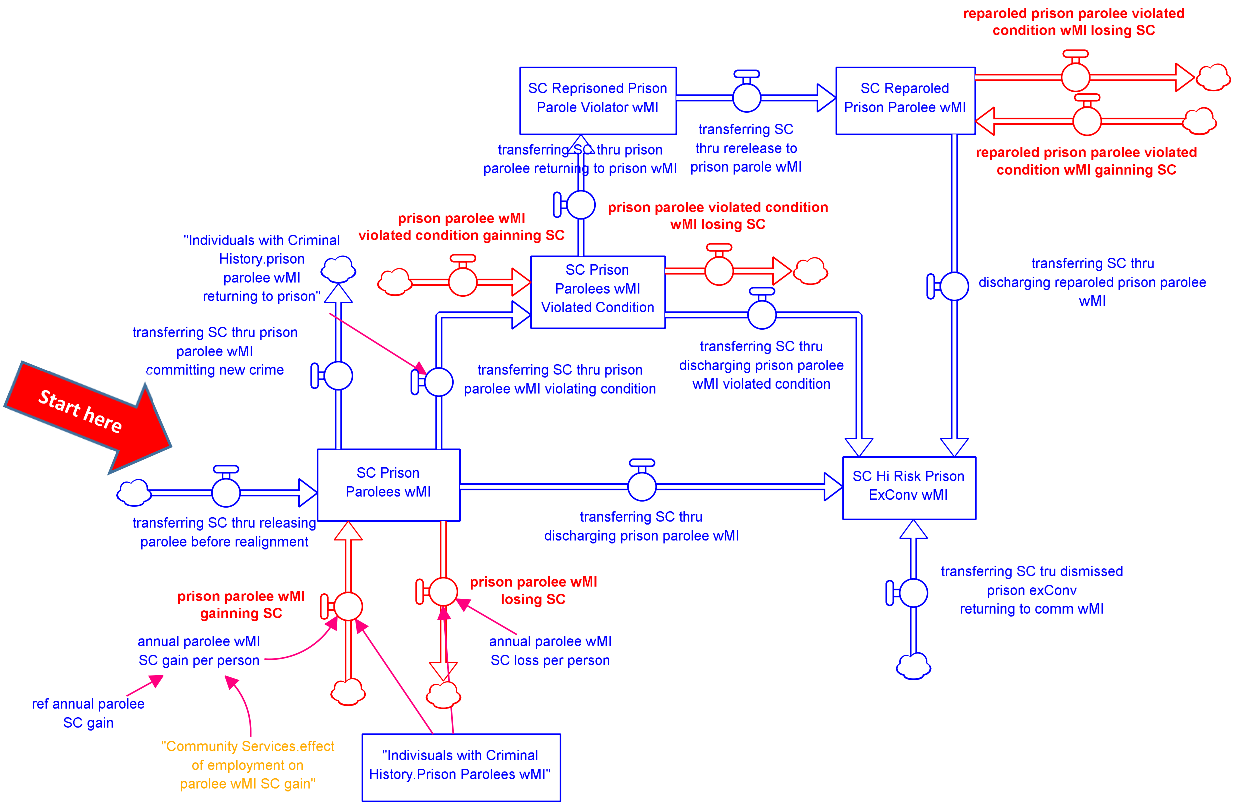


Figure 124 Simplified Stock and Flow Structure of Social Capital of Parolees with Mental Illness

There are two inflows and four outflows from the SC Prison Parolees wMI stock. Parolees wMI bring the average SC of prisoners wMI with them when they are released to parole. Another inflow is "prison parolee gaining SC". Parolees wMI gain two scores of SC per person per year. SC gain is also affected by parolee's employment. This effect is explained in Section 3.2.10.6. Prison parolees wMI violated condition and reparoled prison parolees wMI also gain SC annually. Due to the short stay reprisoned parolees, the SC loss outflow is omitted from the SC Reprisoned Prison Parole Violator wMI stock.

The four outflows from the SC Prison Parolees wMI stock are the transfer of SC through recidivism, parole violation, discharge, and natural loss. When the parolees wMI commit new crimes, they bring the average SC with them to the SC of Arrestees stock. If these parolees violate parole condition, they bring the average SC of parolees wMI to the SC Prison Parolees wMI Violated Condition stock. If the parole violators are sent back to prison, they bring the average SC per prison parolee wMI violated condition to the SC Reprisoned Prison Parole Violator wMI stock. After they are re-released, they bring their SC to the SC Reparoled Prison Parolee wMI stock. When they are discharged after fully serving the parole, they leave with the average SC to the SC Hi Risk Prison ExConv wMI stock.

As mentioned earlier in this section, parolees may gain SC, but their SC may also depreciate naturally. SC declines if resources are not dedicated to maintain and grow SC continuously (Bourdieu, 1986a; Putnam, 1995). SC loss is set at two scores per parolee wMI per year. The only way to prevent SC from depreciation is to increase SC gain through "prison parolee gaining SC" inflow so that this inflow is greater than the "prison parolee losing SC" outflow. The fact that parolees wMI may gain and lose SC is different from the SC structure of prisoners, in which SC stock of prisoners wMI only depletes. This is because that maintaining SC is difficult for prisoners when they are isolated from the community. Unlike prisoners, parolees can interact with others in the community to reinforce the growth of their social capital. However, if they fail to invest adequate resources, such as time and labor, their SC remains at steady state unless prisoners are released with higher or lower SC.

3.2.11.3 Social Capital of Arrestees

This section shows the SC structure of arrestees. The three inflows to increase SC of arrestees are the transfers of SC by prison ex-convicts and jail ex-convicts[75] when they recidivate, and the transfer of SC when the first-time arrestee are arrested (Figure 125). A first-time arrestee is an individual without criminal history from the "Innocent Pop" stock in the **Population** module. Hence, the "SC per new arrestee" is expected to be higher than the recidivists. The social capital concept in this module is a relative concept. A normal SC per individual is defined as 90 score per person while the "SC per new arrestee" is set at 70 score per person. This comparison highlights that on average a new suspect possess one-third less SC than a normal person. Then, the SC of recidivists and SC of suspects without criminal history are blended in the stock.

Since the arrestees stay in the stock for a short period of time, i.e. about two days as stipulated by the law, the SC accumulation and depletion processes are expected to be inconsequential. If the first-time arrestees are not charged, they are released without conviction along with the average *SC per new arrestee*. When these arrestees move further into the criminal justice system, they carry the average *SC per arrestee*, i.e. the average SC of new arrestees as well as SC of recidivists, with them to the next

[75] The two recidivism inflows are simplified representation of the sum of recidivist from prison and the sum of recidivist from jail. Recidivists from prison include parolees wMI, prison parolees wMI violated condition, prison parolees wo MI, prison parolees wo MI violated condition, high risk prison ex-convicts wMI, high risk prison ex-convicts wo MI, low risk prison ex-convicts wMI, and low risk prison ex-convicts wo MI; recidivists from jail include high risk jail ex-convicts wMI, high risk jail ex-convicts wo MI, low risk jail ex-convicts wMI, and low risk jail ex-convicts wo MI

adjacent stock. The average SC per arrestee is the division of the Social Capital of Arrestees stock by the Arrestees stock in the **Individuals with Criminal History** module.

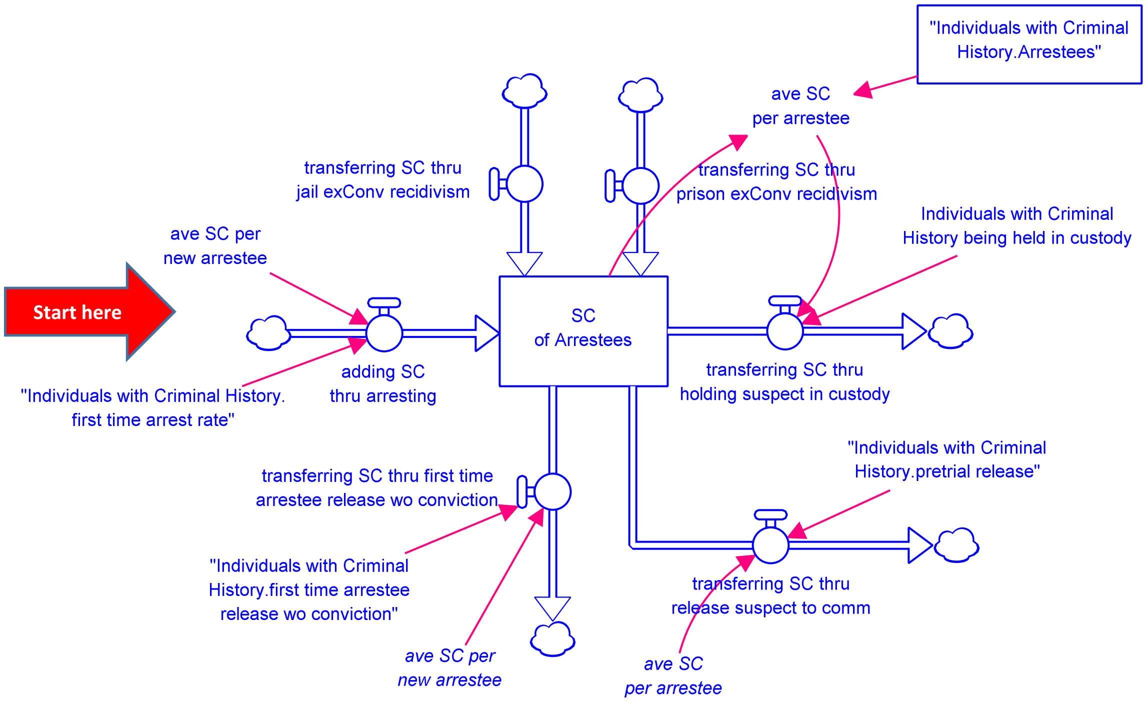


Figure 125 Structure of Social Capital of Arrestees (Simplified)

3.2.11.4 The *Effect of Social Capital on Prison Parolees with Mental Illness Recidivism*

This section explains the effect of SC on prison parolees wMI's recidivism in the form of a table function (Figure 126). The input parameter to the horizontal-axis in this table function is the "relative SC per prison parolee wMI". The "relative SC per prison parolee wMI" is the ratio of the average SC per prison parolee wMI to the initial value. The output is the effect on the fraction of parolees wMI recidivate with the corresponding values reflected on the vertical axis.

The horizontal axis is defined with a range of values between 0.8 to 1.2. The vertical axis is defined with a range of values between 0.85 to 1.5. Under the normal condition, the relative SC per prison parolee wMI equals to one, which characterizes a constant SC per prison parolee wMI. Then the corresponding effect on recidivism also equals to one. This means that there will no effect on the fraction of prison parolees wMI recidivate. When the relative SC per prison parolee wMI rises above one, the effect on the fraction of prison parolees wMI recidivate decreases. This leads to a smaller fraction of parolees wMI commit new crimes. On the contrary, if the relative SC per prison parolee wMI is lower than one, the average SC per prison parolees wMI drops relative to the initial value. If so, the corresponding effect on the fraction of parolees wMI recidivate exceeds one. Then, the fraction of prison parolees wMI commit new crimes is larger.

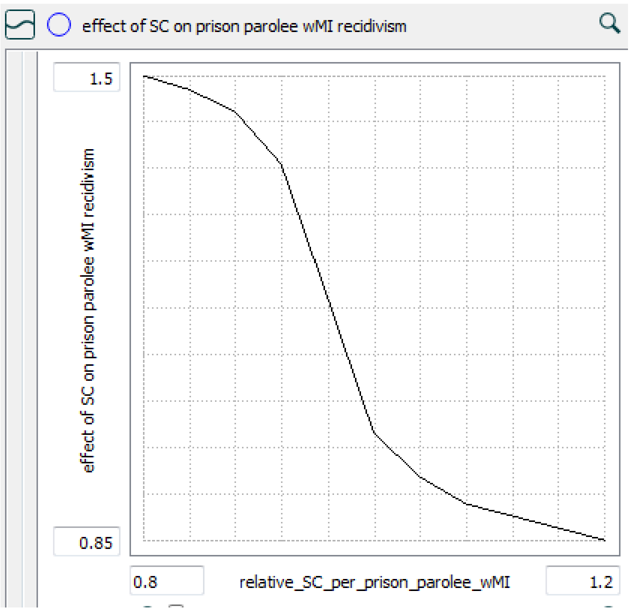


Figure 126 Effect of Social Capital (SC) on the Fraction of Parolees with Mental Illness Recidivate

3.2.11.5 The *Effect of Social Capital on Prison Parole Violation with Mental Illness*

This section explains the effect of SC on prison parolees wMI parole violation in the form of a table function (Figure 127). The input parameter to the horizontal axis in this table function is the "relative SC per prison parolee wMI". The output is the effect on fraction of parolees wMI violate parole condition with the corresponding values reflected on the vertical axis.

The horizontal axis is defined with a range of values between 0.8 to 1.2. The vertical axis is defined with a range of values between 0.8 to 1.2. Under the normal condition, the relative SC per prison parolee wMI equals to one, which characterizes a constant SC per prison parolee wMI. Then the corresponding effect on recidivism also equals to one and there will no effect on the fraction of prison parolees wMI violate parole condition. When the relative SC per prison parolee wMI rises above one, the effect on the fraction of prison parolees wMI violate parole condition decreases. This leads to a smaller fraction of parole violation among parolees wMI. On the contrary, if the relative SC per prison parolee wMI is lower than one, the corresponding effect on the fraction of parolees wMI exceeds one. Then, the fraction of prison parolees wMI violate condition is larger than it would have been.

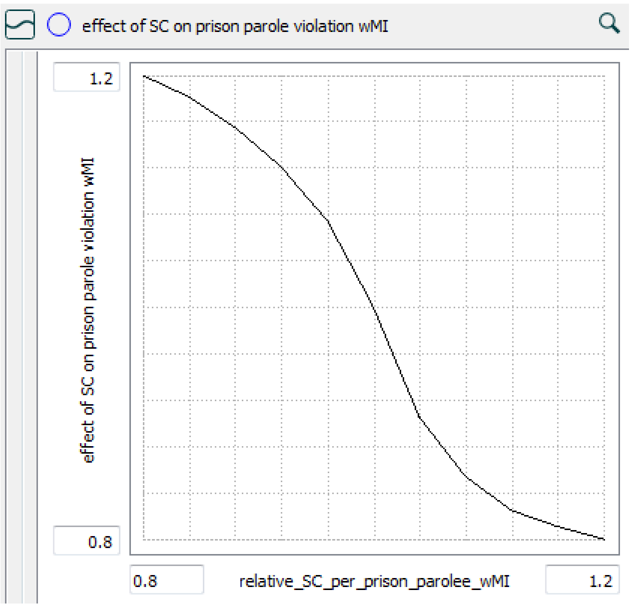


Figure 127 Effect of Social Capital (SC) on the Fraction of Parolees with Mental Illness Violate Parole Condition

3.2.11.6 The *Effect of Social Capital of All Parolees with Mental Illness on Community Service Cost*

This section explains the effect of SC on allparolees wMI on community service cost in the form of a table function (Figure 128). The input parameter to the horizontal axis in this table function is the "relative ave SC of all parolee wMI". This parameter is different from the input parameter mentioned in the previous two sections. The "relative ave SC of all parolee wMI" is the division of the sum of all the SC stocks of all parolees wMI, including prison and county (after Realignment) parolees, by the sum of all the parolees wMI stocks, including prison and county (after Realignment) parolees (Figure 129). The output is the effect on community services cost per parolee wMI with the corresponding value on the vertical axis. The purpose of this formulation is to capture the effect of social capital of all parolees wMI in the pre- and post-Realignment eras because regardless of the authority the parolees wMI are placed under, the total number of them who require community services remain the same.

The horizontal-axis of the table function is defined with a range of values between 0.5 to 1.5. The vertical-axis is defined with a range of values between 0.2 to 4. Under the normal condition, the "relative ave SC of all parolee wMI" equals to one, which characterizes a constant average SC of all parolee wMI. Then the corresponding effect on the community cost per parolee wMI also equals to one. This means that there will no effect on on community cost per parolee wMI. When the average SC of all parolees wMI rises above one, the effect on community cost per parolee wMI decreases. This leads to lower community services cost per parolee wMI. With the existing fund, more community service capacity is available to address the needs for parolees wMI. On the contrary, if the "relative ave SC of all parolee wMI" is lower than one, the effect on community cost per parolee wMI increases. Given the allocated fund, the available capacity to serve the parolees wMI is smaller. Thus, fewer parolees wMI will receive community services or each parolee wMI receive less resources.

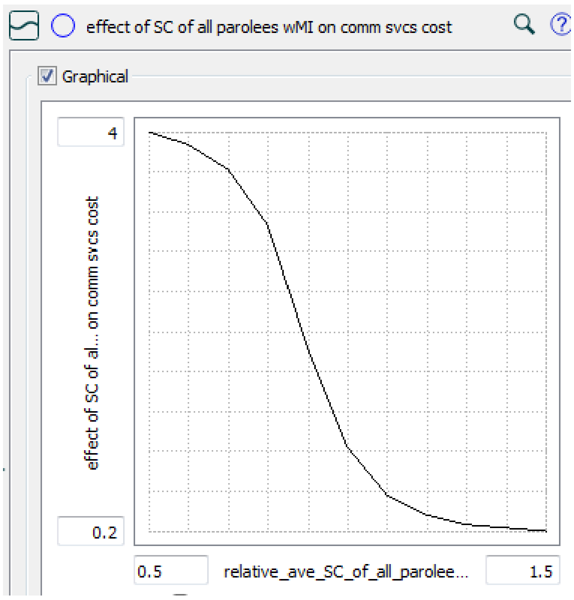


Figure 128 Effect of Social Capital per All Parolees with Mental Illness on Community Services Cost

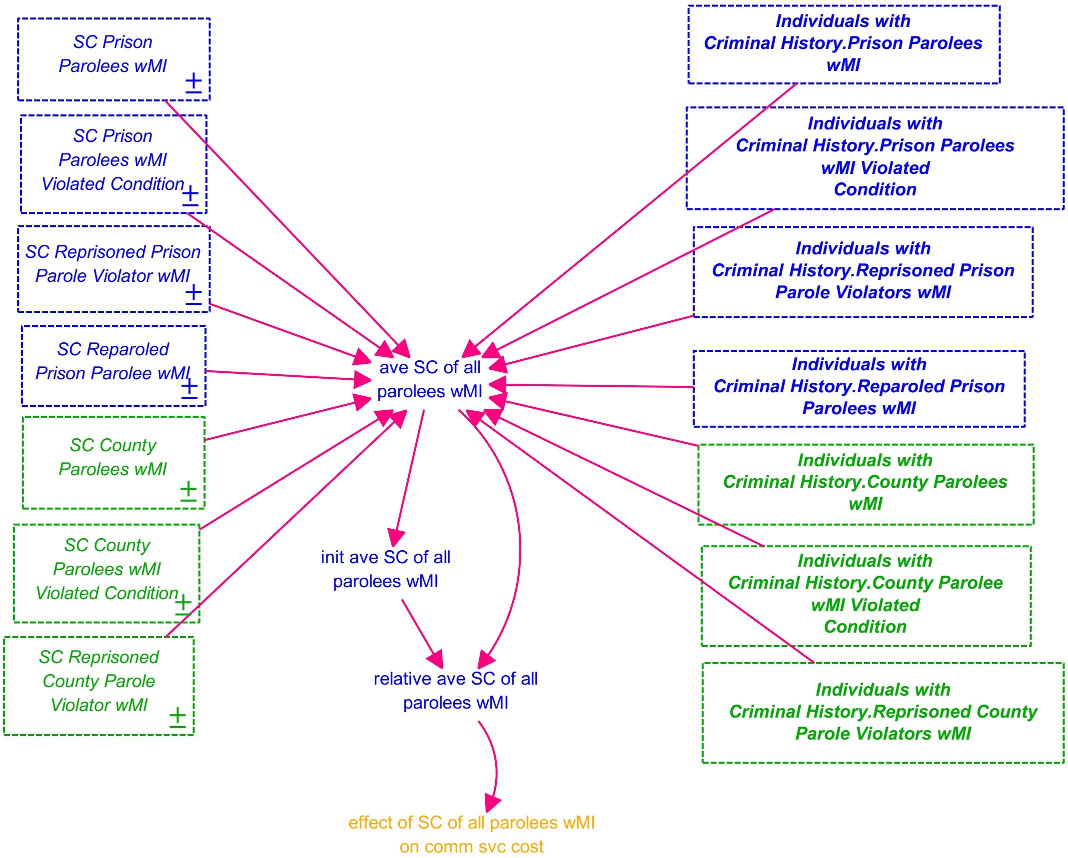


Figure 129 Calculation of Average SC of All Parolees with Mental Illness

Note: The stocks in green color represent the stocks created after the implementation of the Realignment policy in 2012.

3.3 Overview of Stock and Flow Structure - After Realignment Policy

This section presents the new structures added to Section 3.2 after the Realignment policy introduced in 2012. The commonly called "Realignment" is the short form of California's Public Safety Realignment Act of 2011. The purposes of the Realignment are (Krisberg et al., 2011):

1. Reducing state spending on corrections;
2. Reducing prison overcrowding;
3. Improving the system

In 2011, the Federal Court ordered California state government to reduce the prison population from 164% of the design capacity to 136% in two years. By reducing the prison population, California will also reduce state spending on the population in the correctional system. The implicit goal of the spending reduction is to increase health care resources per prisoner to upgrade the medical care in prison to the constitutional level. One of the basis for Realignment is that the county governments are in a better position to provide rehabilitative supports, such as medical and mental health care, jobs, and housing, to facilitate ex-convicts to reenter the community. As jails are also operated by the county governments, integrating rehabilitative support with shorter-term jail sentence is presumably a more efficient way to rehabilitate the offenders.

Under the Realignment, inflows of prisoners are regulated through the deterrence of convicts with less serious offences from the state corrections to local corrections; some convicts also serve their felony sentences in jails instead of prisons. The outflow of prisoners is also modified under Realignment. Some parolees are transferred to the local supervision under the system named "post-release community supervision" (PRCS). Through this reform, the parolees under county supervision return to the jails instead of prisons if they violate parole condition.

The impact of Realignment can be assessed from three aspects: judiciary system, CDCR and county governments.

Impact on Judiciary System

In line with the Realignment, the Criminal Justice Realignment Act of 2011 has changed the sentencing and supervision of some felony offenders. The modifications to the statutory include the logistic where convicts will serve their sentences and the type of post-release community supervision. The following are the statutory changes under the Realignment (CDCR, 2013):

Diverting custody from state to local

- No inmates are transferred from state prisons to county jails.
- No state prison inmates are released early.
- All felons sent to state prisons prior to the implementation of Realignment will continue serving their entire sentence in state prisons.
- All felons convicted of current or prior serious or violent offences, sex offences, and sex offense against children will go to state prison.
- There were nearly 70 additional crimes that were not defined in the Penal Code as serious or violent offences but at the request of law enforcement and district attorneys are added as offences that would be served in state prisons rather than in local custody.
- Convicts who are diverted to county custody under section 1170(h) are not required to serve parole (Couzens et al., 2016)

Releasing Prisoners to County Supervision

CDCR still oversees the prisoners released prior to the Realignment. The following list of prisoners are *illegible* for county parole supervision and will continue to be under placed state parole supervision after the Realignment:

- Prisoners with life terms released to parole, including the third strikers;
- Offenders whose current commitment offence is violent or serious, as defined by California's Penal Code §§ 667.5(c) and 1192.7(c);
- High-risk sex offenders, as defined by CDCR; mentally disordered offenders; nor offenders on parole prior to October 1, 2011

Parole Revocations

- After the Realignment, all county parole revocations are served in county jails instead of state prisons. The resentenced time can only be up to 180 days[76].
- County governments cannot contract the parole violators back to state prisons[77].

[76] Prior to the Realignment, parolees may be reprisoned in state prisons for up to 12 months or 365 days. On average, reprisoned parolees serve about six months after the reduction in reprison sentence from participating in credit-earning programs.
[77] Except for convicts who has served or are serving life sentence prior to the parole.

Impact on CDCR

By mid-2015, CDCR had successfully reduced the prison population to 137% of its design capacity, a reduction of about 35,000 prisoners (CDCR, 2012). No existing prisoners were released or transferred to the county jails or released early under the Realignment. The parole population has also dropped about 60% a year after the Realignment. 23,000 of the parolees were transferred to the county supervision (CPOC, 2012). Prior to the Realignment, the average admission rate was about 55,000 – 60,000 persons per year (CPOC, 2012). After the realignment, this rate has reduced to 36,000. Among those offenders who were diverted from prison sentence, 15,000 served jail sentences[78]. Given more sentencing mechanisms the county governments have, some of the diverted offenders serve other types of sentences, such as split-sentence[79] or pure probation. Before the Realignment, California had one of the highest return-to-prison (RTP) rate in the nation (Bird et al., 2016). From 2011 to 2012, the first-year RTP rate has reduced from 0.36 to 0.1 (Figure 130). In the subsequent year, the first-year-RTP rate further reduced to 0.07. However, the second-year-RTP rate shows a sign of increase again.

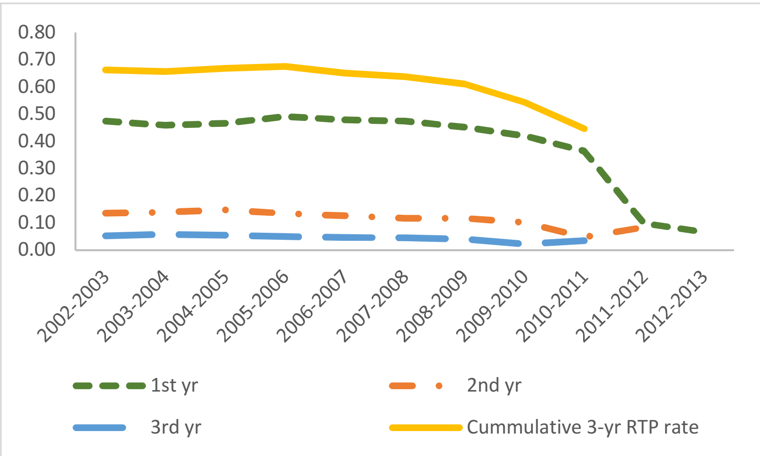


Figure 130 Historical Data: California State Prison's Return-to-Prison (RTP) Rate

Source: CDCR (2010 - 2015)

On the other hand, the federal court has placed CDCR's healthcare under receivership. Receivership is an uncommon remedy adopts by the federal court when other court orders have failed to remedy an institutional violation. The receiver's job goes beyond upgrading CDCR's health care system to the constitutional level; the receiver also ensures the sustainability of new system after returning the responsibility of managing prison health care system to CDCR. Essentially, the Receiver's plan aims to increase access to health care in prison by providing effective care, keeping accurate patient records,

[78] Under the new Penal Code section 1170(h)
[79] Refers to a combination of jail sentence mandatory community supervision.

providing adequate housing, medical facilities, equipment, and process, accessing to appropriate medication, treatment modalities, specialists, and appropriate level of care (Kelso, 2008).

Impact on the County Governments

The assessment of the impact of Realignment at the county level focuses on the local criminal justice system and community services. California's jail population has increased after the introduction of the Realignment policy. Six months after Realignment, jail population surged 12% with six more counties with jails operated above the rated capacity (Turner et al., 2015). Although some counties use early release to cope with overcrowding, statewide data shows that early release due to jail overcapacity is actually decreasing before and after Realignment (Figure 131). This implies that jail overcapacity may not have been at the critical level for jail administrator to increase the use this mechanism to reduce jail utilization. Currently, data on return-to-jail rate due to recidivism is unavailable. Thus, we are unable to estimate the extent to which recidivism affects jail after Realignment. However, the probability of being reconvicted for serious crimes after the county parolees are rearrested has increased after Realignment (Bird et al., 2016). This development suggests it is possible that reconvicting county parolees with serious crimes becomes a back channel to reduce the burden of the local correctional system.

Before and after the Realignment, special Realignment funds were appropriated to the county governments annually for a few years. County governments are given significant liberty in planning and implementing the reform. The two main strategies county governments adopt to implement the reform with Realignment fund are "enforcement-focus" and "reentry focus" (Bird et al., 2016). The counties that adopt enforcement-focus approach allocate four times more funds to support the sheriff, jail beds, and local law enforcement agencies than the counties that adopt reentry-focus approach; on the contrary, counties that adopt reentry-focus approach allocate twice as many resources to programs and services to facilitate reintegration than the enforcement-focused counties. Evidence shows that the rearrest and felony reconviction rates are about 2% higher in counties that adopt the "enforcement-forcus" strategy. This implies that different approaches adopted by the counties may affect the recidivism rates at both the state and local level because parolees who are reconvicted for felony will most likely receive prison sentence. If these reconvicted parolees have previous felony offenses, they will end up being second or third strikers in the state prisons.

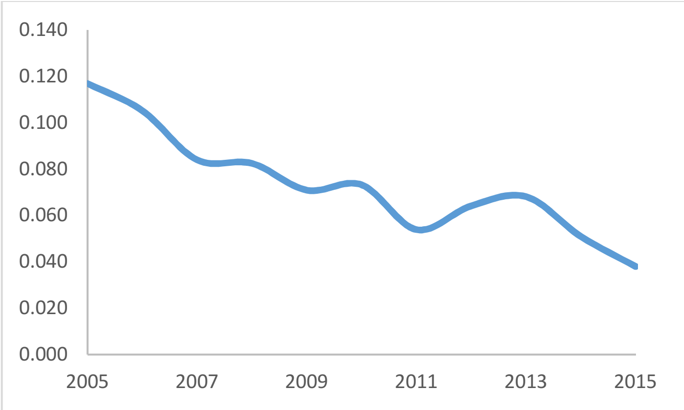


Figure 131 Calculated Data: Fraction of Early Release Due to Jail Overcrowding

Source: California Board of Corrections (2005-2015)

In the following sections, the structures that are affected by the Realignment policy will be presented in green color and explained in detail.

3.3.1 Individuals with Criminal History

3.3.1.1 Prisoners with Mental Illness Released to County Parole

This section presents the structure showing the release of some prisoners wMI to county parole post-Realignment (Figure 132). Under the Realignment, mentally disordered prisoners are not eligible for county parole supervision. However, "mentally disordered" soon-to-be released prisoners refer *to the prisoners with severe MI who are required to serve parole condition by undergoing treatment at the Department of State Hospitals* (Couzens et al., 2016). The Scarlett Carp Report published at the request of California state government in 1992 for the *Coleman v. Wilson* lawsuit discloses the prevalence of severe MI was about 10%. However, prisoners with mild and moderate MI may still be placed on county parole. So we assign 0.7 to "fract parolee realigned wMI". This fraction is 0.15 lower than "fract parolee realigned wo MI".

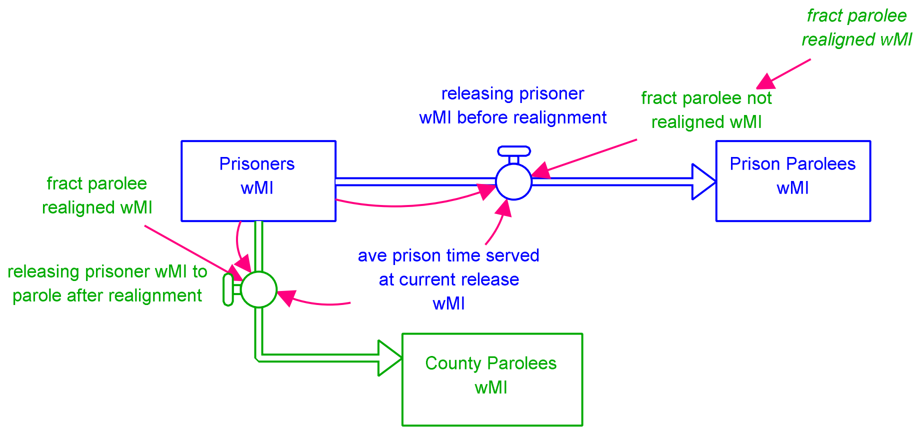


Figure 132 Post-Realignment - A Portion of Prisoners with Mental Illness Released to County Parole

3.3.1.2 Convicts Diverted to Jail Instead of Prison

One of the objectives of the Realignment policy is to re-categorize some offences from felonies to misdemeanors. This offence reclassification changes the location where relevant convicts serve their sentences. "prison sentence conviction reduction post realignment" is an exogenous input (Figure 133). The reduction in prison sentence conviction decreases "fract convicts in custody convicted to prison sentence" and "fract convicts in comm convicted to prison sentence" simultaneously. The decrease in these two fractions leads to decreases in the inflows to the Prisoners wMI and Prisoners wo MI (not shown in the Figure 133) stocks after the Realignment.

Prior to the Realignment, the average admission rate was about 55,000 – 60,000 persons per year (CPOC, 2012). After the realignment, this rate has reduced to 36,000, which translates to a 37% reduction in prison admission rate. Hence, the value of "prison sentence conviction reduction post realignment" is set at 0.6. This means that after the Realignment, about 40% of the prison admission rate is diverted away.

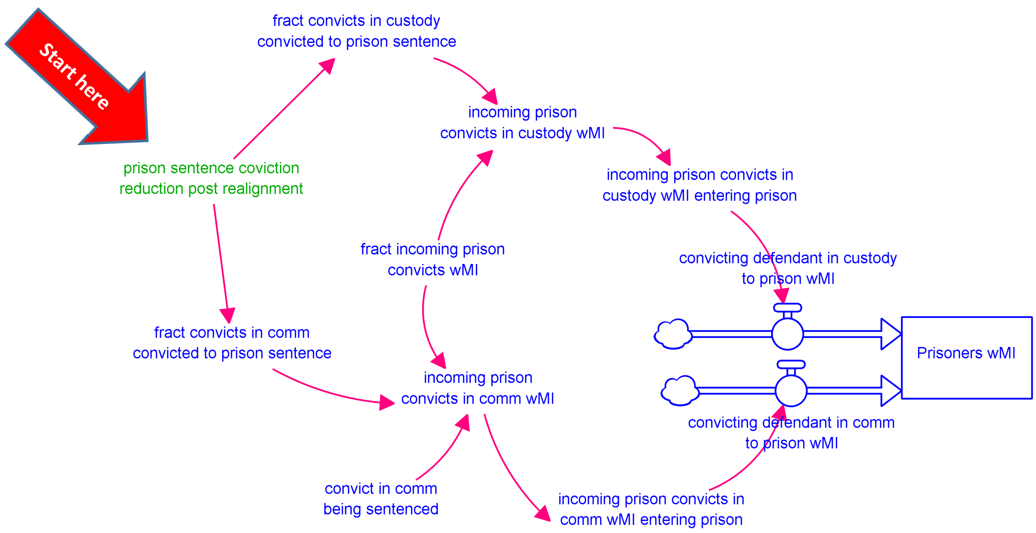


Figure 133 Formulation of the Diversion of Convicts from Prison Sentence to Jail Sentence after Realignment (Simplified)

3.3.1.3 County Parolee with Mental Illness Progression

This section shows the process of county parolees wMI being released from prison and various exit pathways thereafter (Figure 134). The structure is almost similar to the prison parolee wMI stock-and-flow structure in Section 3.2.2.2 with two exceptions. First, the parolees from the County Parolee wMI, County Parolee wMI Violated Condition, and Reprisoned County Parolees wMI stocks are released to the Hi Risk Jail ExConvicts wMI stock instead of the Hi Risk Prison ExConvicts wMI stock. Second, the reprisoned parolees wMI who violated conditions will serve the rest of their sentences in jails until they are discharged to the Hi Risk Jail ExConvicts wMI stock. Before the Realignment, prison parolees wMI were required to continue serving their unfinished parole even after they were reprisoned. These structural changes are the major distinctions between the pre- and post-Realignment era.

There are three outflows from the County Parolees wMI stock. First, county parolees wMI finish serving their paroles and are discharged. Second, county parolees wMI violate conditions. A fraction of the parolees wMI who violate conditions are reprisoned while the others continue serving parole until they are discharged. Third, the country parolees wMI commit new crimes. As the data on county parolee RTP rate have not been collected and reported, we set the "ref fract county parolee wMI RTP rate" as the same value as the fraction prison parolee wMI RTP rate, which is 0.05 per year (see Section 3.2.2.2). Previous incarceration year served has a positive relationship with the fraction of prison parolee wMI RTP rate. This relationship is expressed in a table function similar to the effect of previous incarceration time served per prison parolee wMI on prison parolees wMI's RTP rate (Section 3.2.9.9, Figure 112), except that the input parameter to the horizontal-axis is the "relative ave previous incar time per county parolee wMI".

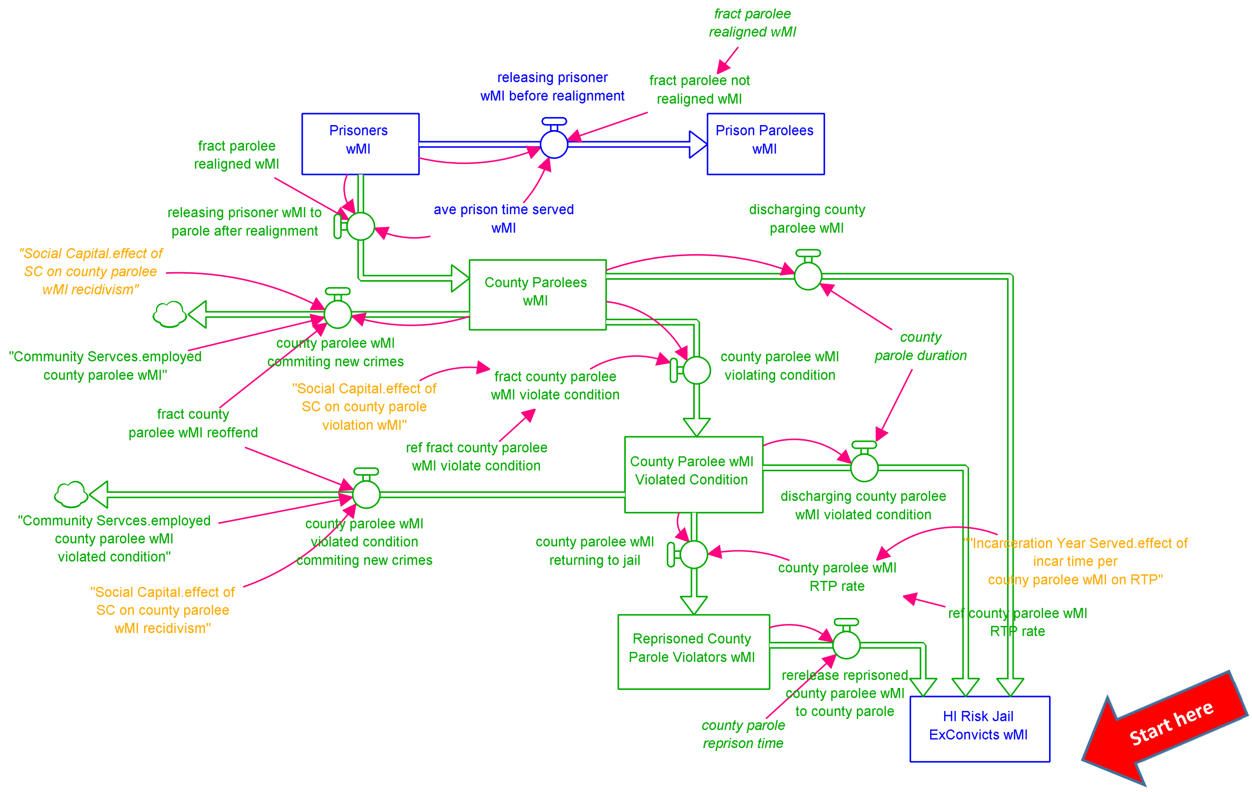


Figure 134 Progressions of Country Parolees with Mental Illness

The fraction of county parolees wMI violate conditions is estimated to be 0.3 per year, same as the fraction of prison parolees wMI violate parole conditions. The effect of social capital on county parolee wMI parole violation is similar to the table function for the prison parolee wMI (Section 3.2.11.5, Figure 127), except that the input parameter to the horizontal-axis is the "relative ave SC per county parolee wMI".

The fraction of county parolees wMI reoffend is also estimated to be the same as the prison parolees wMI, which is 0.15 per year. Social capital affects county parolee recidivism as in the case of prison parolees wMI (Section 3.2.11.4, Figure 126), except that the input parameter to the horizontal axis is the "relative ave SC per county parolee wMI".

"County parole duration" is assigned a value of one year. Under the Post Release Community Supervision Act of 2011, the maximum confinement for county parole violation, i.e. the re-prison duration for county parole violators, should not exceed 180 days. Hence, we assume the average county parole duration falls between the maximum re-prison confinement duration and the average prison parole duration. The average prison parole duration for parolees wMI and parolees wo MI are three and 2.5 years.

3.3.1.4 The *Prisoners with Mental Illness Recovery* Process

This section explains the recovery process of prisoners wMI from mental illness. After the Realignment, the Receiver has increased health care capacity in prison considerably. Consequently, a larger fraction of prisoners wMI may recover from the debilitating MI. However, the concept of recovery in mental health care is a controversial one. Predominantly, there are two types of definition for recovery. The advocates for the first definition view recovery as alleviating the symptoms associated with MI and returning the patients to the health status prior to the onset of the illness (Davidson et al., 2007). The advocates for the second definition embrace that recovery is a long-term process. The patients may or may not fully return to the health status prior to onset, but this deficit does not hinder the patients from leading a normal life as other healthy individuals. In other words, patients learn to accept the condition and live with the illness. As patients learn how to reclaim control over their lives, mental illness will increasingly become a smaller part in their lives. Eventually, even if the patients do not fully recover from MI, they learn how to cope with a new life with the co-existing mental illness. This concept spans across clinical and rehabilitative practices. It is with the second definition of recovery we model the recovery process for prisoners wMI post-Realignment.

Considering that CDCR is facing budget constraint, it is reasonable to believe that CDCR would adopt the most cost-effective approach, i.e. maximizing the financial resources to treat the maximum number of prisoners in need with the most effective treatment protocol. Simply put, the goal that maximizes health care resources per prisoner to yield the best result in terms of functionality improvement leading to acceptable quality of life most likely supersedes the idealistic but costly treatment goal full recovery.

Additionally, the four dimensions of recovery suggested by Substance Abuse and Mental Health Services Administration (SAMHSA, 2012) are: health, home, purpose, and community. The health dimension refers to *the symptoms associated with MI*. The "home" dimension depicts *a stable and safe living place*. The "purpose" dimension describes *the engagement in meaning daily activities, such as work, school, family caretaking, volunteerism, and financial independence*. Lastly, the "community" dimension relates to *the relationship with the community and social networks*. The health aspect may be addressed by mental health care (MHC) in prison. But the last three dimensions are difficult to address because the prisoners are isolated from the community. In conjunction with budget constraint, we argue that the implicit prison MHC treatment goal is unlikely to assists mentally ill prisoners to regain full mental functions prior to the onset of the illness.

Figure 135 shows the added flow between Prisoners wMI and Prisoners wo MI. In 2013, five years after California's prison health care is placed under the federal receivership, the prison health care reform still continues (California Correctional Health Care Services, 2013). Hence, the time to recover from MI is assume to be reducing as the prison health care capacity is still increasing. Time to Recover fr MI in Prison is modeled as a first-order feedback structure in order to capture the gradual reduction process. The initial time to recover equals to "ref time to recover fr MI in prison", which is set as ten years.

Recovery from MI is a controversial notion. Some define recovery from from the clinical perspective. When a patient meets the criteria on the diagnostic tool, he or she is declared as fully recovered from MI. However, some scholars argue that recovery from MI cannot be viewed solely from a clinal standpoint given that the individuals who suffer from MI may experience fewer or more functionality impairment associated with MI over time (Davidson et al., 2007). In fact, 35-75% of the mentally ill individuals do not recover if they are assessed according to the clinical criteria. Even so, some of these individuals have adapted their new lifestyle to live with MI. Based on this view, we argue that some prisoners with moderate or mild MI may never fully recover from MI. But they can still possibly lead normal lives upon release. Therefore, under the assumption that prison MHC is effective, prisoners wMI will recover from their illness after a period of treatment.

"New time to recover fr MI in prison" is conditioned by the mental functions of prisoners wMI and prison MHC adequacy. These two effects are explained in Section 3.3.3.1 and 3.3.4.7. As prison MHC adequacy increases, treatment become more effective. The increase in effectiveness leads to shorter recovery time. At the same time, as MHC adequacy increases, mental functions per prisoner wMI improves. Therefore, "new time to recover fr wMI in prison" reduces. "New time to recover fr wMI in prison", a product of "ref time to recover fr MI in prison", "effect of mental func per prisoner wMI on recovery time", and "effect of MHC adequacy on recovery time after realignment", is the goal to which the Time to Recover fr MI in Prison stock aims to adjust. "Ref time to recover fr MI in prison" and the initial value of Time to Recover fr MI in Prison are set as ten years. As the mental functions of prisoners wMI and effect of MHC adequacy on recovery time change over time, "new time to recover fr wMI in prison" changes accordingly. Hence, the stock will eventually adjust to meet the goal over the adjustment time.

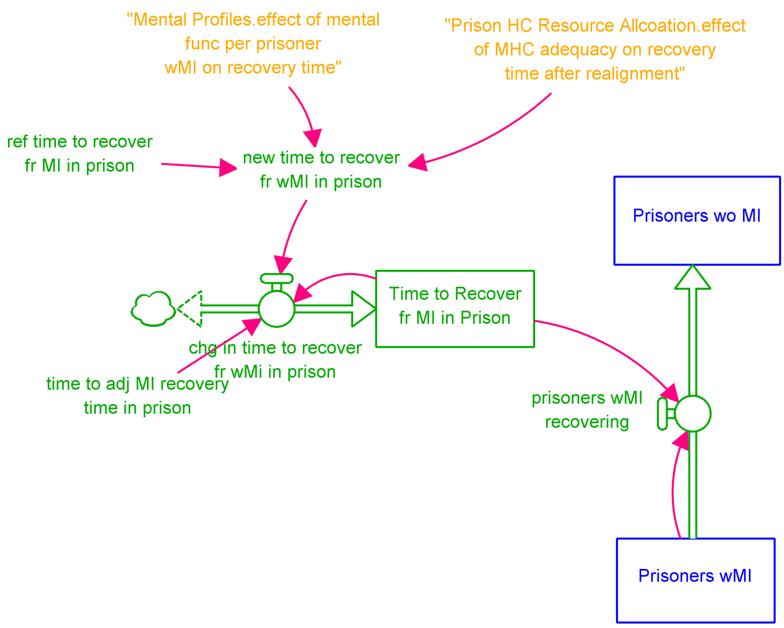


Figure 135 Prisoners with Mental Illness Recover from MI after Realignment (simplified)

3.3.1.5 Jail Offenders Develop Mental Illness

This section illustrates the flow that captures jail offenders wo MI moving into the Jail Offenders wMI stock after Realignment. Before Realignment, jail offenders served an average of six months of jail time (U.S. Department of Justice, 1992-2006). After Realignment, the convicts sentenced to jails include offenders with more serious felony convictions, and thus the average jail time served by jail offenders increases accordingly. Furthermore, higher jail utilization leads to overcrowding. An even more crowded environment then it was before Realignment contributes to the deterioration of mental functions of jail offenders. Thus, some jail offenders develop MI when they are serving jail time. Prior to the Realignment, we assume that jail offenders enter the jails with mental illness and they do not develop MI in the jails given their short stay in jail, which is about six months on average.

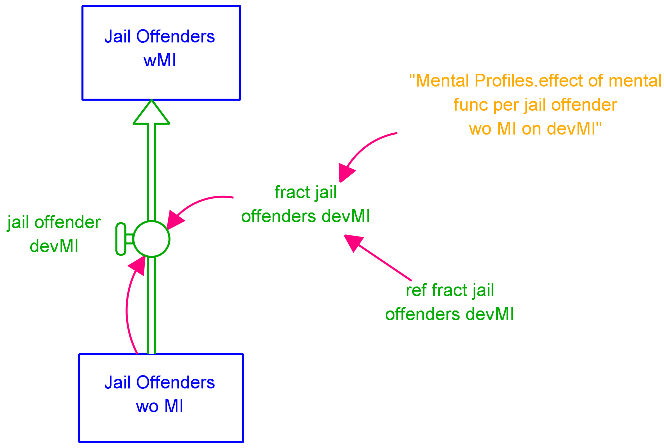


Figure 136 Jail Offenders Development Mental Illness in Jail After Realignment

Figure 136 shows the additional flow from “Jail Offenders wo MI” to “Jail Offenders wMI”. The fraction of jail offenders who develop MI is determined by two parameters: the normal fraction, which is assumed at 0.1, and the effect of mental functions of jail offenders wo MI. This effect is similar to that for prisoners wo MI (Section 3.2.4.4, Figure 71).

3.3.2 Age Profile

The ***Age Profile*** module contains similar structure as in pre-Realignment with the additional structure explained in Section 3.3.1.1 to 3.3.1.5.

3.3.3 Mental Profile

The ***Mental Profile*** module contains a similar structure as in the coflow structure in the pre-Realignment era (see Section 3.2.4). After the Realignment, some prisoners wMI are released to county parole. The same goes for prisoners wo MI. Based on the eligibility criteria for county parole, mentally ill prisoners who require inpatient treatment do not qualify for county parole. Also, county parole is only reserved for convicts with certain less serious offences. Hence, the mental functions of prisoners released to county parole is assumed to be higher than those who are place under CDCR parole. The average mental function that prisoner wMI bring with them to county parole is assumed to be higher. This assumption is modeled through the "multiplier of ave mental func of prisoner to county parole" parameter (Figure 137). "Multiplier of ave mental func of prisoner to county parole" is set at 1.1. This means that the average mental functions of prisoners wMI flowing to the the Mental Functions of County Parolees wMI stock is 10% higher than that flowing to the Mental Functions of Prison Parolees wMI stock. This multiplier also affects the flow of prisoners wo MI to county parole.As the outflow "transferring mental func thru releasing prisoners wMI to county parole" drains more from the Mental Functions of Prisoners wMI stock, the stock diminishes. Hence, those who are placed under CDCR parole supervision leave with lower average mental functions to the Mental Functions of Prison Parolee wMI stock (not shown in Figure 137).

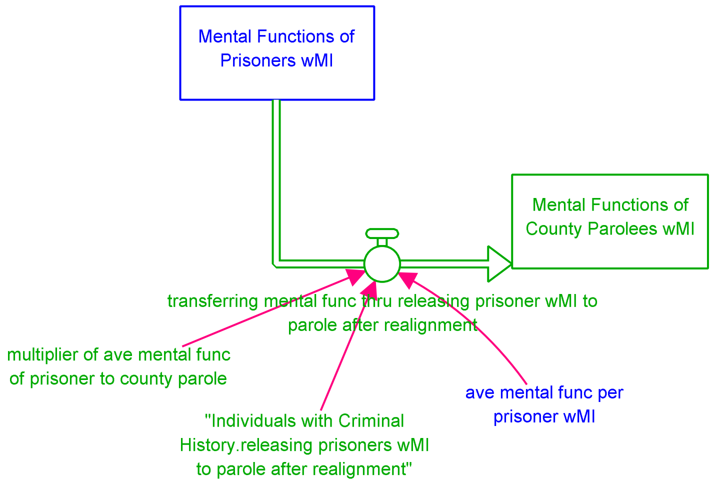


Figure 137 Higher Average Mental Functions per Prisoners with Mental Illness Placed Under County Parole after Realignment

Figure 139 presents the simplified stock and flow structure for county parolees wMI. This structure is similar to the structure in Section 3.3.1.3 except for two addition inflows to the Mental Functions of County Parolees wMI and Mental Functions of County Parolees wMI Violated Condition stocks. These two inflows characterizes the increase in mental functions as an effect of community services. “County parolee wMI mental func chg thru comm svcs” is the product of the total number of county parolees wMI, “parolee wMI mental func gain per year”, and the effect of community service adequacy on parolee wMI mental function change. “County Parolees wMI” is an input from the **Individuals with Criminal History** module. “Parolee wMI mental func gain per year” is a constant defined as one score per person per year. Under normal condition, each parolees wMI gains one score per person per year. This assumption implies that when community services are, county parolees wMI gain one score per person per year. Community service adequacy has the same effect on parolees wMI’s mental function gain as in the pre-Realignment era. This effect is documented in Section 3.2.10.7. Community service adequacy also influences mental function gain of parolees wMI who have violated condition.

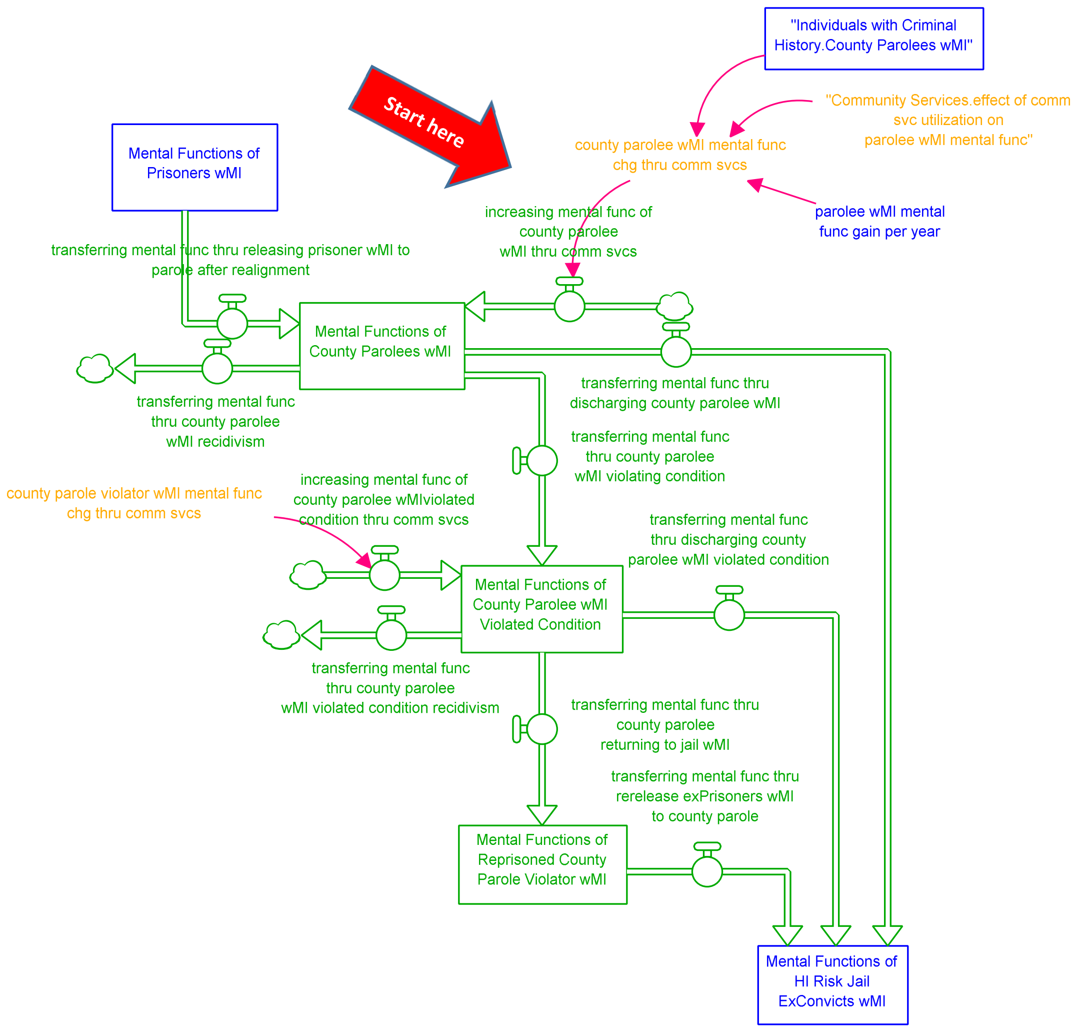


Figure 138 Effect of Community Service Adequacy on the Mental Functions of Parolees with Mental Illness (simplified)

There is an additional coflow in this module: "transferring mental func thru jail offender devMI after realignment". The length of stay for convicted jail offenders increases considerably after Realignment. In San Diego county jails, the average length of stay for a convicted jail offender was 65 days pre-realignment (Littlefield, 2017). After the realignment, the average length of stay has increased to 18 months. Given the longer incarceration time, some jail offenders may develop MI while serving jail time. We set the fraction of jail offenders develop MI as 0.01 per year. Although data on MI development in jail is lacking, omitting this flow means the denial of such phenomenon. To err on the side caution, we estimate the fraction of jail offenders develop MI to be a number smaller than the development of MI in prison. Further research will be required to understand MI development in jail.

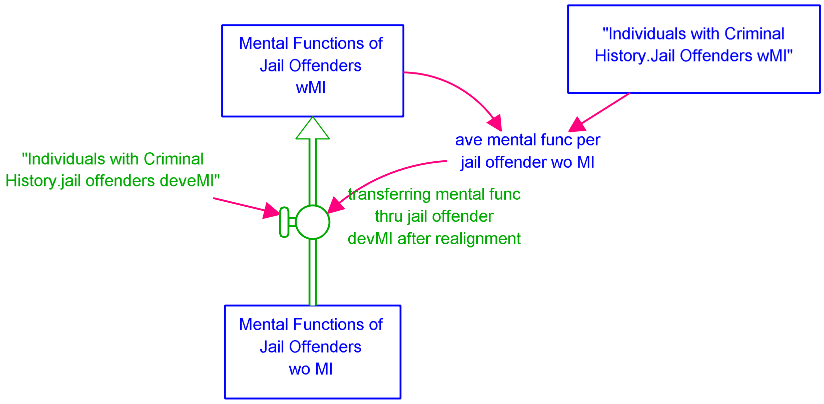


Figure 139 The Transfer of Average Mental Functions of Jail Offenders without Mental Illness when Developing Mental Illness in Jails

3.3.3.1 The *Effect of Mental Functions per Prisoner with Mental Illness on the Recovery Time*

The recovery concept that we adopt forms the basis for the rationale of the absence of inflows to improve mental functions of the high risk and low risk ex-convicts and desisting ex-convicts in the model. It is assumed that even these individuals have lower mental functions than the mentally healthy individuals with no criminal history, the ex-convicts have learned to live with their MI in the community (Figure 140). Therefore, "desired mental func per recovered prisoner" is set to be equal to "init mental func per prisoner wo MI" under the assumption that prisoners wo MI manage to live with mental functions with the score of 63.1 albeit it is lower than normal persons with acceptable level of mental functions with the score of 70 per person. The ratio of the average mental functions a prisoner wMI to the desired mental function of a recovered prisoner from mental illness is the "relative mental func of prisoner wMI to recovered prisoner". This variable becomes the input to "effect of mental func per prisoner wMI on recovery time".

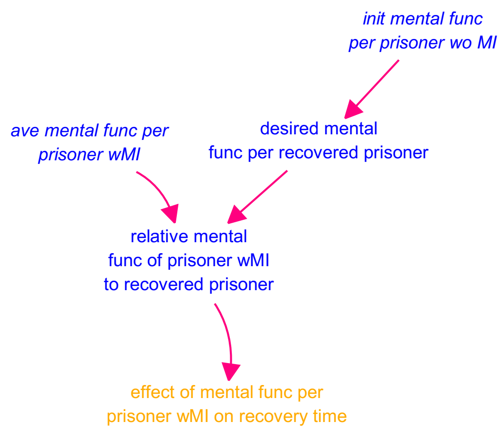


Figure 140 Composition of Relative Mental Functions of Prisoners with Mental Illness

Figure 141 demonstrates the formulation of the effect of mental functions of prisoners wMI on the recovery time through a table function. The input to the horizontal-axis of the table is "relative mental func per prisoner wMI". Initially, "ave mental func per prisoner wMI" is 17% lower than the "desired mental func per recovered prisoner". A declining "relative mental func per prisoner wMI" represents the deterioration in mental functions among the prisoners wMI. This implies a larger correction required to bring the mental functions of the prisoners wMI to the desired level. The "init mental func per prisoner wo MI" is used as a goal for MHC treatment and thus this parameter becomes the input to "desired mental func per recovered prisoner".

The values on the horizontal-axis of the table function ranges between 0.4 and 1.2. The output of the table function is the effect on recovery time, which is reflected on the vertical-axis. The shape of the graph reads that when the "relative mental func per prisoner wMI to recovered prisoner" is one, which means the “ave mental func per prisoner wMI” equals to the “desired mental func per recovered prisoner”, the time for recovery is 40% less than the “ref time to recover fr MI in prison”. In the initial condition, “ave mental func per prisoner wMI” is lower than the “desired mental func per recovered prisoner”. Then, the effect of mental functions per prisoner wMI on recovery time is one. This means that the time for recover from MI in prison is the same as is the same “ref time to recover fr MI in prison”. This reinforcing relationship shows that when the mental functions of prisoners wMI is closer to the desired level, the prisoners recover faster. On the contrary, when the “relative mental func per prisoner wMI” reduces to 0.4, which characterizes the deterioration of the mental functions of prisoners wMI, the recovery time is 20% longer than the “ref time to recover fr MI in prison”. The decreasing “relative mental func per prisoner wMI” also implies more sev

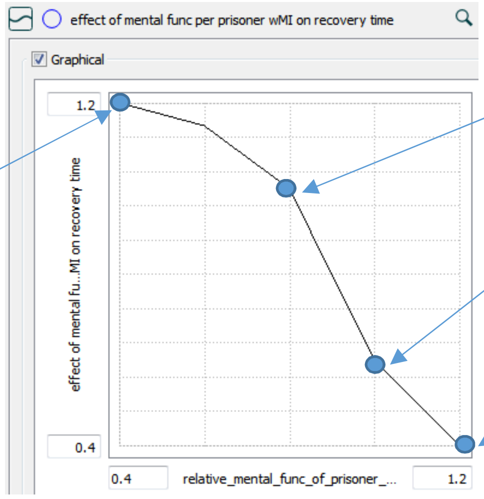


Figure 141 Effect of Prisoners with Mental Illness Mental Function Ratio on Recovery Time

3.3.4 Prison Health Care Resource Allocation

This section focuses on the change in prison health care budget adjustment and allocation process, treatment capacity for infectious disease (ID), chronic disease (CD), and mental health care (MHC) in the prison.

3.3.4.1 Total Health Care Budget Adjustment Process

Before Realignment, CDCR adopts a general health care budget adjustment approach. With this approach, CDCR applied for budget adjustment based on expected prison population growth (Section 3.2.6.1). After the Realignment, the Receiver implemented an acuity-based budget adjustment approach. Under this approach, Receiver projects the needs for the three types of health care capacity in prison separately, i.e. infectious disease (ID), chronic disease (CD), and mental health care (MHC). The estimation for these three types of needs is explained in Section 3.2.5.

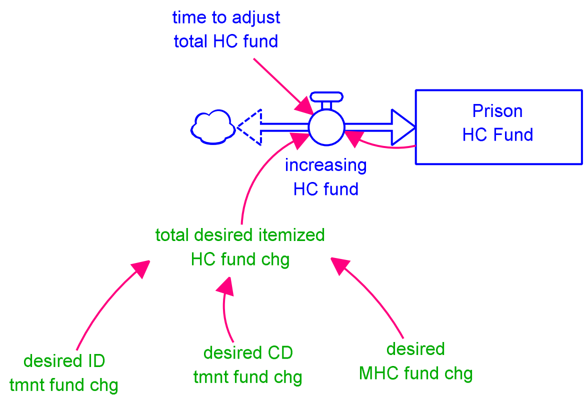


Figure 142 The Acuity Based Health Care Budget Adjustment

Figure 142 shows that Prison HC Fund is adjusted based on the acuity-based budget adjustment process after the Realignment. Acuity-based adjustment refers to *the adjustment process according to the needs for each types of treatment*. "Total desired itemized HF fund chg" is the sum of "desired ID tmnt fund chg", "desired CD tmnt fund chg", and "desired MHC fund chg". These three parameters represent the desired fund for each treatment capacity. The difference between the total desired itemized HC fund change and the existing fund is adjusted over the adjustment time.

3.3.4.2 Adjustment of Infectious Disease (ID) Treatment Capacity

This section explains the formulation for the adjustment process of ID treatment capacity. Figure 143 presents the structure of ID treatment capacity and fund adjustment process. This differs from the approach prior to the Realignment, which prioritizes fund to ID treatment capacity over the other two treatment capacities. The gap in ID treatment capacity determines the ID capacity adjustment. "adjustment for ID tmnt capacity based on gap" refers to *the capacity adjustment over a delay*, i.e. ID Capacity Adjustment Time. "adjustment for ID tmnt capacity based on gap" becomes one of the parameters that determines "desired ID tmnt fund chg". The other parameter is ID treatment cost per prisoner. Compare to ID Treatment Capacity Fund, the gap in ID fund appears. "Adjustment for ID fund" over the adjustment time is the input to the flow that changes the ID treatment capacity fund. The adjustment time is same as the adjustment time for total HC fund.

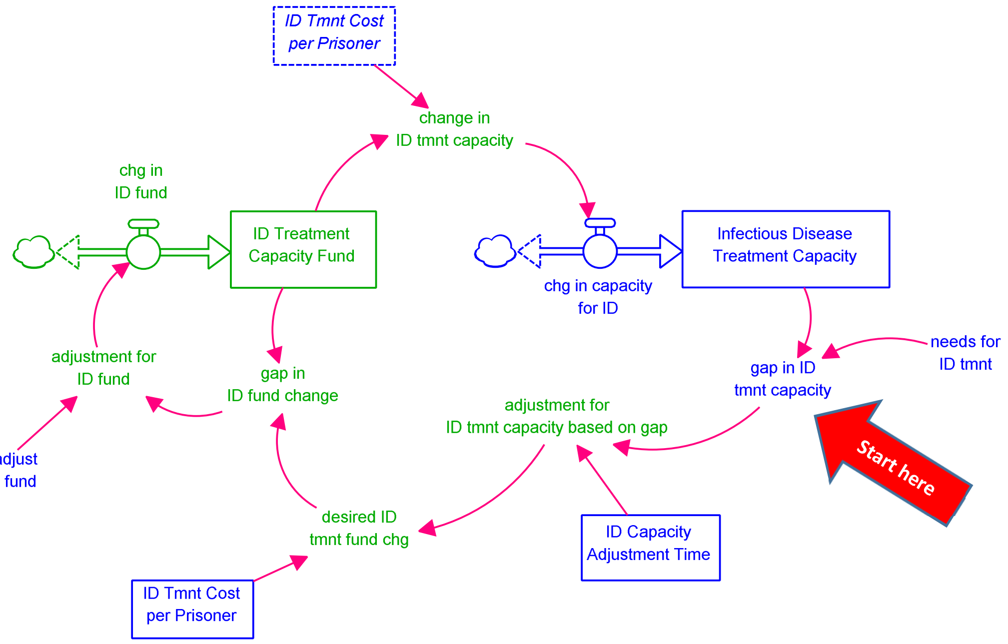


Figure 143 Infectious Disease (ID) Treatment Capacity Fund Adjustment Process

With the updated ID Treatment Capacity Fund Change, the "change in ID tmnt capacity" is determined. This parameter is the division of ID Treatment Capacity Fund Change by the ID treatment cost per prison. "change in ID tmnt capacity" becomes the input to the bi-flow that changes the Infectious Diseases Treatment Capacity stock. Hence, the Infectious Diseases Treatment Capacity is adjusted to match the "needs for ID tmnt".

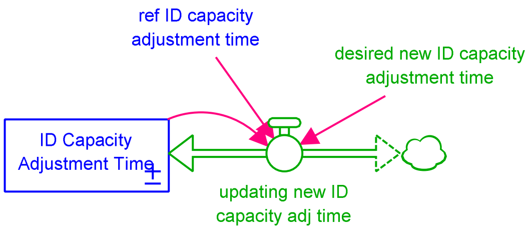


Figure 144 Infectious Diseases Capacity Adjustment Time Adjustment Process

Figure 144 shows the adjustment process of ID Capacity Treatment Adjustment Time. It is modeled as a stock to capture the gradual reduction in ID capacity adjustment time after the Realignment. After the Realignment, the Receiver introduced new system-wide database infrastructure to maintain prisoners' medical records properly in order to facilitate prisoners' mobility within the system and plan for health care capacity. Thus, the new framework has considerably reduced the capacity adjustment time. This new adjustment time replaces the "ref ID capacity adjustment time" with "ID Capacity Adjustment Time". From 1987 to 2011, ID Capacity Adjustment Time remains constant and equals to "ref ID capacity adjustment time". "Ref ID capacity adjustment time" is set as four years. From 2012 onwards, the bi-flow "updating new ID capacity adj time" is enabled. This bi-flow is the difference between the desired ID capacity adjustment time and ID Capacity Adjustment Time adjusted over a delay, which is "ref ID capacity adjustment time". "Desired new ID capacity adjustment time" is set as one year. After the Realignment, the Receiver reformed prison HC to be a more responsive system to meet the needs of prisoners. Hence, we estimate the adjustment time to be one year. This first-order negative feedback structure generates an exponential decay behavior to match the goal, which is the desired new ID capacity adjustment time.

3.3.4.3 Adjustment of Chronic Disease (CD) Treatment Capacity

Figure 145 presents the treatment capacity adjustment process after the Realignment. The formulation of this adjustment process is similar to that of the ID treatment capacity. Hence, we only present the structure here.

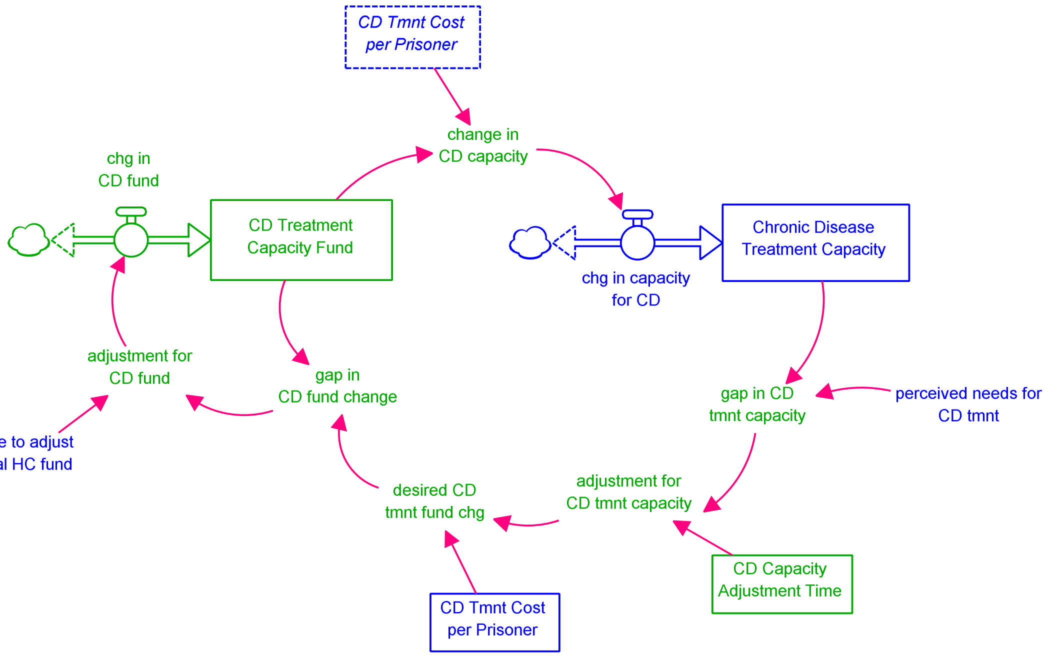


Figure 145 Adjustment Process for Chronic Disease Treatment Capacity

The CD Capacity Adjustment Time stock formulation and the adjustment process are also similar to the ID capacity adjustment time formulation.

3.3.4.4 Adjustment of Mental Health Care (MHC) Capacity

This section explains the adjustment process for MHC capacity (Figure 146). The adjustment process for MHC fund and capacity is similar to the ID and CD fund and treatment capacity. Hence, we are only presenting the structure in this section. The MHC Capacity Adjustment Time stock formulation and the adjustment process are also similar to the ID and CD capacity adjustment time formulation.

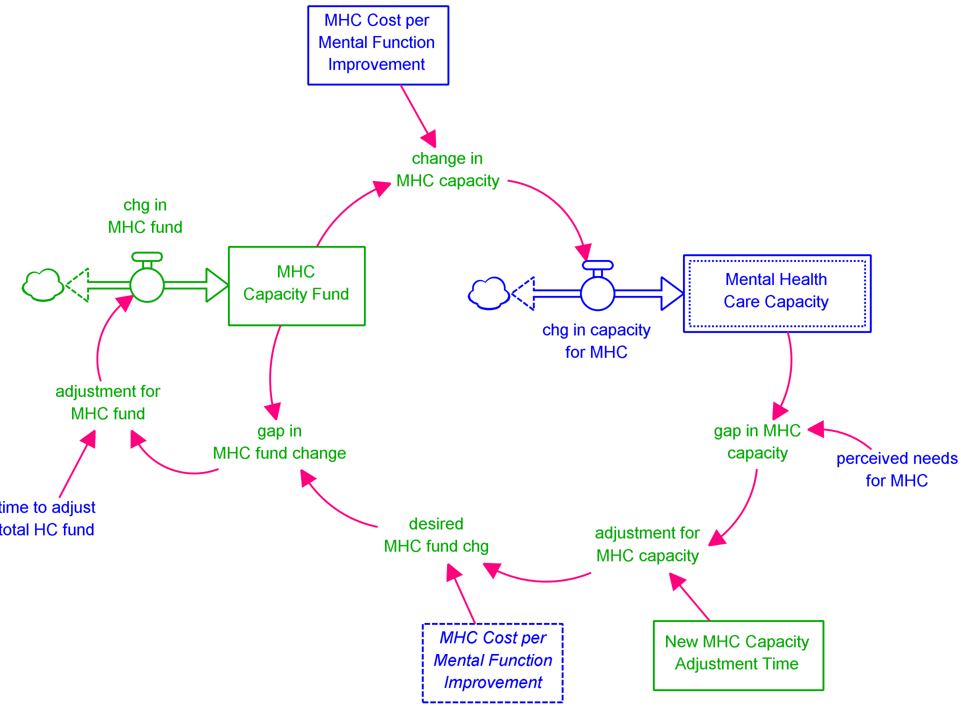


Figure 146 Adjustment Process for Chronic Disease Treatment Capacity

3.3.4.5 Medical Screening Capacity at Reception Centers

Medical screening is provided to the incoming prisoners at the reception centers[80]. Prior to the handover to the Receiver, the medical screening at the reception centers was unproductive ("Plata v. Schwarzenegger," 2009)[81]. Owing to the lack of space combined with a prison capacity utilization level with 200% to 300% over the capacity, many of the reception centers only spent seven minutes to administer each medical screening procedures to assess incoming prisoners' general health. Even though the medical screening includes mental health assessment, having many prisoners cramp into a small space, prisoners generally do not take the assessment seriously. Also, seven minutes for a complete medical screening was insufficient (Nieto, 1998). A minimum period for an acceptable medical screening is 15 minutes. This implies that prior to the intervention of the Receiver, mental

[80] Reception center is the initial holding places for the incoming prisoners. In the reception center, the new prisoners undergo health screening, including mental health assessment.
[81] P.60-65

health screening was almost non-existent. Effective medical screening at the reception centers is crucial because the identification of prisoners wMI helps in MHC capacity planning.

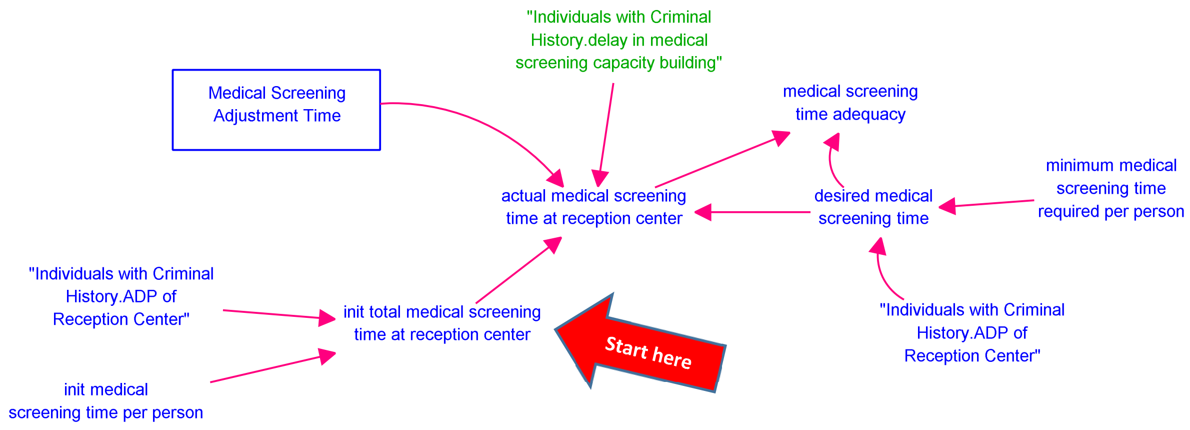


Figure 147 Formulation of the Medical Screening Capacity at the Reception Center after Realignment

Figure 147 presents the formulation of the medical screening capacity at the reception centers. The number of prisoners in the reception centers per day along with the initial medical screening time constitute the "initial total medical screening time at reception center". The "init medical screening time per person" is set as seven minutes. The "ADP of Reception Center" is the average daily population derived from the number of new prisoners at the reception center divided by 365 days. "Initial total medical screening time at reception center" is compared to the "desired medical screening capacity". The gap between the actual and desired states indicates a gap. "Desired medical screening capacity" is the product of the ADP of Reception Center and minimum medical screening time required per person. "Medical screening time adequacy" refers to the ratio of actual medical screening time to the desired medical screening capacity.

The formulation of "actual medical screening time at reception center" is expressed with equation 3-7.

actual medical screening time at reception center=

(1-Individuals_with_Criminal_History.delay_in_medical_screening_capacity_builldling) * init_total_medical_screening_time_at_reception_center +

Individuals_with_Criminal_History.delay_in_medical_screening_capacity_builldling * (**SMTH3** (desired_medical_screening_time, Medical_Screening_Adjustment_Time, init_total_medical_screening_time_at_reception_center)) (3- 7)

where,

delay_in_medical_screening_capacity_builldling is a switch with zero or one.

init_total_medical_screening_time_at_reception_center = 7 minute/person

desired_medical_screening_time = Individuals_with_Criminal_History.ADP_of_Reception_Center * minimum_medical_screening_time_required_per_person

minimum_medical_screening_time_required_per_person = 15 minute/person

Equation 3-7 reads that when the "delay in medical screening capacity builldling" parameter is disabled, i.e the value of this parameter is set as zero, "actual medical screening time at reception center" takes the value of "init total medical screening time at reception center". If the value of "delay in medical screening capacity builldling" is set as one, "actual medical screening time at reception center" takes the value of "desired medical screening time" with a third-order information delay. The averaging time for this information delay is Medical Screening Adjustment Time. After the Realignment, Medical Screening Adjustment Time decreases. Therefore, "actual medical screening time at reception center" is adjusted at a faster rate to achieve the desired medical screening time.

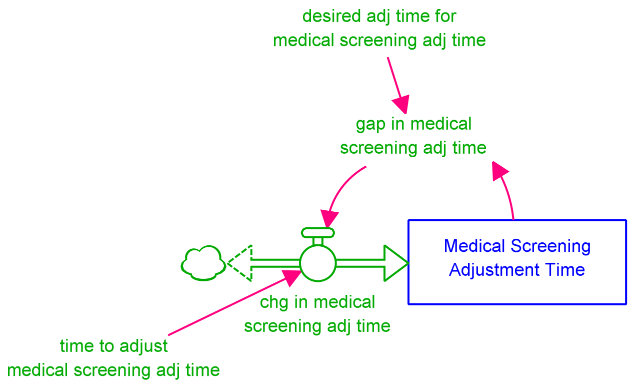


Figure 148 Formulation of the Medical Screening Adjustment Time as a First-Order Negative Feedback Structure

Medical Screening Adjustment Time is formulated as a stock because this adjustment time is adjusted over time (Figure 148). The initial value in the Medical Screening Adjustment Time stock is set as 20 years. It is inferred from the "Plata v. Schwarzenegger" 2009) case that after eight years, the medical screening capacity at the reception center still failed to provide sufficient services. This court case was filed in the early 1990s. This implies that after about 20 years, the medical screen capacity at recepter center still had not achieved the desired capacity. After the Receiver took over the operation of prison health care from CDCR, one of the objectives was to increase the medical screening capacity at the reception center as soon as possible. Therefore, the “desired adj time for medical screening adj time” is set at two years.

3.3.4.6 The *Effect of Medical Screening Time Adequacy on Mental Illness Screening Effectiveness*

This section presents the effect of medical screening time adequacy on the effectiveness on identifying MI among the incoming prisoners in a table function (Figure 149).

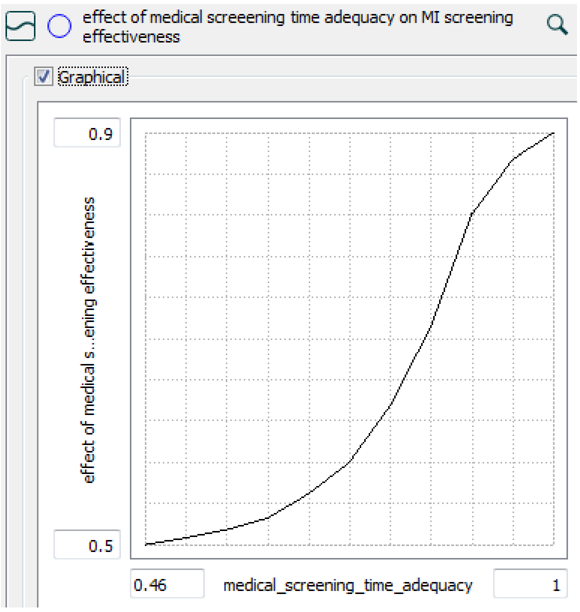


Figure 149 Effect of Medical Screening Time Adequacy on MI Screening Effectiveness

The input to the horizontal axis of the table in Figure 49 is "medical screening time adequacy". This ratio represents the sufficiency level of screening time by comparing the actual total screening time to the desired total screening time. The horizontal axis ranges between 0.46 and one. The output of the table function is the effect on MI screening effectiveness. When the initial medical screening time adequacy starts at 0.46, which is the division of seven minute by 15 minutes, the effectiveness of screening the mental health of the incoming prisoners is only 0.5. As the screening capacity builds up and approaches one, the effectiveness in mental health screening gradually reaches 0.9. In the beginning as the screening capacity increases, the MI screening effectiveness increases slowly. When the screening capacity closed to the maximum screening capacity and the medical screening adequacy approaches one, the screening effectiveness increases much faster. However, the screening effectiveness will not reach one because of the possibility of misdiagnosis.

3.3.5 Jail Capacity

Prior to the Realignment, county governments received fund from the State government to expand jail capacity based the needs projected from county population growth. To delegate correctional responsibility to the counties for Realignment, the State government appropriated two new jail construction funds in 2007 and 2012 to the county governments. The AB 900 new jail construction fund of $1,586 million was allocated in 2007 with a plan to build 9,768 jail beds. The SB 1022 new jail construction fund of $500 million was allocated in 2012 with the aim to build another 2,221 jail beds. Then, the State government further allocated $2 billion for the 2013-2014 fiscal year and then $4.4 billion for 2014 to 2017 (Lin et al., 2014) (Figure 150). This leads to $880 million per year between 2014 and 2018. County governments were encouraged to apply for the Five-year Realignment fund appropriated between 2013 and 2017 to expand jail capacity when necessary.

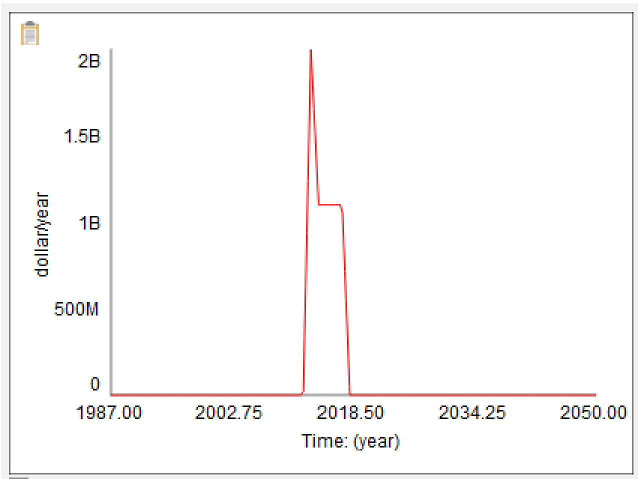


Figure 150 Historical Data: Five-Year Realignment Fund to County Governments Timeline

Note: This image of a table function is different from previous table functions. Due to the limitation on the numerical presentation on the vertical axis, this is a screenshot of the result of the simulation. It shows the same appropriation as in the table function.

Source: Lin et al. (2014)

At the time of the study, further fund allocation to counties have not been reported. Hence, we assume zero fund allocation for the subsequent years after 2018. County governments are given generous autonomy to decide how they spend the Realignment fund (appropriated between 2013 and 2017). In general, the spending of the Five-year Realignment fund by the county governments between 2013 and 2014 can be broadly categorized into law enforcement-related activities and community services-related activities. Realignment resources for local law enforcement refer the sum of Realignment fund spent on law enforcement-related activities. Jail expansion falls under law enforcement spending. Half of the counties allocated 0% to 20% of the Realignment fund to jail expansion (Bird et al., 2014). The fraction of Realignment resource spent on jail expansion is set as 0.2. About 45% of the county governments take the law enforcement approach under which the fraction of Realignment fund spent on law enforcement, jail expansion, and sheriff is four times larger than the counties that adopt the reentry-focused approach. Half of the counties allocated 0% to 20% of the Realignment fund to jail expansion (Bird et al., 2014).

Figure 151 presents the structure for the appropriation of the pre-Realignment jail construction fund. The PreRealignment New Jail Construction Fund stock accumulates three types of special funds for jail expansion between 2007 and 2017. The initial value for PreRealignment New Jail Construction Fund is zero.

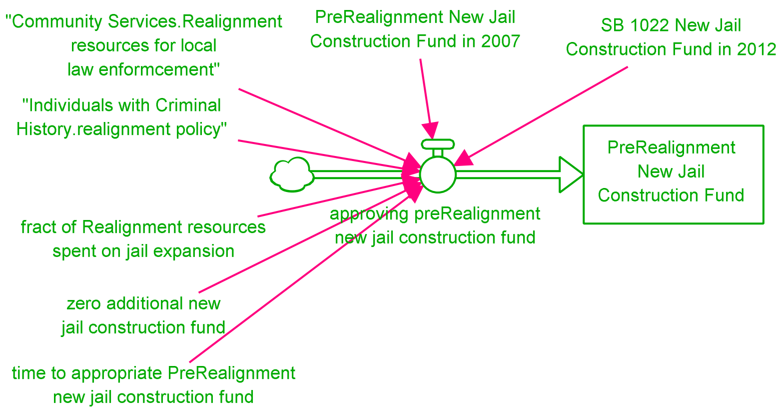


Figure 151 Additional Jail Expansion with Realignment Fund

The three types of funds allocated for jail expansion are "PreRealignment New Jail Construction Fund in 2007", "SB 1022 New Jail Construction Fund in 2012", and "Realignment resources for local law enforcement". The first two are one-time fund allocations. The third fund is allocated for a five-year period begins in 2014.

"PreRealignment New Jail Construction Fund in 2007" is expressed in the following equation with a PULSE built-in function[82].

PreRealignment New Jail Construction Fund in 2007 =

PULSE (1586000000, 2007, 0) (3-8)

A PULSE function contains three arguments. The first argument represents the volume to be pulsed in. The second argument refers to the start time for the pulse to take effect. The last argument specifies

[82] PULSE function is used to pulse in a volume at a certain time or continue pulsing in with a specified volume in designated interval repeatedly.

the interval for the pulse to repeat. As the model runs from 1987 to 2050, an interval of 0 ensures that the PULSE function will never take place again. "SB 1022 New Jail Construction Fund in 2012" also consists of a similar equation, but the first two arguments are $500,000,000 and 2012.

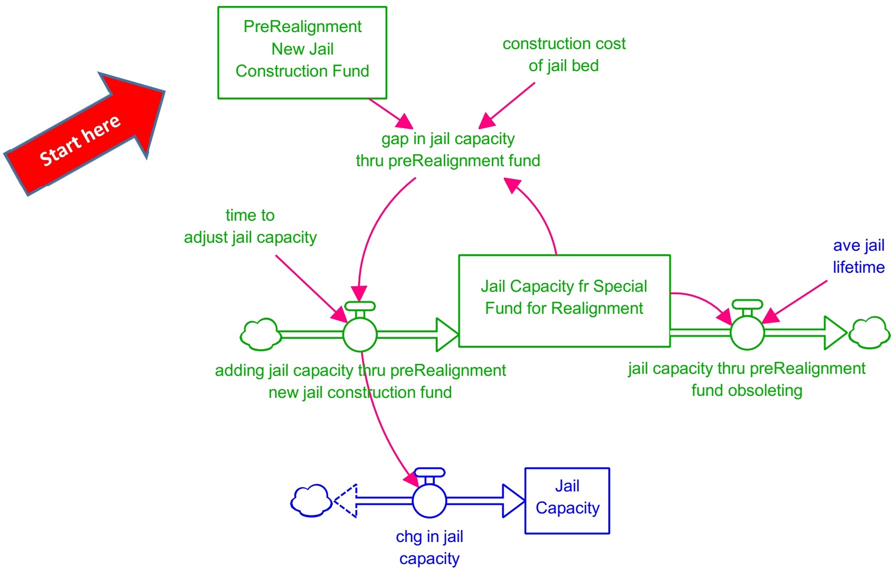


Figure 152 Increase in Jail Capacity through Special Fund Allocation

Figure 152 demonstrates the formulation of additional jail capacity resulted from special county Realignment fund for jail construction. With the PreRealignment New Jail Construction Fund and "construction cost of jail bed", a gap appears when comparing the upcoming jail capacity funded by the PreRealignment New Jail Construction Fund to the existing jail capacity built. The initial value of Jail Capacity fr Special Fund for Realignment stock is zero. The construction cost per jail bed is assumed conservatively at $174,000 per new jail bed[83] (Martin et al., 2014). The average time for a jail construction is six years including the planning process and additional delay in construction (Martin et al., 2014). Similar to the Jail Capacity structure explained in Section 3.2.8, the Jail Capacity fr Special Fund for Realignment stock also consists of an outflow that represents the depreciation of the jail capacity funded through the special PreRealignment fund. The inflow to the Jail Capacity fr Special Fund for Realignment stock also becomes one of the inputs to the inflow to Jail Capacity. Another input to add jail capacity is through regular funding from the State government that is based on county population growth projection (not shown in Figure 152). Thus, the jail capacity is adjusted.

[8383] Author's calculation by averaging the construction cost per jail bed under the Pre-Realignment and SB 1022 Funds. For further details, refer to Martin et al. (2014)

3.3.6 Community Services

As mentioned in the **Jail Capacity** module, the State government distributed an additional $2 billion Realignment fund to the counties for 2013-2014 and then $4.4 billion for 2014 to 2017 (i.e. after the implementation of the Realignment policy). Half of the counties directed 8% to 33% to programs and services expenditures (Bird et al., 2014). Counties adopting reentry-focused approach in Realignment budget allocation spent twice as much as the counties follow enforcement-focused model on programs and services. In the following subsections, the budget allocation and community service capacity adjustment process will be explained. As the structure for community services for parolees wo MI is similar to that for parolees wMI, only community services for parolees wMI will be illustrated. Differences between these two structures will be underscored.

Figure 153 shows the formulation of the additional Realignment resources allocated to boost up community service capacity for prison and county parolees wMI.

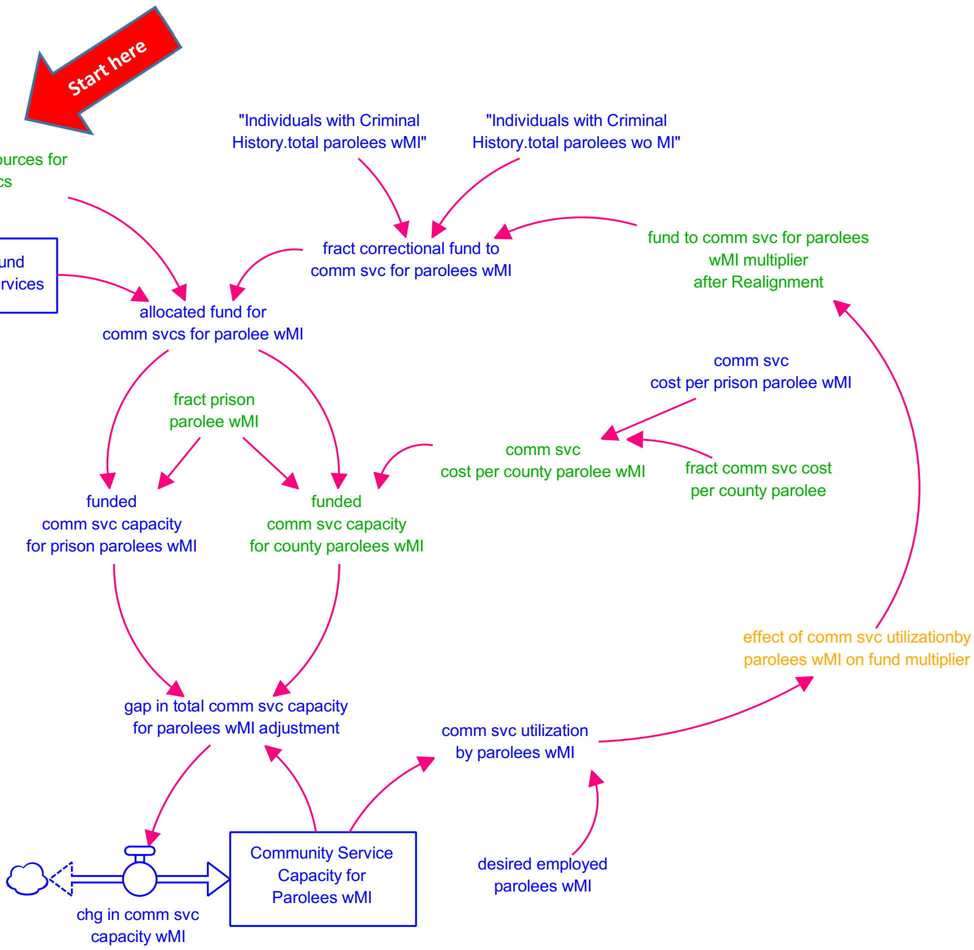


Figure 153 Formulation of the Additional Realignment Resources for Community Services Capacity for Prison and County Parolees with Mental Illness

“Realignment resources for comm svcs” is a fraction of the special five-year county Realignment fund appropriated to increase the capacity of community services (see the next section). Hence, “allocated fund for comm svcs for parolees wMI” increases. The fraction of spending between parolees wMI and parolees wo MI is modified. Instead of distributing the fund based on the size of parolees wMI, the weight to spend the Correctional Fund to Community Services and five-year county Realignment fund on community services for parolees wMI is heavier than the weight on spending for community services for parolees wo MI. This is because that the Realignment policy emphasizes on boosting community mental health care (CMHC) capacity. Therefore, “fund to comm svc for parolees wMI multiplier after Realignment” stresses the spending on community services for parolees wMI to be 1.5 times higher than the spending on community services for parolees wo MI if the community service utilization by parolees wMI is 2.

“Fund to comm svc for parolees wMI multiplier after Realignment” is a variable that is influenced by “effect of comm svc utilization by parolees wMI on fund mulitiplier”. This nonlinear effect is modeled with a table function (Figure 154).

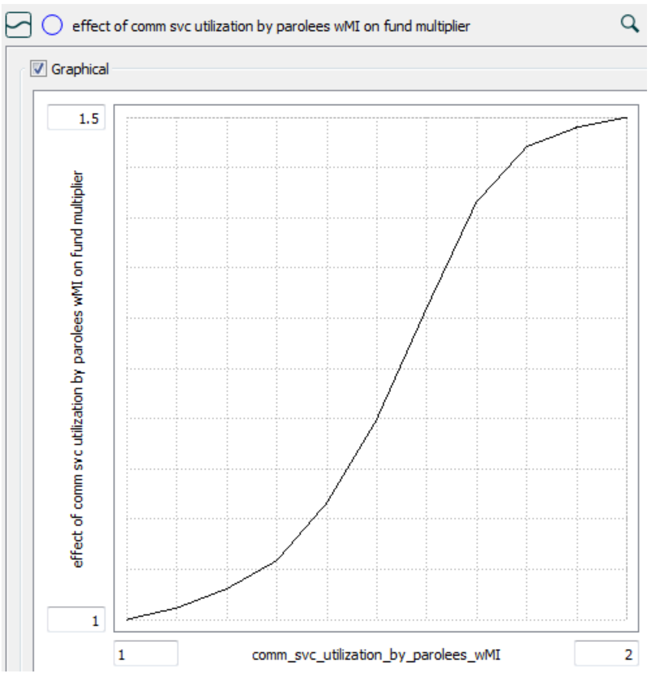


Figure 154 Effect of Community Service Utilization by Parolees with Mental Illness on Fund Multiplier

The input parameter to the horizontal-axis in the table function is community service utilization by parolees wMI. The horizontal-axis ranges between one and two. The effect of community service utilization on the weight for fund distributed to support community service capacity for parolees wMI is reflected on the vertical-axis, which ranges between one and 1.5. The nonlinear relationship expresses that when the utilization level is above one, i.e. the needs for community services for parolees wMI exceeds the capacity, the weight for more fund to support community service capacity for parolees wMI increases. When the utilization level is slightly above one, the effect is marginally smaller as compared to the utilization level approaches two. When utilization level approaches two, the weight is 1.5. With this table function, the weight for fund appropriation to community service capacity for parolees wMI is endogeneously determined. This formulation captures the dynamics of the decision-making process of the State government to allocate more fund to boost up community services for parolees wMI, in particular the community mental health care (CMHC) capacity in the beginning of the Realignment.

"Fract prison parolees wMI" determines the amount of allocated fund distributed between prison and county parolees wMI. "Funded comm svc capacity for county parolees wMI" is determined by the remaining allocated fund for parolees wMI and "comm svc cost per county parolee wMI" after deducting the fund for prison parolees wMI. The cost for community services of county parolees wMI is expected to be lower than the prison parolees wMI given the less serious offences that the county parolees commit and shorter previous incarceration time served by the county parolees (previous incarceration time served as adverse effects on mental functions, social capital, and a reinforcing relationship with the needs for community services). The supervision cost for a mentally ill probationer is reported as $2,845 as opposed to the supervision costs of a mentally ill prison parolees at $4,200 (LAO, 2000a). Hence, "fract comm svc cost per county parolee wMI" is set as 0.68. The community service cost per county parolee wMI is 68% of the community service cost per prison parolee wMI. If county supervision yields success in rehabilitating these parolees in terms of reduction in recidivism, long-term savings in the corrections could be materialized.

3.3.6.1 Decision-making Process for County Realignment Fund Allocation

This section explains the decision-making process of counties in allocating the Realignment fund between law enforcement and community services.

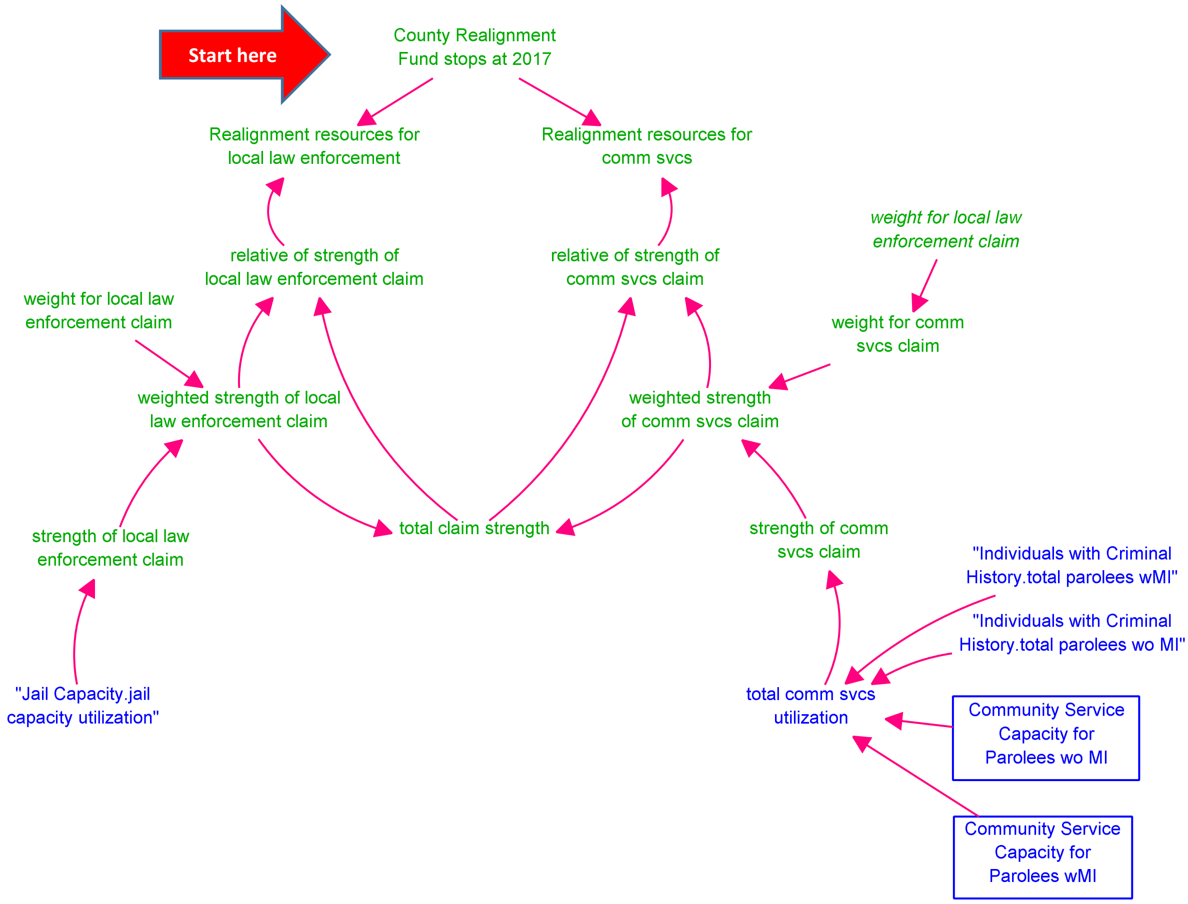


Figure 155 Decision-making Process on Allocating County Realignment Fund between Law Enforcement and Community Services

Primarily, the Realignment fund allocations is broadly dispensed to two categories of activity: local law enforcement and community services (Figure 155). The determination on the amount spent on each category is influenced by the relative strength of the local law enforcement and community services claims. The relative strength of community services claim is the product of the weighted strength of community services relative to the total claim strength. Weight is assigned to the two groups of spending. 55% of the counties adopt the reentry-focused approach while 45% take the enforcement-focused approach (Bird et al., 2014). Hence, the weights for community services claim and local law enforcement are set at 0.55 and 0.45 respectively. The strength of community services claim results from community services utilization level, which is determined by the capacity availability for the all types of parolees. On the other hand, the strength of local law enforcement hinges upon jail utilization (Lin et al., 2014). The higher the community services utilization, the larger the weighted strength of community services claim, and thus the higher the budget allocation to community services. The same is true for the fund appropriation to local law enforcement activities.

3.3.7 Incarceration Year Served

The post-Realignment structure for the **Incarceration Year Served** module is similar to the pre-Realignment structure in Section 3.2.9 and additional structure in Section 3.3.1.

After the Realignment, some prisoners wMI are released to county parole. The same goes for prisoners wo MI. Based on the eligibility criteria for prisoners to be placed under county parole, mentally ill prisoners that require inpatient treatment do not qualify for county parole. Also, county parole is only reserved for convicts with certain less serious offense. Hence, the “ave previous incar time served per prisoner wMI” and “ave current prison time served wMI” brought by the prisoner wMI to county parole is assumed to be shorter than that prisoners wMI brought to CDCR parole supervision. This assumption is modeled through the addition of the “multiplier of ave incar time served by prisoner to county parole” parameter (Figure 156). “multiplier of ave incar time served by prisoner to county parole” is set at 0.9. This represents that the average previous incarceration time served and current incarceration time served by prisoners wMI flowing to the Total Incar Time Served by County Parolees wMI stock is 10% lower than that flowing to the “Total Incar Time Served by Prison Parolees wMI” stock.

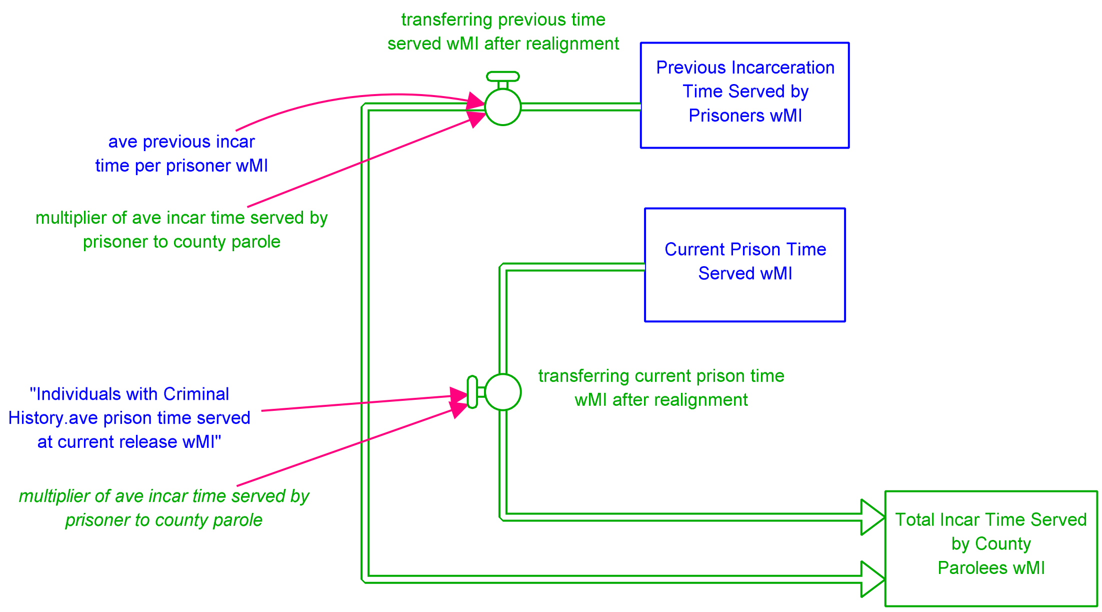


Figure 156 Transferring Previous Incarceration Time Served by Prisoners with Mental Illness and Current Prison Time Served by Prisoners with Mental Illness to the County Parolees with Mental Illness Stock after Realignment

Figure 157 presents the second additional flow in this module. After the Realignment, mental health care (MHC) capacity is building up gradually. Hence, prisoners wMI benefit from MHC provision and recover from MI. When these prisoners leave the Prisoners wMI stock to the “Prisoners wMI” stock, they bring the “ave previous incar time served per prisoner wMI” with them. So their criminal history move along with them to the Previous Incarceration Time Served by Prisoners wo MI stock.

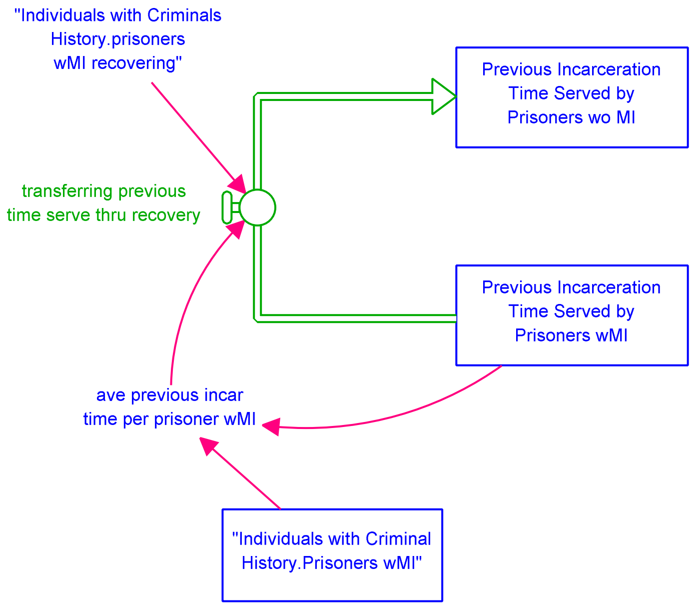


Figure 157 Transferring Previous Incarceration Time Served by Prisoners with Mental Illness through Recovery after Realignment

The recovered prisoners also bring the "ave current prison time served wMI" with them to the "Current Prison Time Served wo MI" stock (Figure 159). This parameter represents the average current sentence they have served up until the point of their transfer. It does not refer to the total time they have served upon their release.

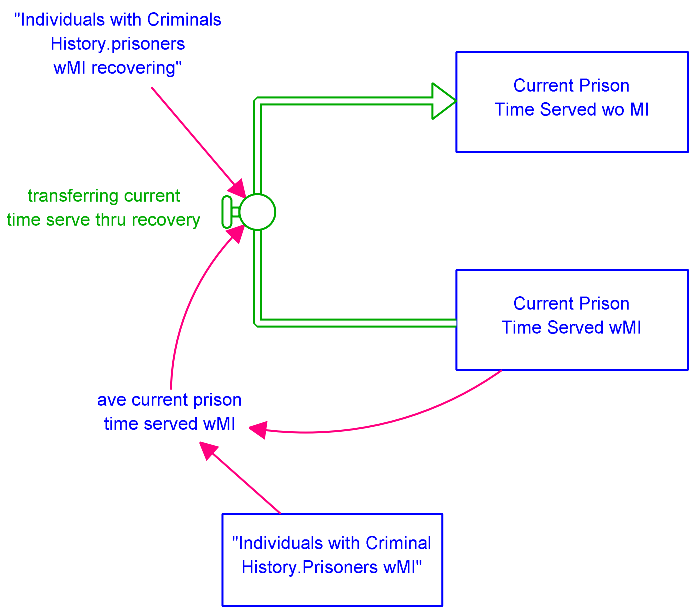


Figure 158 Transferring Current Prison Time Served by Prisoners with Mental Illness through Recovery after Realignment

3.3.8 Social Capital (SC)

The post-Realignment structure for the **Social Capital** module is similar to the pre-Realignment structure in Section 3.2.11 and the post-Realignment structure in the **Individuals with Criminal History** module in Section 3.3.1. As the prisoners released to county parole are likely to have shorter incarceration history, they bring higher SC with them. Thus, the "multiplier of ave SC per prisoner to county parole" is set as 1.5. This means that the average SC brought along by prisoners released to county parole is expected to be 1.5 times higher than those who are released to parole under CDCR supervision.

3.4 Chapter Summary

Chapter 3 presents the dynamic hypothesis in the form of causal loop diagrams (CLDs) and stock-and-flow diagrams (SFDs). CLD presentation is helpful in identifying the dominant causal loops and the process of shifting dominance. SFD presentation is useful in explainning the low-level technical details of the dynamic hypothesis in the form of a model. Also, through detailed and explicit explanation of the model with supporting evidence help building confidence in the model. All 11 modules are illustrated. The pre- and post-Realignment structures are differentiated and explained.

4 Validation and Analysis

4.1 Validation

Model validation tests are crucial because the validity of the results from the model is contingent upon the validity of the model (Barlas, 1996). Barlas argues that the accuracy of the model's ability in reproducing the real behavior observed is only meaningful if we have enough confidence in the model structure. Therefore, the suggested logical sequence of model validation is to test the validity of model structure first, then the behavior accuracy.

4.1.1 Testing Structure Validity

The purpose of this type of testing is to examine the variables in the model, the values of the variables, and their causal relationships.

Direct Structure Tests

Through comparison to the knowledge of the real world from which the model attempts to extract, this test assesses the validity of the model structure. The available tests for this purpose include structure and parameter confirmation tests, extreme conditions test, and dimensional consistency test. The structure and parameter confirmation tests are passed by including detailed and specific references and historical data analysis in Chapter 3 to document the formulation of the model structures. Data sources and estimations are listed in Appendix K. The model has passed the dimensional consistency test. Equations have been inspected directly to assess outcomes with extreme values assigned. Then, the model is initialized in equilibrium.

The purpose of initializing the model in the equilibrium state is to conduct a controlled experiment (Sterman, 2000). Equilibrium refers to *a state where all the stocks in the system are constant by equating the inflows to the outflows*. By initializing the model in a balanced equilibrium, the stocks are populated with the desired values that bring to a desirable state. Initializing the model in equilibrium prior to further policy testing enable us to introduce perturbation to the system and trace the rippling effect of the changes imposed on the system. In a disequilibrium condition, the effects arise from the perturbation may be confounded by the interactions of other parameters or feedback loops.

4.1.2 Testing Structure-oriented Behavior

The purpose of this group of tests is to assess the validity of the model structure indirectly through testing the model-generated behavior. This kind of tests can reveal potential structural flaws. We conduct stress-testing, also called “indirect extreme-condition test” (Barlas, 1996) by assigning extreme values to selected parameters and comparing the simulated behavior to the expected behavior in the real system should the same extreme conditions happen.

The purpose of extreme condition tests is to test the robustness of the model by setting extreme inputs or policies. The model is considered to have passed these tests if it behaves in realistic fashion. Extreme condition tests in this section involve examining the model-generated behavior under the following conditions. The results of these extreme condition tests can be found in Appendix L.

<u>Pre-Realignment Model in Equilibrium</u>

- 1a. Reduce Innocent Population 60%
- 2a. Increase Innocent Population 60%
- 3a. Zero Fraction of Convicts with Prison Conviction
- 4a. Zero Fraction of Convicts with Probation Conviction
- 5a. Increase Fraction of Prisoners without Mental Illness Develop Mental Illness to 1
- 6a. Increase Initial Age at First Commitment to the Expected Life Expectancy of Prisoners
- 7a. Increase Average Mental Functions per New Arrestee to 90
- 8a. Increase Social Capital per New Arrestee to 90
- 9a. Reduce Prison Mental Health Care Fund to Zero
- 10a. Reduce Correctional Fund to Community Services to Zero

<u>Post-Realignment Model in Equilibrium</u>

- 1b. Reduce Innocent Population 60%
- 2b. Increase Innocent Population 60%
- 3b. Zero Fraction of Convicts with Prison Conviction
- 4b. Zero Fraction of Convicts with Probation Conviction
- 5b. Increase Fraction of Prisoners without Mental Illness Develop Mental Illness to 1

6b. Increase Initial Age at First Commitment to the Expected Life Expectancy of Prisoners

7b. Increase Average Mental Functions per New Arrestee to 90

8b. Increase Social Capital per New Arrestee to 90

9b. Reduce Prison Mental Health Care Fund to Zero

10b. Reduce Correctional Fund to Community Services to Zero

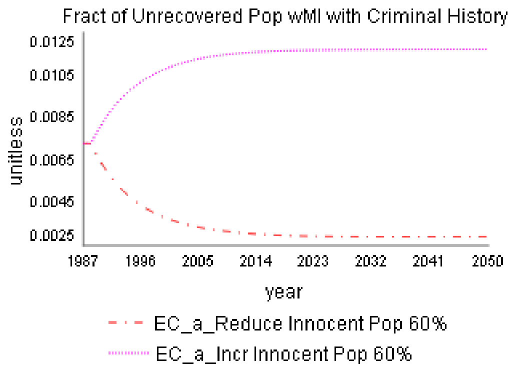
4.1.2.1 Summary from Extreme Condition Tests

This section presents the selected results obtained from the extreme condition tests, in which some parameters are set as zero or some feedback loops are disabled.

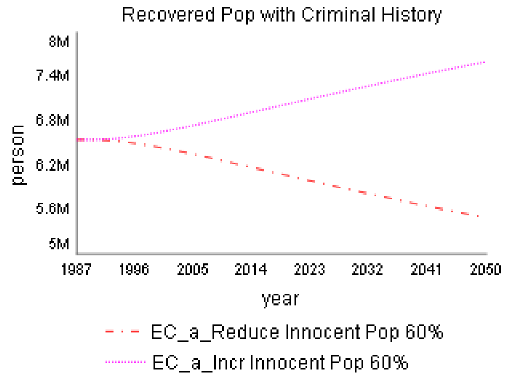
We conduct extreme condition (EC) tests on the pre-Realignment and post-Realignment model. Since the post-Realignment model contains additional or modified structures, the initial conditions for the stocks in the post-Realignment model differs from that in the pre-Realignment model. The extreme condition test results for pre-Realignment model will be summarized first followed by the post-Realignment model's extreme condition test results. Note that in some of the graphs in Chapter 4 keep zero invisible from the vertical-axis in order to present the difference between trends clearer. Test names with the alphabets "**a**" and "**b**" denote testing for *pre-Realignment* and *post-Realignment* model respectively.

4.1.2.1.1 Pre-Realignment Extreme Condition Test Summary

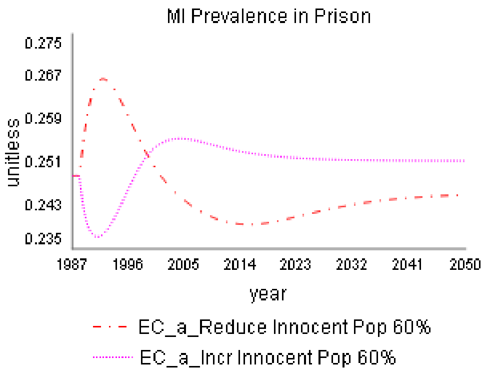
Reduce Innocent Population 60% (Test 1a) and Increase Innocent Population 60% (Test 2a)



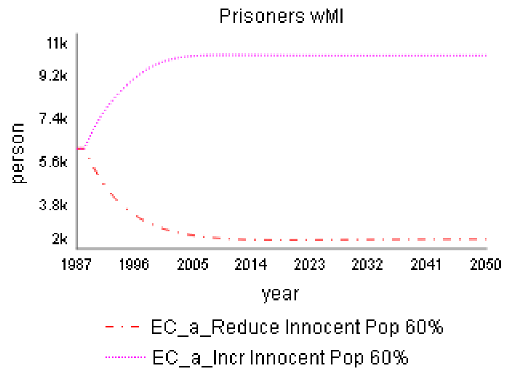
(a)



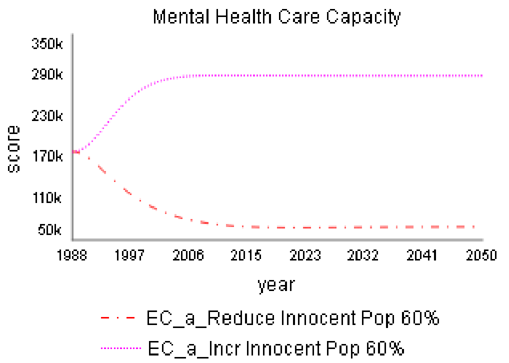
(b)



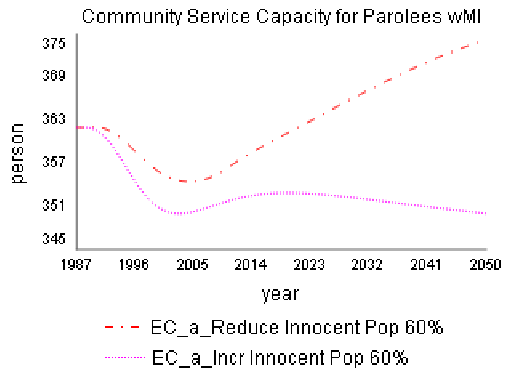
(c)



(d)



(e)



(f)

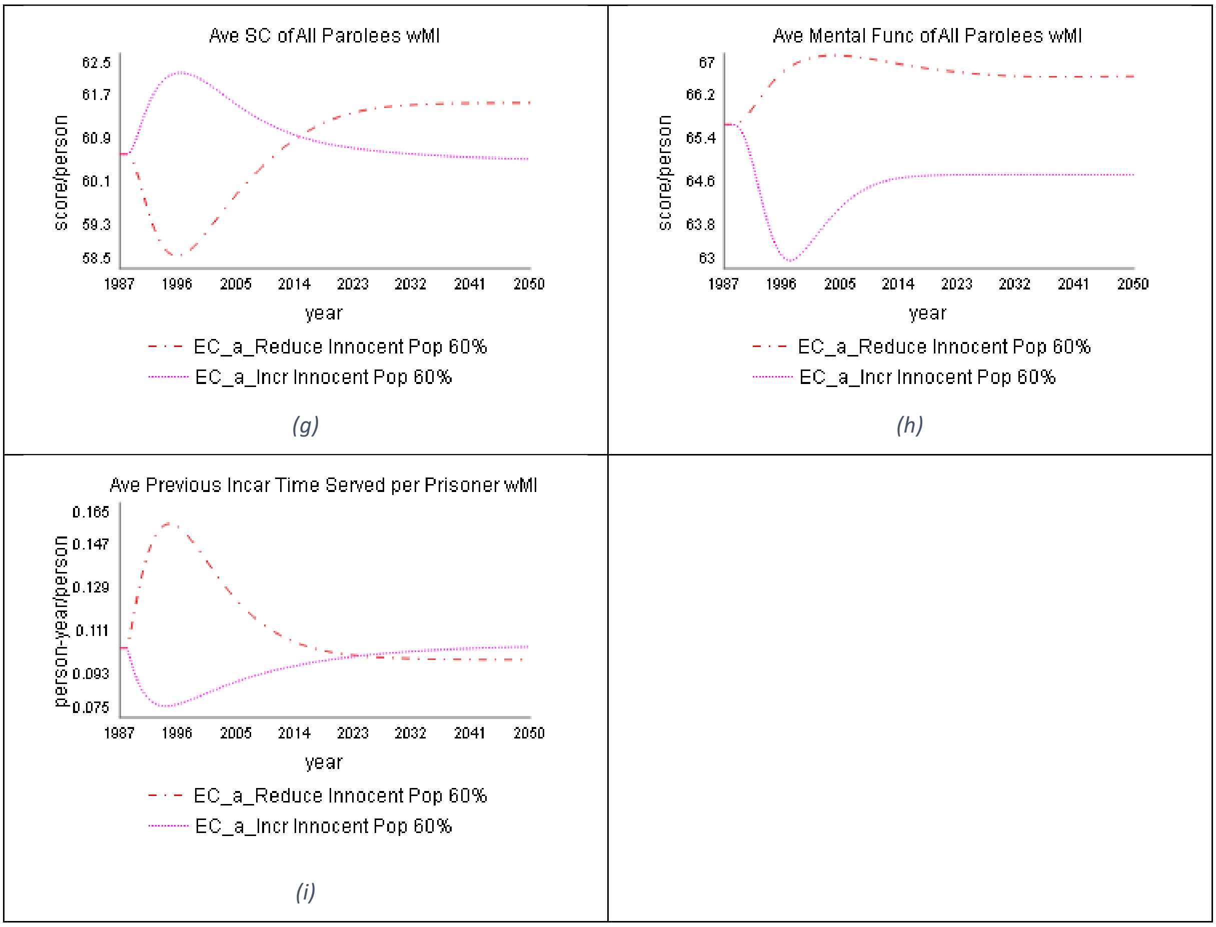


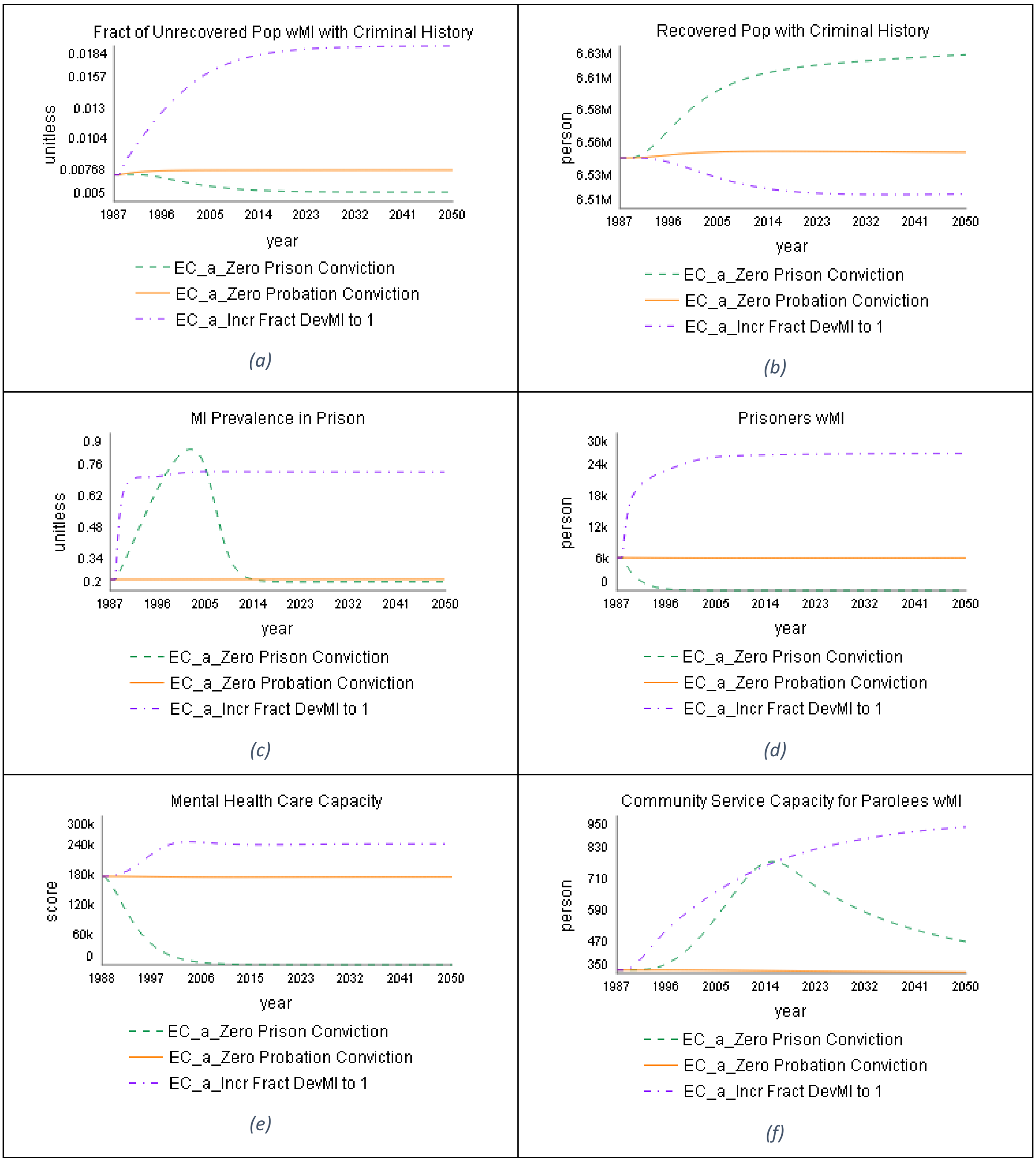
Figure 159 Comparison of Extreme Condition Test 1a and 2a for Post-Realignment Model

(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Average Social Capital of All Parolees with Mental Illness; (h) Average Mental Functions of All Parolees with Mental Illness; (i) Average Previous Incarceration Time Served per Prisoner with Mental Illness

In test 1a and 2a, the innocent population reduces 60% and increases 60%. When the innocent population reduces, all the stocks reduce except for Community Service Capacity for Parolees wMI (Figure 159). The stock of Community Service Capacity for Parolees wMI declines after the both of the tests are iniated, but for different reasons. In Test 1a which the innocent population reduces 60%, the costs for community service per parolees wMI increases due to lower social capital (SC) among parolees wMI (Figure 159g). This is because that the parolees wMI have lower SC than the first-time offenders. Hence, the community service capacity for parolees wMI (Figure 159f) drops because of higher per capita costs associated with lower average SC among the parolees wMI. In Test 2a, which the innocent population increases 60%, the drop in the community service capacity for parolees wMI is caused by the lower average mental functions among parolees wMI (Figure 159h). Again, the community service capacity for parolees wMI (Figure 159f) drops because of higher per capita costs caused by the lower mental functions among parolees wMI. Subsequently, as more correctional fund are split among fewer parolees wMI in Test 1a, the community service capacity for parolees wMI rebounds and grows. On the contrary, the community service capacity for parolees wMI continues to drop due to the limited correctional fund split among larger number of parolees wMI.

The MI prevalence in prison hikes in Test 1a because fewer first-time prisoners wMI and recidivism among ex-convicts wMI. Those who remain are more likely to be habitual offenders wMI and prisoners wMI with longer previous incarceration time served (Figure 159i). Longer previous incarceration time served also implies the more severe SC deterioration.

Zero Prison Conviction (Test 3a)
Zero Probation Conviction (Test4a)
Increase Fraction of Prisoners wo MI Develop MI to 1 (Test 5a)



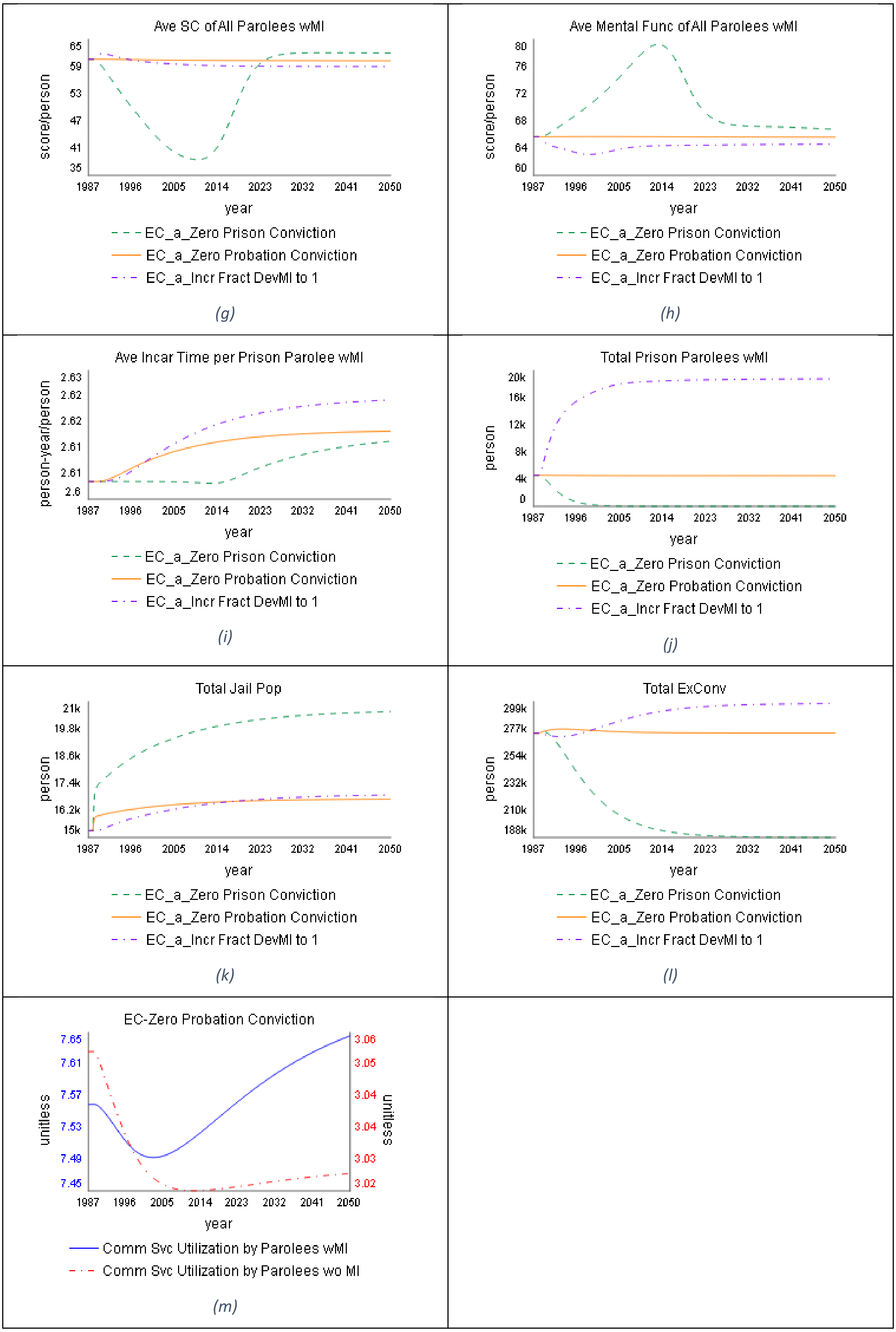


Figure 160 Comparison of Extreme Condition Test 3a, 4a, and 5a for Post-Realignment Model

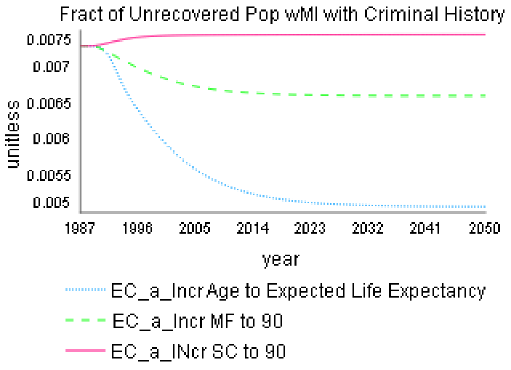
(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; ; (g) Average Social Capital of All Parolees with Mental Illness; (h) Average Mental Functions of All Parolees with Mental Illness; (i) Average Incarceration Time Served per Prison Parolees with Mental Illness; (j) Total Prison Parolees wMI; (k) Total Jail Population; (l) Total Ex-covicts

When prison conviction becomes zero, the fraction of unrecovered population wMI and criminal history reduces (Figure 160a) and the recovered population with criminal history increases (Figure 160b). As the number of prisoners wMI gradually depletes to zero (Figure 160d), so does the MHC capacity (Figure 160e). Community Service Capacity for Parolees wMI increases and decreases. The reason for the increase is due to the reduction in community service cost per parolees wMI due to higher average mental functions (Figure 160h) and longer incarceration time served by prison parolees wMI (Figure 160i) upon their release. In the later stage, when the number of prison parolees wMI starts to deplete to zero (Figure 160j), the community service capacity for prison parolees wMI also starts to deplete.

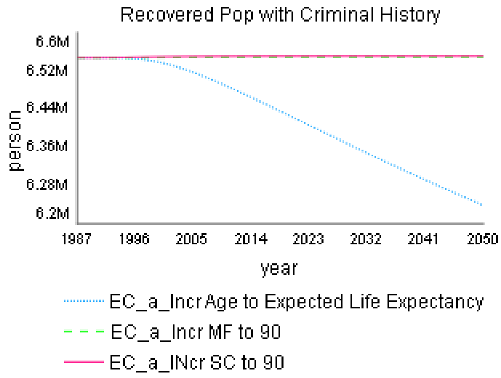
When probation conviction is set to zero, the fraction of population wMI and criminal history increases (Figure 160a). The recovered population also increases slightly (Figure 160b). MI prevalence changes little after the test is initiated (not visible in Figure 160c). Prisoners wMI decreases (not visible in Figure 160d) because more ex-econvicts proceeds to desistance. Initially, more offenders serving the jail sentence when probation sentence is not an option (Figure 160k). As jail sentences are shorter than the prison and probation sentences and released jail offenders are not required to serve parole, more of the released jail offenders proceed to desistance at a faster rate. However, a larger number some of them recidivate. But recidivism among prison ex-convicts reduces. Consequently, MHC capacity decreases because more offenders receive jail conviction (Figure 160e). Community service capacity for parolees wMI drops due to lower needs (Figure 160f). Due to the correctional fund allocation approach, resources are prioritized for community service for parolees wo MI. Consequently, the capacity utilization for parolees wo MI reduces while the capacity utilization for parolees wMI reduces but resumes growing (Figure 160m). Hence, the ex-convicts population increases in the beginning and then decreases subsequently (Figure 160l).

When more prisoners develop MI, the fraction of population wMI and criminal history hikes (Figure 160a) because the stock of prisoners wMI increases (Figure 160d). This resulted in a higher MI prevalence in prison (Figure 160c). Consequently, the recovered population with criminal history drops (Figure 160b). MHC capacity also increases and levels off at a higher capacity (Figure 160e). Despites higher commmunity service capacity for Parolees wMI to accommodate more parolees wMI (Figure 160f), due to resource constraints, the community service utilization level for parolees wMI hikes to a higher level. This results in lower employment level among the parolees wMI and implies higher recidivism among parolees wMI is higher than that of parolees wo MI.

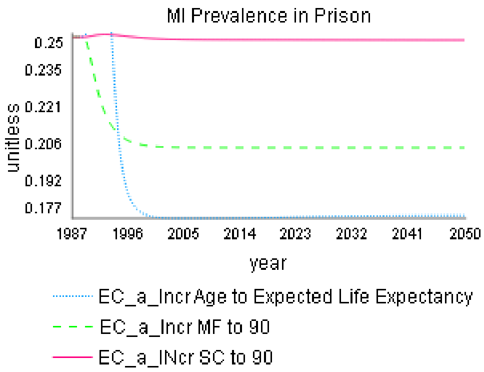
Increase Initial Age at First Commitment to the Expected Life Expectancy (Test 6a)
Increase Average Mental Functions per New Arrestee to 90 (Test 7a)
Increase Social Capital per New Arrestee to 90 (Test 8a)



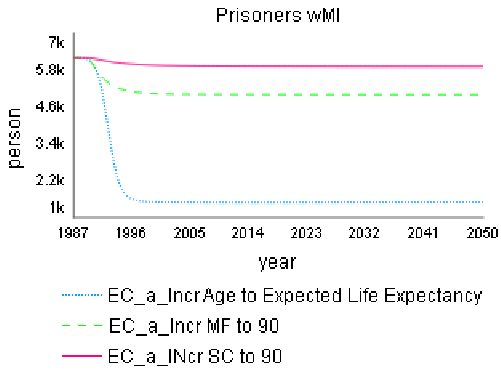
(a)



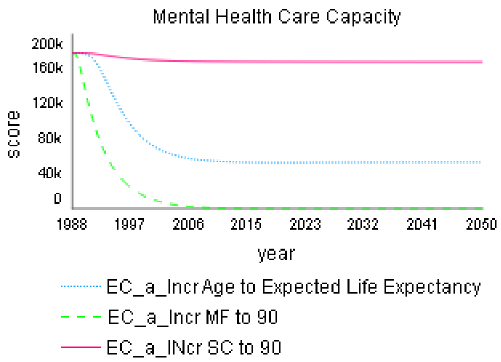
(b)



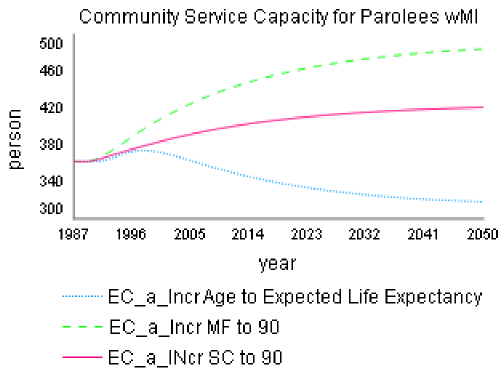
(c)



(d)



(e)



(f)

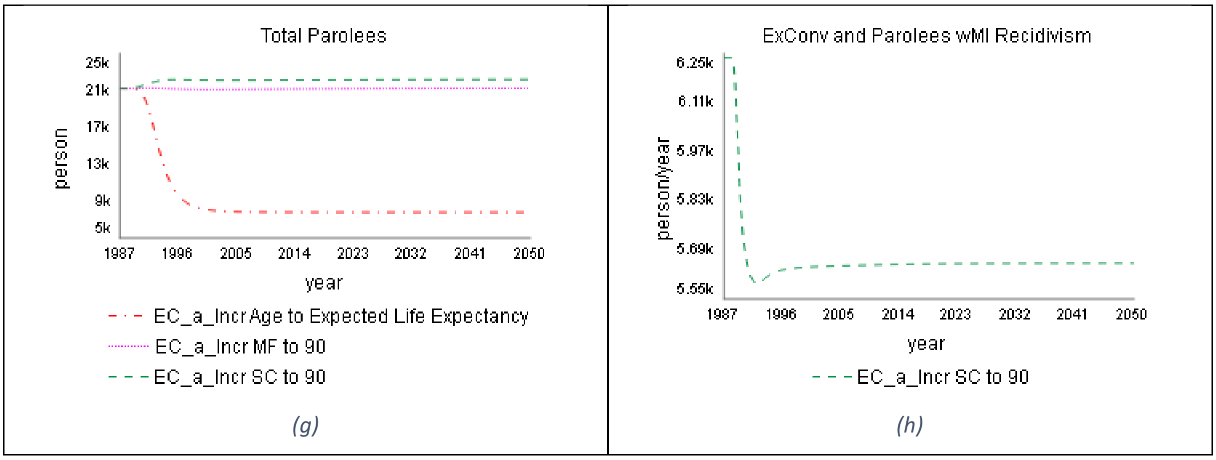


Figure 161 Comparison of Extreme Condition Test 6a, 7a, and 8a for Post-Realignment Model

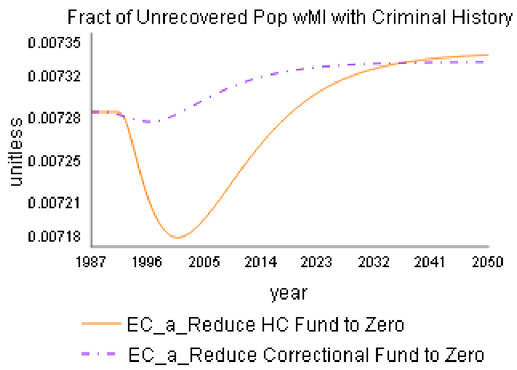
(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Total Parolees; (h) Ex-convicts and Parolees with Mental Illness Recidivism

When the average age of new arrestee increases to match the expected life expectancy of prisoners, i.e. from 28 to 65, each new arrestee enters the system at the age of 65. As mortality rate for prisoners is endogenized, prisoners die rather quickly. Hence, all the stocks in Figure 161 decline in test 6a. MI prevalence hikes right after the test is initiated because with fewer prisoners, MHC resources per capita increases. Therefore, more prisoners who suffer from MI are diagnosed. Alos, the stock of prisoners wo MI drops at a faster rate than the stock of prisoners wMI. As prisoners continue to die at a faster rate, MI prevalence eventually declines (Figure 161c). Community service capacity for parolees wMI only increases insignificantly in the beginning, then it depletes (Figure 161f).

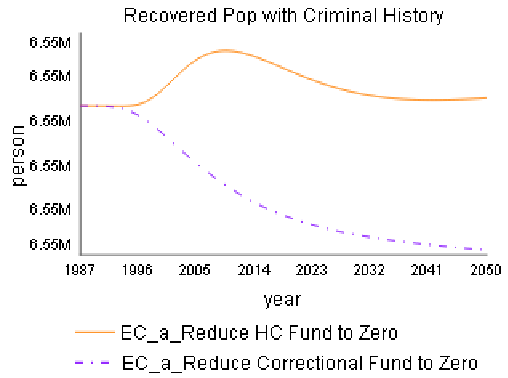
When the average mental function per arrestee increase to 90, fewer prisoners wMI are admitted and fewer prisoners develop MI. Therefore, the fraction of population wMI and criminal history reduces (Figure 161a). The recovered population with criminal history also decreases (not visible in Figure 161b). MI prevalence plummets and levels off at a lower level (Figure 161c) as the stock of prisoners wMI reduces (Figure 161d).

As the SC per new arrestee increases, fraction of unrecovered population wMI and criminal history increases (Figure 161a) because more parolees wMI stay in the stock instead of recidivating (Figure 161g). As they progress to desistance smoothly, the recovered population also increases (not visible in Figure 161b). MI prevalence increases initially when the community service capacity for parolees wMI (Figure 161f) has not caught up with the demand. When the capacity finally matches the demand, the utilization level of community service for parolees wMI reduces significantly. Then, MI prevalence starts decreasing as the employment level among parolees wMI increases and recidivism among parolees and ex-convicts wMI decreases (Figure 161h). MHC capacity shrinks due to lower needs (Figure 161e).

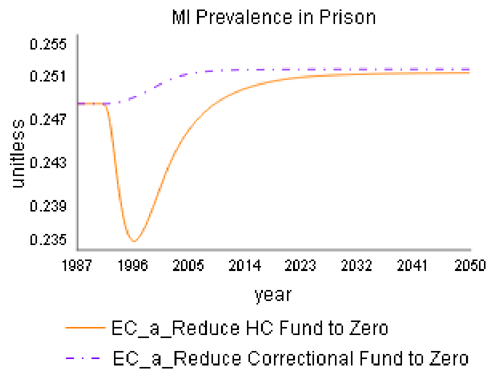
Reduce Prison Health Care Fund to Zero (Test 9a)
Reduce Correctional Fund to Community Services to Zero (Test 10a)



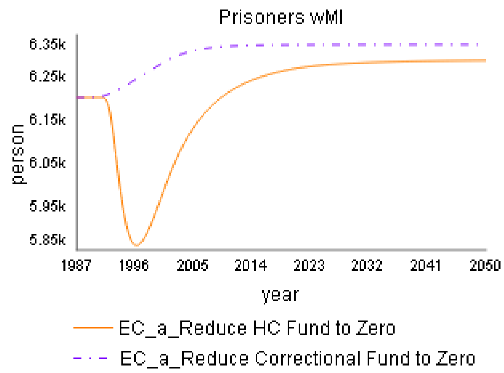
(a)



(b)



(c)



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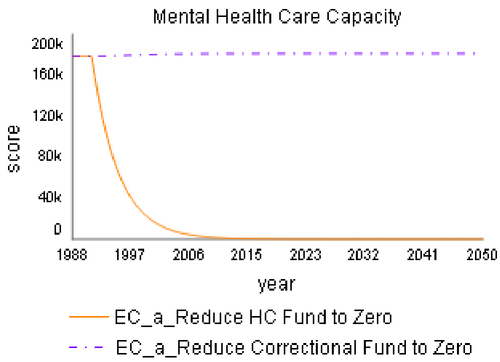
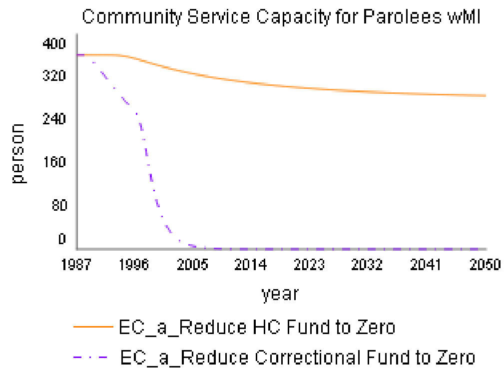
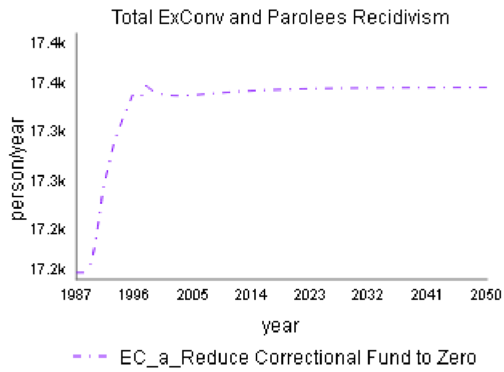


(e)



(f)



(g)

Figure 162 Comparison of Extreme Condition Test 9a and 10a for Post-Realignment Model

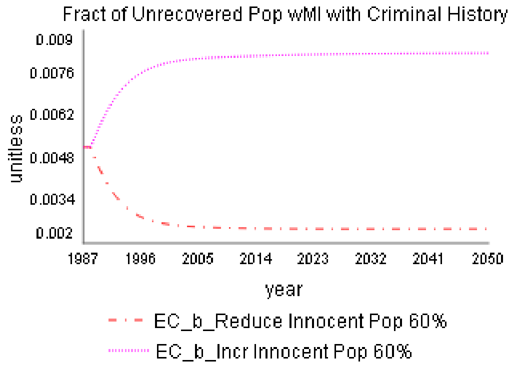
(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Total Ex-convicts and Parolees Recidivism

Fraction of population wMI and criminal history drops when prison health care fund reduces to zero (Figure 162a). This is because that fewer prisoners are diagnosed with MI when they experience the onset of MI. Consequently, MI prevalence and the stock of prisoners wMI are lower (Figure 162c and d). However, the recovered population with criminal history increases as the parolees progress towards desistance faster (Figure 162b). MHC capacity depletes to zero due to insufficient funding (Figure 162e). Community services for parolees wMI reduces due to fewer parolees wMI (Figure 162f).

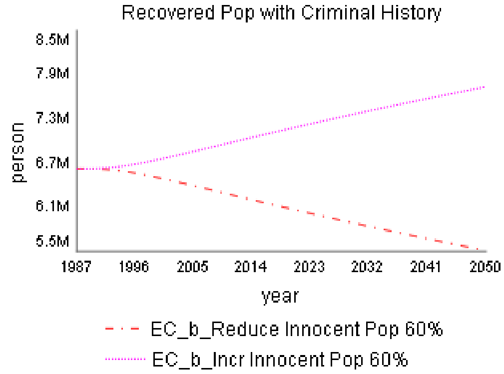
When the correctional fund to community services reduces to zero, fraction of unrecovered population wMI and criminal history reduces gradually first and then grows again (Figure 162a). Initially, fewer parolees wMI recidivate as the community service provision is still available. As the community service capacity for parolees wMI depletes, ex-convicts and parolees wMIs' receidivism hikes (Figure 162g). Consequently, prisoners wMI and MI prevalence increase. The recovered population with criminal history is lower (Figure 162b).

4.1.2.1.2 Post-Realignment Extreme Condition Test Summary

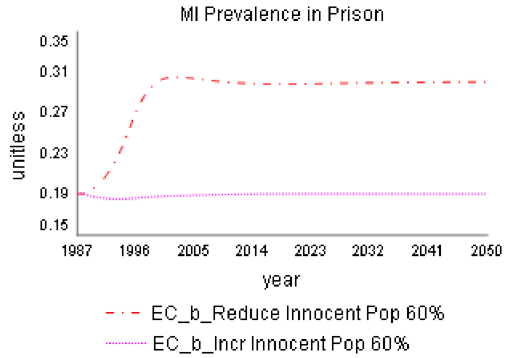
Reduce Innocent Population 60% (Test 1b) and Increase Innocent Population 60% (Test 2b)



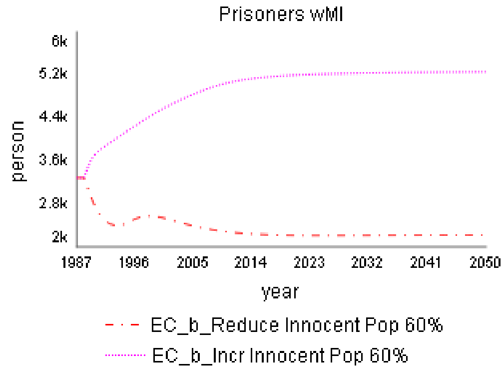
(a)



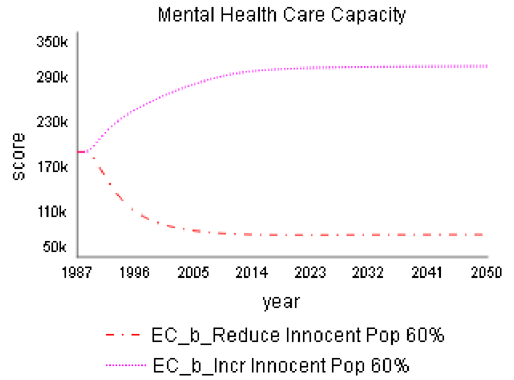
(b)



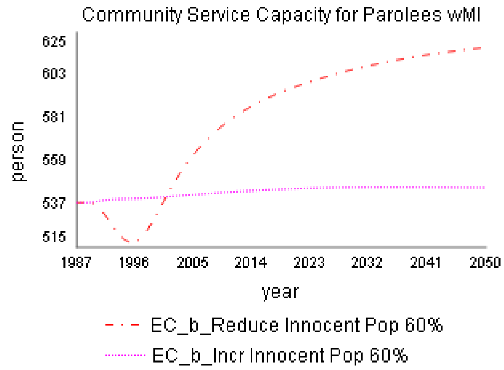
(c)



(d)



(e)



(f)

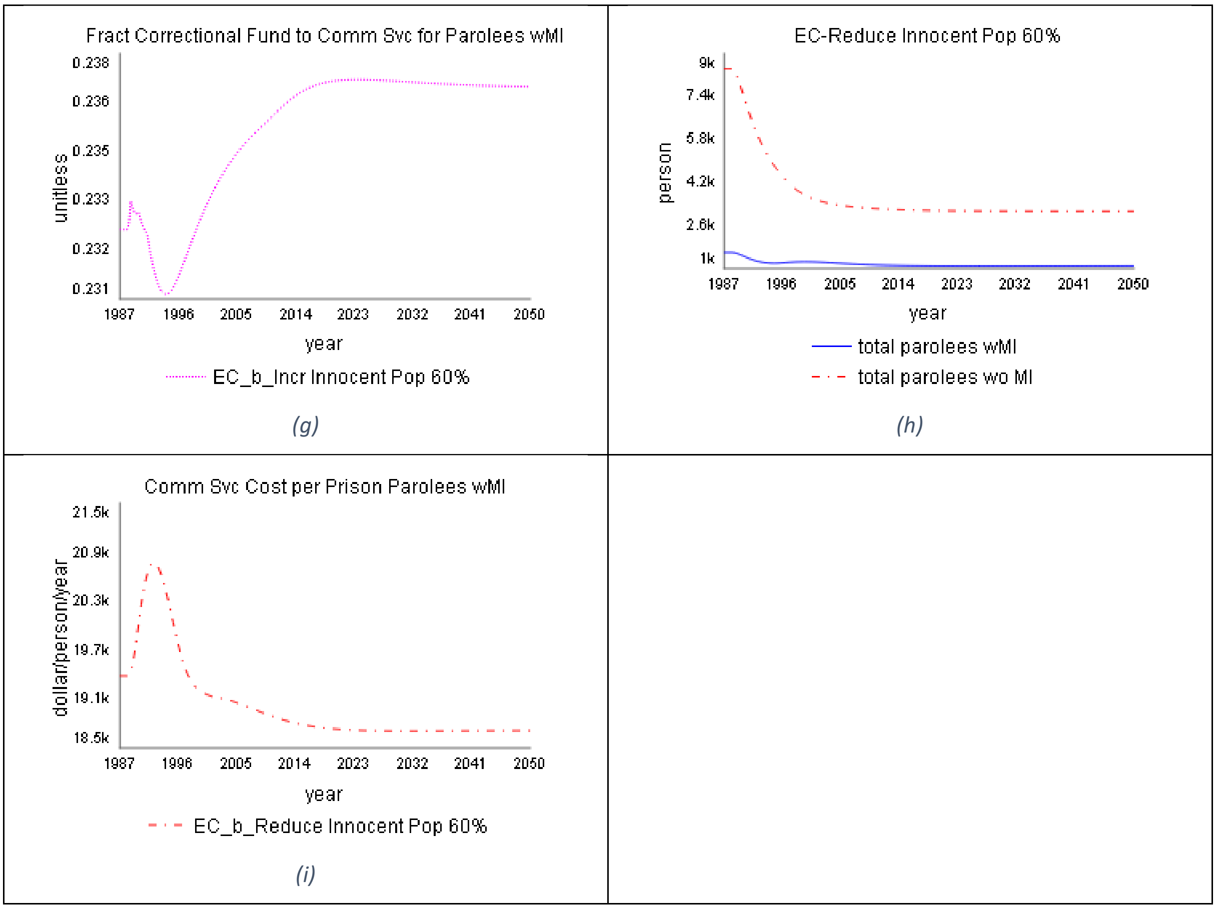


Figure 163 Comparison of Extreme Condition Test 1b and 2b for Post-Realignment Model

(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Fraction Correctional Fund to Community Services for Parolees with Mental Illness; (h) Parolees with Mental Illness and Parolees without Mental Illness; (i) Community Service Cost per Prison Parolees with Mental Illness

In test 1b and 2b, the innocent population reduces 60% and increases 60%. When the innocent population reduces, all the stocks reduce except for Community Service Capacity for Parolees wMI (Figure 163). The stock of Community Service Capacity for Parolees wMI declines after the test is iniated, but the trend resumes growing afterwards (Figure 163f). This is resulted from the lower fraction of correctional fund to the community services for parolees wMI. Correctional fund is prioritized to community services for parolees wo MI (Figure 163g). In this test, the population of parolees wo MI still outgrowths the population of parolees wMI (Figure 163h). Therefore, more resources are prioritized to community services for parolees wo MI. At the same time, the costs of community service for parolees wMI hikes after the test is initiated (Figure 163i). Hence, community service capacity for parolees wMI drops. recidivism among the parolees wMI. When the costs for parolees wMI drops and the number of parolees wo MI drops to a new low level, fraction of correctional fund to community services for parolees wMI increases, the community service capacity for parolees wMI resumes growing. MI prevalence in prison hikes because more health care resources are distributed among fewer prisoners wMI. Hence, more prisoners are diagnosed. At the same time, the reduction in prisoners wo MI is greater than the reduction in prisoners wMI.

Zero Prison Conviction (Test 3b)
Zero Probation Conviction (Test4b)
Increase Fraction of Prisoners wo MI Develop MI to 1 (Test 5b)

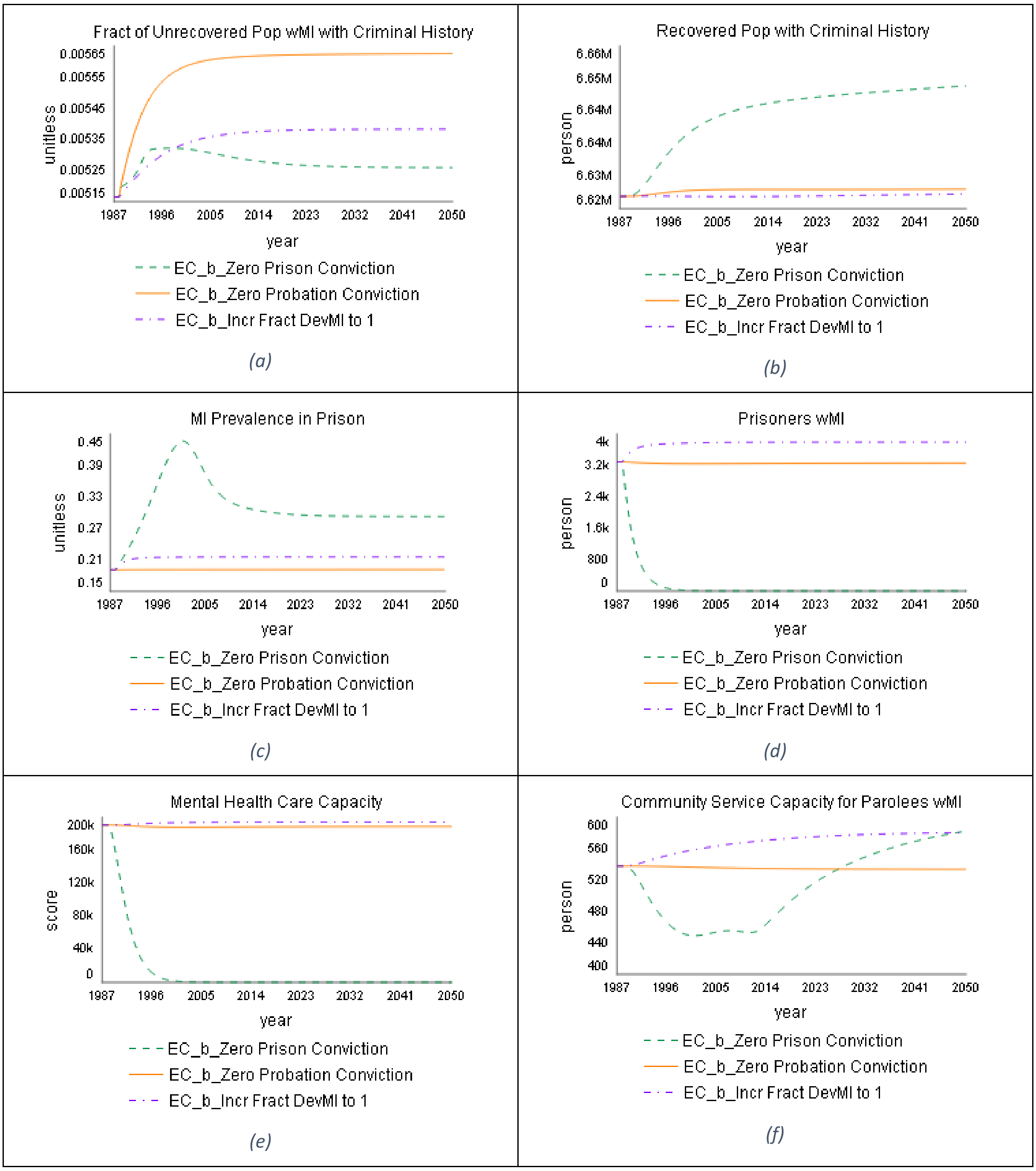


Figure 164 Comparison of Extreme Condition Test 3b, 4b, and 5b for Post-Realignment Model

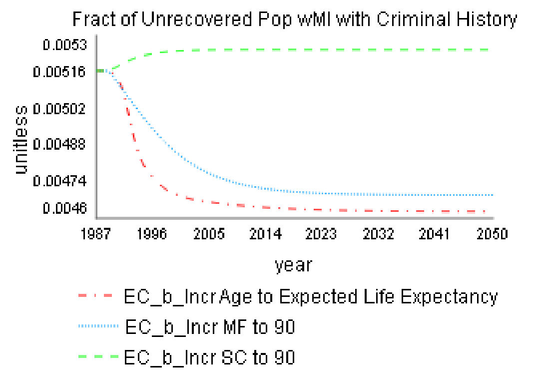
(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness

When prison conviction becomes zero, the fraction of unrecovered population wMI and criminal history increases (not visible in Figure 164a) and the recovered population with criminal history increases (Figure 164b). As the number of prisoners wMI gradually depletes to zero (Figure 164d), so does the MHC capacity (Figure 164e). Community Service Capacity for Parolees wMI (Figure 164f) decreases slightly initially due to the prioritization of correctional fund to community services for parolees wo MI and the increase in costs of community services for parolees wMI. Afterwards, as community service capacity for parolees wo MI depletes to near zero due to the depletion of parolees wo MI, then more correctional fund is allocated to support community services for parolees wMI. At that time, community service capacity for parolees wMI resumes growing.

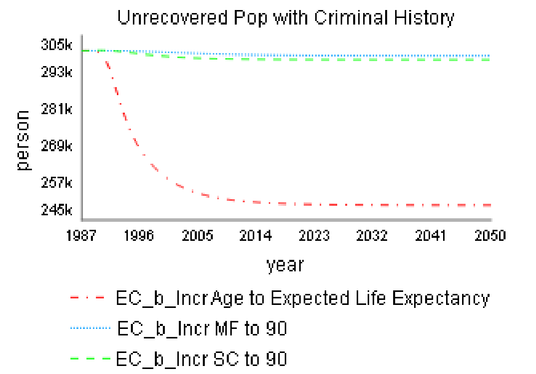
As probation conviction is set to zero, the fraction of population wMI and criminal history (Figure 164a) and the recovered population (Figure 164b) increase slightly. MI prevalence increases slightly (Figure 164c) because the reduction in prisoners wo MI is greater than the reduction in prisoners wMI (Figure 164d). Consequently, MHC capacity also increases to accommodate higher needs (Figure 164e). As more parolees wMI recidivate, community service capacity for parolees wMI drops (Figure 164f).

When more prisoners develop MI, the fraction of population wMI and criminal history hikes (Figure 164a) because the stock of prisoners wMI increases (Figure 164d). This resulted in a higher MI prevalence in prison (Figure 164c). The MHC capacity (Figure 164e) increases in response to the increase in the population of prisoners wMI. Therefore, more prisoners are diagnosed and treated. Consequently, more prisoners proceed to desistance and the recovered population with criminal history increases (Figure 164b). Due to the increase in parolees wMI, community service capacity for Parolees wMI grows to accommodate higher needs (Figure 164f).

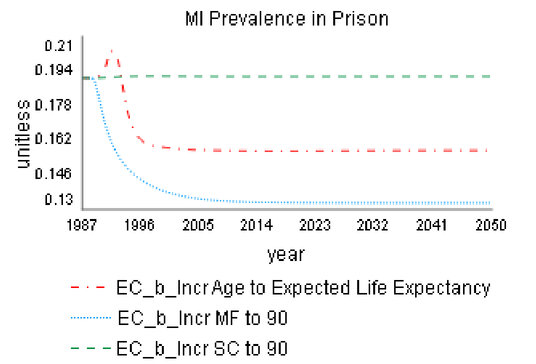
Increase Initial Age at First Commitment to the Expected Life Expectancy (Test 6b)
Increase Average Mental Functions per New Arrestee to 90 (Test 7b)
Increase Social Capital per New Arrestee to 90 (Test 8b)



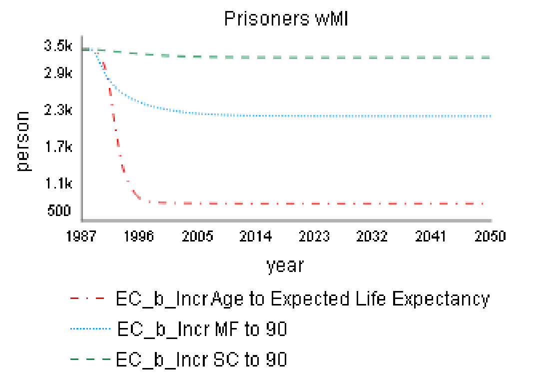
(a)



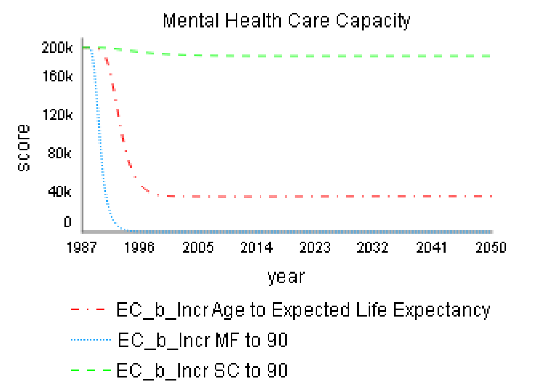
(b)



(c)



(d)



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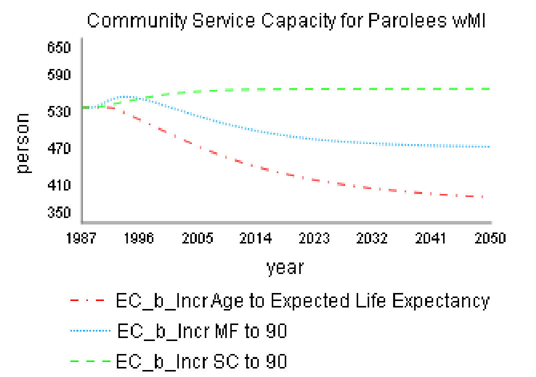


(f)

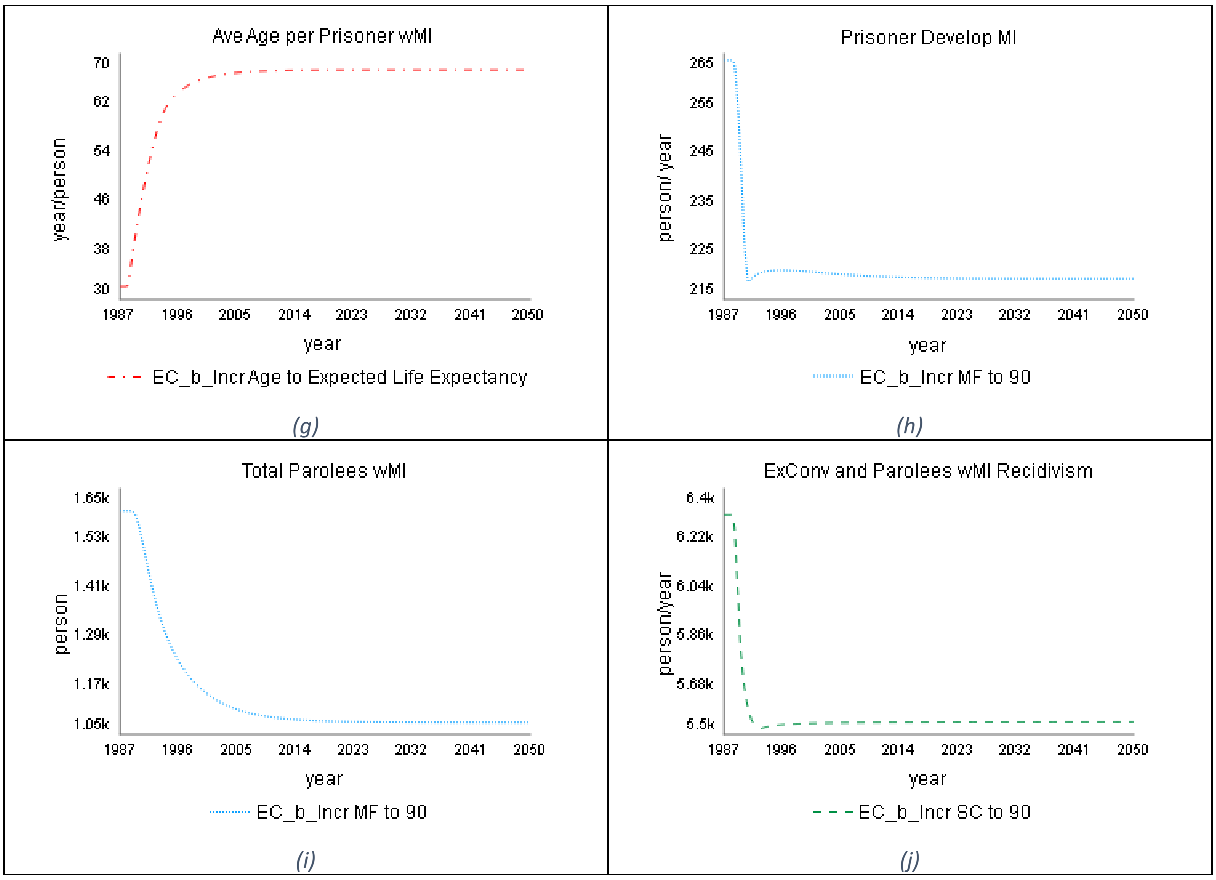


Figure 165 Comparison of Extreme Condition Test 6b, 7b, and 8b for Post-Realignment Model

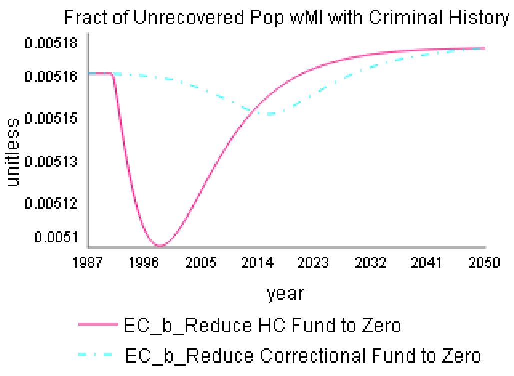
(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Average Age per Prisoner with Mental Illness; (h) Prisoners Develop Mental Illness; (i) Total Parolees with Mental Illness

When the average age of new arrestee increases to match the expected life expectancy of prisoners, each new arrestee enters the system at the age of 65. As mortality rate for prisoners are endogenized, prisoners die rather quickly. Hence, all the stocks in Figure 165, including the Recovered Pop wMI and Criminal History (Figure 165e), Prisoners wMI (Figure 165d), Mental Health Care Capacity (Figure 165e), and Community Service Capacity for Parolees wMI (Figure 165f), decline. MI prevalence reduces due to fewer prisoners wMI (Figure 165c and d). Initially, MI prevalence hikes because those who are newly admitted at an average age of 65 die rather quickly. But those who are remaining in the prisons and serving sentences are admitted at the average age of 28. So these prisoners wMI do not die, but are rather released after finish serving sentences in a few years. After these younger prisoners wMI leave the prisons, the remaining prisoners are mostly made up of older prisoners (Figure 165g). Hence, they die quickly and the population of prisoners wMI decrease sharply a few years after Test 6a is initated. This is to accommodate the parolees wMI who are still serving parole. Once these parolees wMI finished serving parole, community service capacity for parolees wMI reduces to accommodate the shrinking population of parolees wMI.

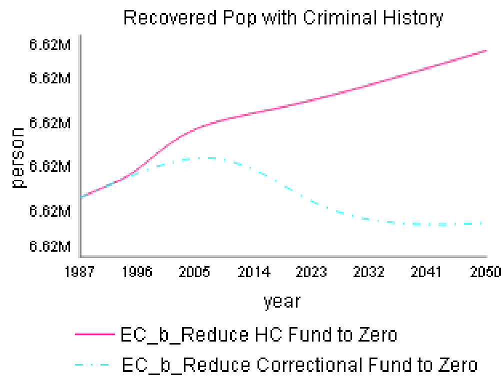
When the average mental function per arrestee increase to 90, fewer prisoners wMI are admitted and fewer prisoners develop MI (Figure 165h). Therefore, the fraction of population wMI and criminal history reduces (Figure 165a) while the recovered population with criminal history increases (not visible in Figure 165b). MI prevalence plummets (Figure 165c) as the stock of prisoners wMI reduces (Figure 165d). Community service capacity for parolees wMI (Figure 165f) increases initially, then it declines continuously a few years after Test 7b is initiated as the population of parolees wMI declines and levels off at a new lower level (165i).

As the SC per new arrestee increases, fraction of unrecovered population wMI and criminal history (Figure 165a) increases because more parolees wMI stay in the stock instead of recidivating (Figure 165i). As they progress to desistance smoothly, the recovered population also increases (not visible in Figure 165b). MI prevalence increases due to the larger decrease in prisoners wo MI as compared to prisoners wMI (not visible in Figure 165c). MHC capacity shrinks due to the diminishing needs (Figure 165e). As more parolees wMI remain the the stock, community service capacity for parolees wMI grows (Figure 165f).

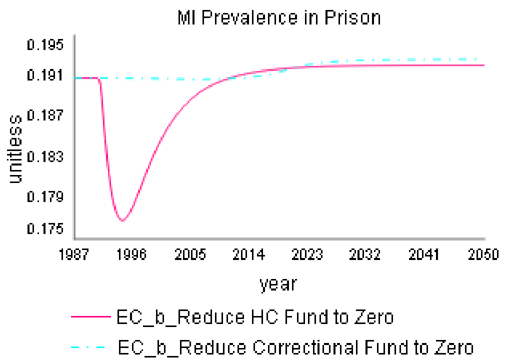
Reduce Prison Health Care Fund to Zero (Test 9b)
Reduce Correctional Fund to Community Services to Zero (Test 10b)



(a)



(b)



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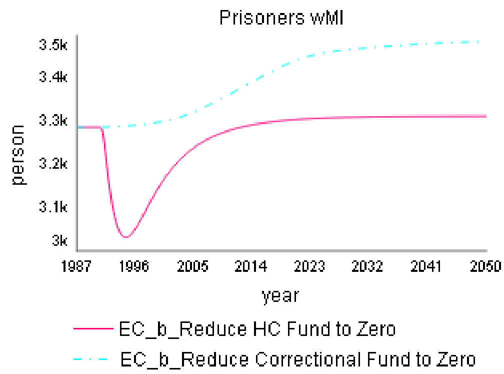

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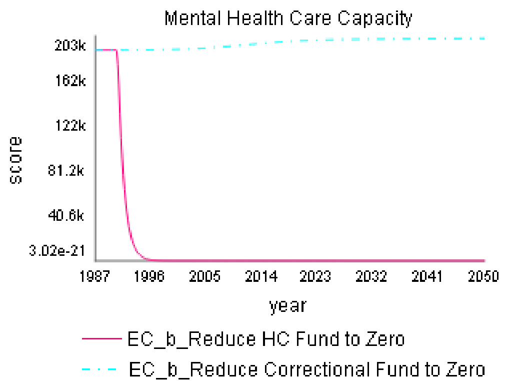

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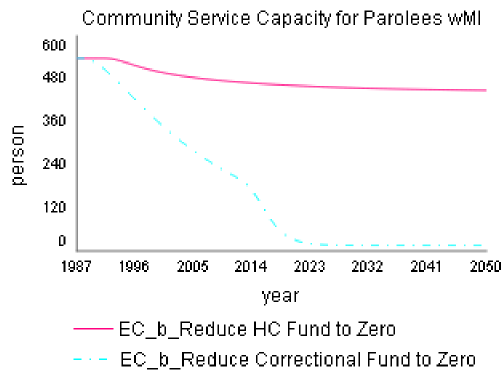
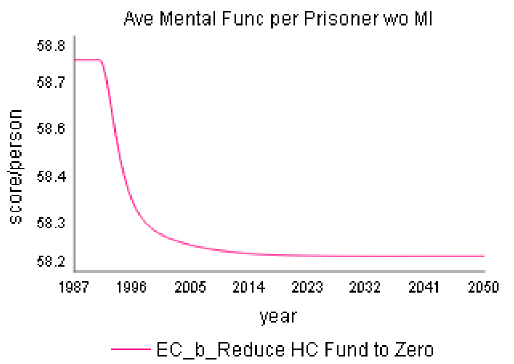
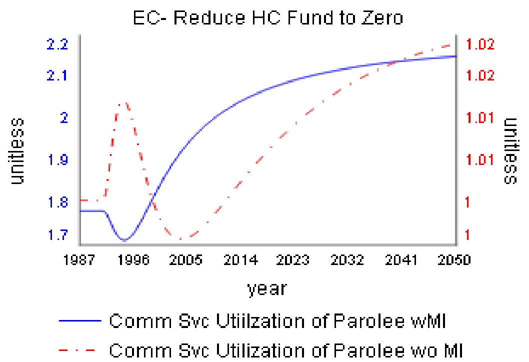


(f)



(g)



(h)

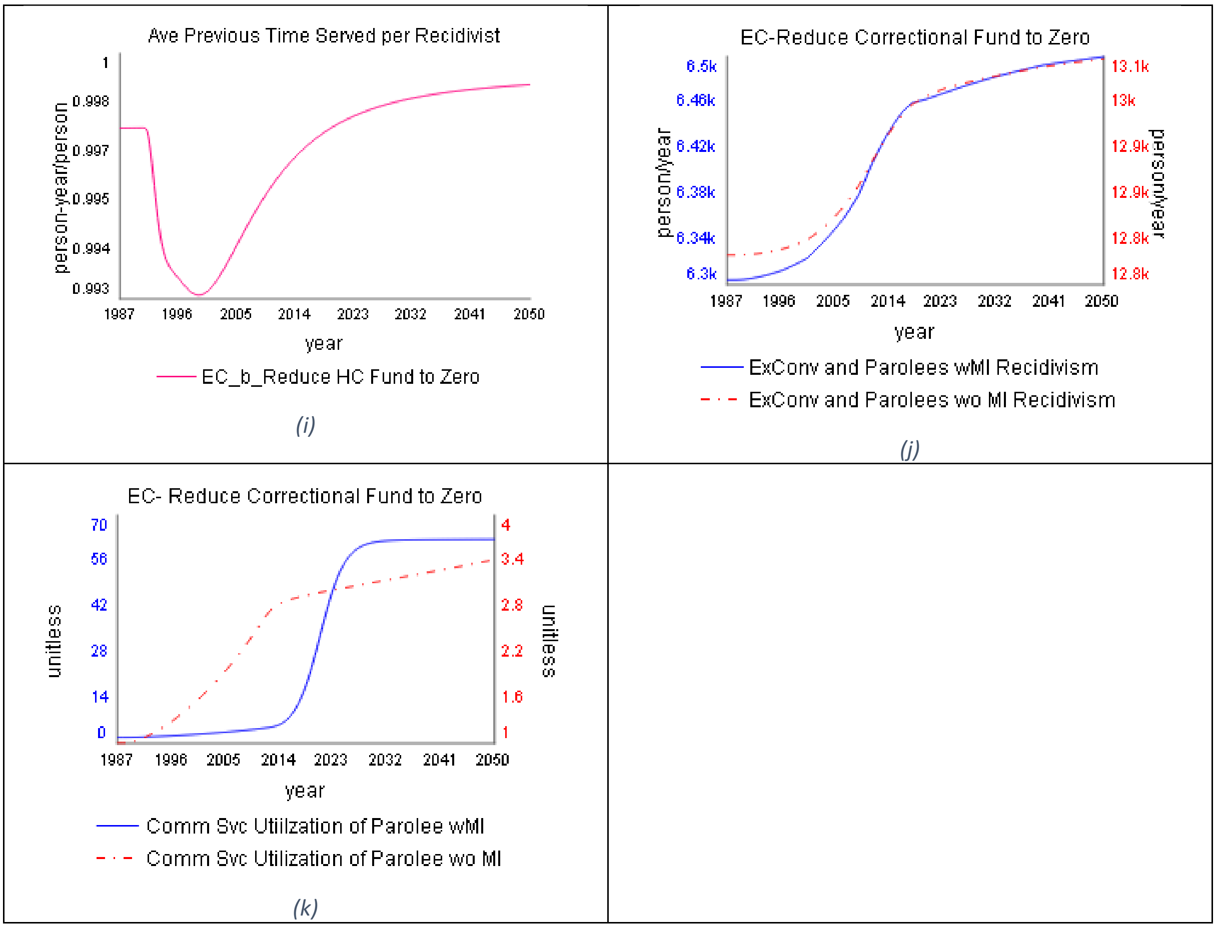


Figure 166 Comparison of Extreme Condition Test 9b and 10b for Post-Realignment Model

(a) – Fraction of Population with Mental Illness and Criminal History; (b) – Recovered Population with Criminal History; (c) – Mental Illness Prevalence; (d) – Prisoners with Mental Illness; (e) – Mental Health Care Capacity; (f) – Community Services for Parolees with Mental Illness; (g) Average Mental Functions per Prisoner without Mental Illness; (h) Community Service Utilization Level for Parolees with Mental Illness and Paroless without Mental Illness; (i) Average Previous Time Served per Recidivist; (j) Ex-convicts and Parolees with Mental Illness and Ex-convicts and Parolees without Mental Illness Recidivism; (k) Community Service Utilization of Parolees with Mental Illness and Parolees without Mental Illness

Fraction of population wMI and criminal history drops when prison health care fund reduces to zero (Figure 166a). This is because that fewer prisoners are diagnosed with MI when they develop MI and also fewer prisoners wMI recover from their illness. Consequently, MI prevalence (Figure 166c) and the stock of prisoners wMI (Figure 166d) decreases. Due to the lack of mental health care resources, many prisoners who have mental illness remain to be as "prisoners wo MI" despite their decreasing mental functions (Figure 166g). When these "prisoners wo MI" (some actually have mental illness) are released as parolees wo MI, the community service utilization for parolees wo MI increases in response to the increase in demand (Figure 166h). As more resources are prioritized to increase the community service capacity for parolees wo MI, the utilization level of community service capacity for parolees wMI continues to increase (Figure 166g). Community service capacity for parolees wMI (Figure 166f) reduces due to fewer parolees wMI. The average previous time served by the recidivists decreases and is lower than in the pre-test level after the test is initated. Thus, the recovered population with criminal history increases as the parolees progress towards desistance faster (Figure 166b). 30 years after Test 9b is initiated, the average previous time served by the recidivists increases and levels off at a higher level because those who recidivate are habitual offenders. MHC capacity depletes to zero due to insufficient funding (Figure 166e).

When the correctional fund to community services reduces to zero, fraction of unrecovered population wMI and criminal history reduces gradually first and then resumes growing to a higher level (Figure 166a). Initially, fewer parolees wMI and parolees wo MI recidivate (Figure 166j) as the community service utilization levels (Figure 166k) are still not overly utilized. However, as the community service utilization levels for both groups of parolees grow higher, which implies community service capacity over-utilization, the recidivism among both groups of parolees because the adjustment time for community services is long. So, the community service capacity for parolees wMI drops slowly in the beginning. We can see that the community service utilization level of parolees wMI is far more higher than that of the parolees wo MI. Hence, the recidivism among parolees wMI increases higher than that of parolees wo MI. Consequently, more parolees wo MI proceeds to desistance in the beginning and the recovered population with criminal history increases (Figure 166b). As community service utilization levels for both groups of parolees grow to significantly high, so do the recidivisms for both groups of parolees. From then, the recovered population with criminal history starts to decline. It is also at the same time, MI prevalence (Figure 166c) increases because more prisoners wMI remain in the prisons. Consequently, MHC capacity (Figure 166e) increases to accommodate more prisoners wMI.

To summarize, the pre-Realignment and post-Realignment models yield reasonable behaviors under the extreme condition testing.

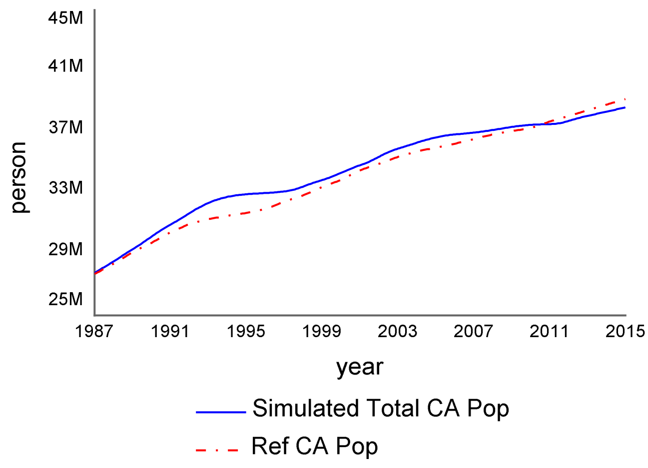
4.1.3 Testing Behavior Pattern

Once we gain confidence through the previous structure validity tests, behavior validity testing is the next step. We compare the simulated model behavior to the historical data, which is called the behavior reproduction test. The purpose of this test is to assess whether the model is able to generate the behavior similar to that in the real world.

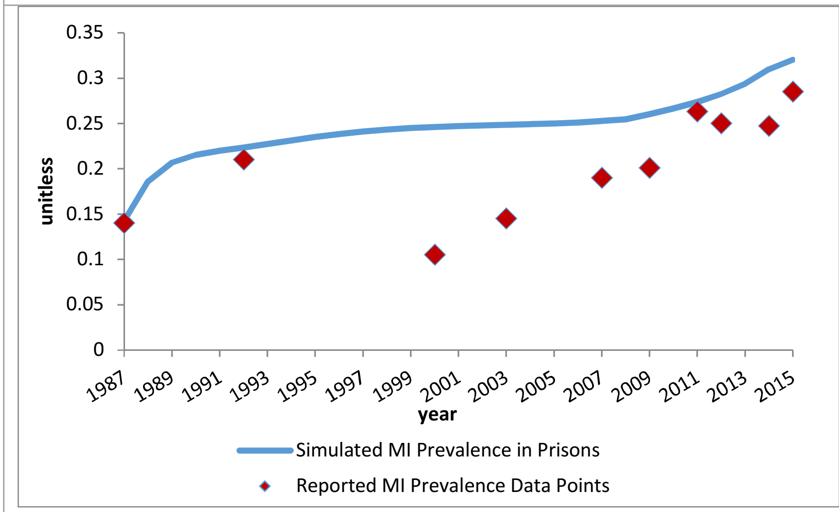
4.1.3.1 Behavior Reproduction

The purpose of the behavior reproduction test is to examine how well the model-generated behavior matches the observed behavior in the real system. Note that the emphasis of the behavior reproduction test is on pattern prediction instead of point or event prediction. As such, this test aims to compare the model-generated behavior pattern to the observed behavior pattern in the real system. Due to the fragmented reported data on MI prevalence, which is the main reference mode, aiming to reproduce the historical MI prevalence is meaningless. However, if the endogenous structure of the model is a robust abstraction of the real system, the model still contains high explanatory power. In our study, the purpose of the model is to understand the cause of the increasing and persistently high mental illness prevalence in the prisons and to assess ways to alleviate the development of such behavior. Therefore, behavior reproduction test serves to build confidence that the model is a reasonable representation the real-world problem for the intended purpose.

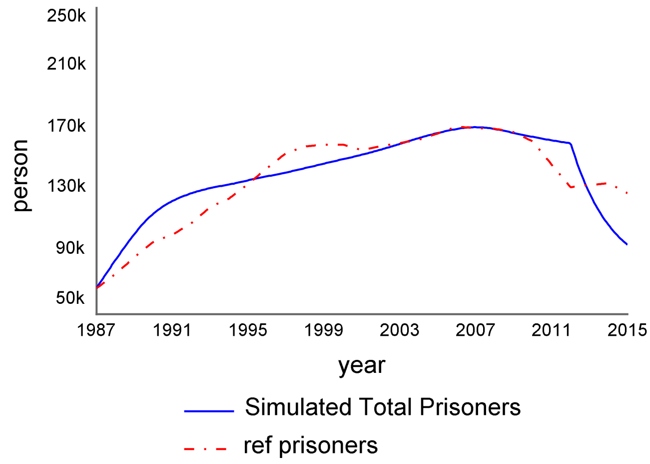
Figures 167 (a) – (f) demonstrates the major behavior reproduction of major stocks.



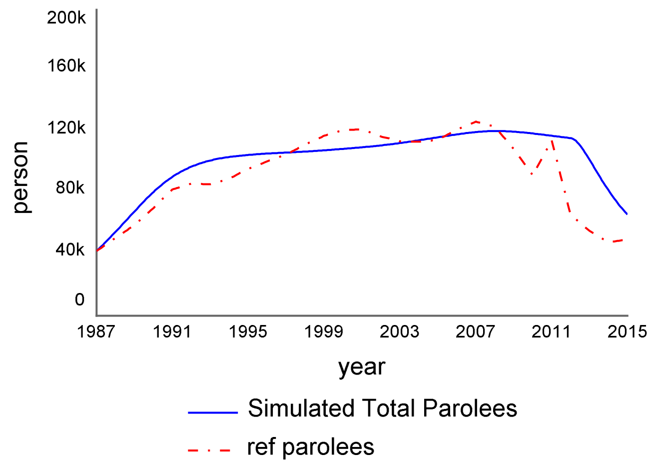
(a)



(b)


250k
210k
170k
130k
90k
50k
person
1987
1991
1995
1999
2003
2007
2011
2015
year
Simulated Total Prisoners
ref prisoners

(c)


200k
160k
120k
80k
40k
0
person
1987
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1999
2003
2007
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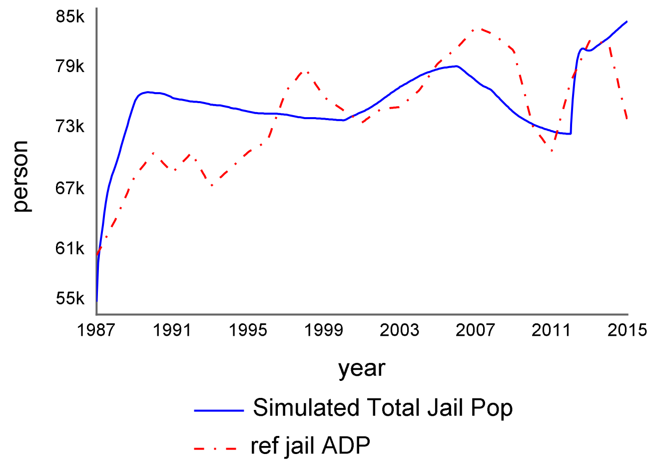
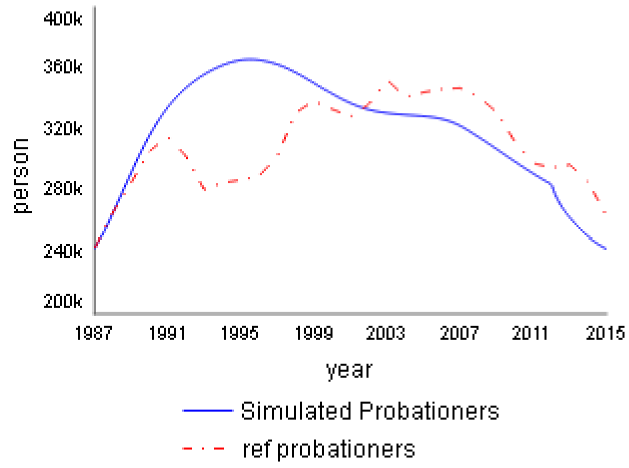
year
Simulated Total Parolees
ref parolees

(d)


85k
79k
73k
67k
61k
55k
person
1987
1991
1995
1999
2003
2007
2011
2015
year
Simulated Total Jail Pop
ref jail ADP

(e)



(f)

Figure 167 Comparison of Model-generated Behaviors to the Reference Mode

(a) – California Population; (b) – Mental Illness Prevalence in Prison; (c) – Total Prisoners; (d) – Total Parolees; (e) – Total Jail Average Daily Population; (f) - Probationers

4.2 Analysis

This section discusses the dynamics of the progression of the criminals through the criminal justice system from the analysis of the simulation results. A brief explanation of the setup of the simulation and validation will be provided and followed by analysis.

4.2.1 Simulation Specification

Figure 162 presents the specification for the simulation:

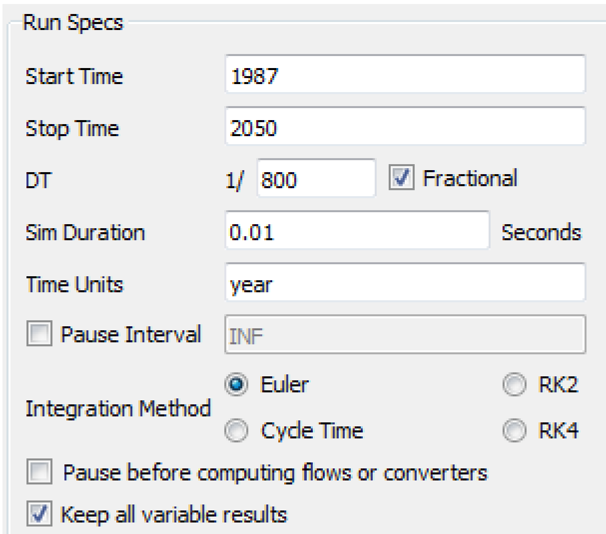


Figure 168 Simulation Specification

The simulation runs from 1987 through 2050. The period from 1987 to 2012 is defined as the "Pre-Realignment" era and the period after 2012 characterizes the "Post-Realignment" era. The software used to build and run the model is Stella Architect (version 1.6.2) by iSee Systems.

4.2.2 Analysis of the Driving Factors of Increasing Mental Illness Prevalence in Prison

This section explains the base case scenario. In the base case scenario, the model simulates the pre-Realignment and post-Realignment policies. To simulate the base case scenario, the following parameters are activated. Some of the parameters are activated before the implementation of Realignment policy, but they are also considered as part of the Realignment reform as those policies are preparation for the reform.

Pre-Realignment			
Parameter	Module	Input Type	Value
Equilibrium switch	Individuals with Criminal History	Constant	0
Ref fract prisoner devMI	Individuals with Criminal History	Constant	0.02 1/year
Historical pop growth rate	Population	Time series (1987-2015)	-
Effect of "war on drugs" on law enforcement release	Individuals with Criminal History	Table function (1987-2015)	-
Effect of "war on drugs" on parole violation RTP	Individuals with Criminal History	Table function (1987-2015)	-

Realignment			
Prison sentence conviction reduction post realignment	Individuals with Criminal History	Constant	0.6
MHC screening capacity building start time switch	Prison HC Resource Allocation	Constant (from 2008)	1
Delay in medical screening capacity building	Prison HC Resource Allocation	Constant (from 2008)	1
Acuity-based budget policy switch	Prison HC Resource Allocation	Constant	1
County realignment fund stops at 2017	Community Services	Table function (2013-2017)	-

In the base case scenario, MI prevalence in prison increases rapidly from 0.14 to 0.20 between 1987 and 1994 (Figure 169). After that, the prevalence grows until 0.28 in 2012. Three years after the Realignment policy is introduced, MI prevalence increases to and peaks at 0.30 in 2015. Then, the prevalence ratio decreases to 0.29 in 2050.

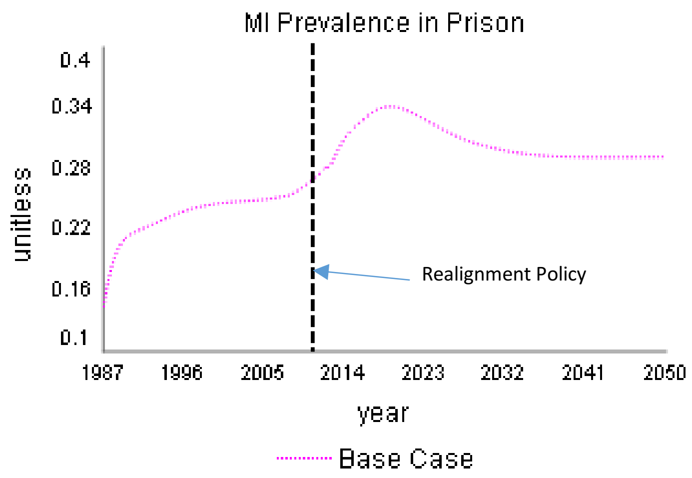


Figure 169 Mental Illness Prevalence in Prison

In the following sub-sections, we will explain how the structure of criminal justice system and community services contribute to the increasing mental illness prevalence in prisons. There are five factors that contribute to the increase in mentally ill prisoners:

- Influx of prisoners and prisoners wMI due to War of Drugs
- Underfunded prison mental health care
- Medical screening capacity at the reception centers
- Prison time served
- Underdeveloped community services
- MI development in prison

4.2.2.1 Perturbation from the "War on Drugs" Policy

In mid-1980s, the federal government directed additional federal resources to encourage state-level law enforcement agencies to tackle the prevalence of drug use by increasing arrests and prosecutions of drug-related offenses. Consequently, arrest rate increased and resulted in a sudden surge of drug-related felony convictions to the prison. California saw an unprecedentedly large prison population since then (Section 3.2.2.1, Figure 30). Even though the first-time arrest rate has been decreasing from 1.6 to to 1.0 million person per year between 1987 and 2012 (- 38 %), total conviction rate oscillates and remains in the range between 200,000 to 215,000 persons per year for the same period (Figure

170). The first time arrest rate refers to *the arrest of the innocent population which is defined as the individuals without criminal history* whereas the conviction rate refers to *the number of first-time arrestees and recidivists who are actually convicted for the crimes they committed every year*. The decrease in total conviction rate in this period constitutes to 11% drop. This implies that total conviction rate does not decrease proportionately with the drop in first-time arrest rate. This also means that a significant portion of the total conviction rate consists of recidivists.

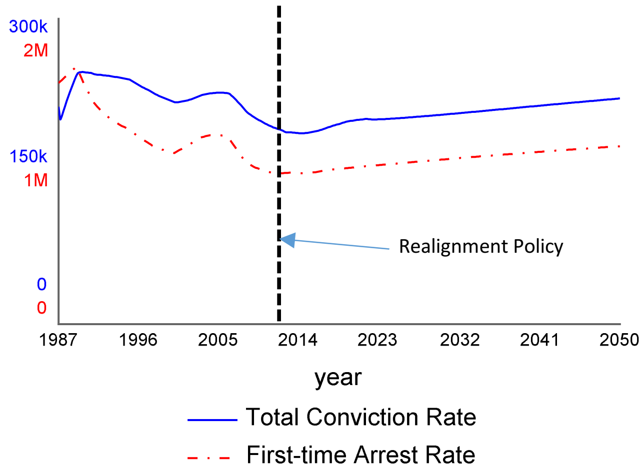


Figure 170 Simulated Total Conviction Rate and First-time Arrest Rate

(Including prison convictions, jail sentence convictions, and probation conviction) and First-time Arrest Rate

Recidivism, defined as *new offense commitments by ex-convicts (including the parolees and ex-convicts from prison and jail)*, is increasing between 1987 and 2012 (Figure 171) against a backdrop of a decreasing number of first-time arrestees (Figure 170). After Realignment, recidivism by prison parolees and ex-convicts drops significantly while the recidivism by jail ex-convicts increases. Prison recidivism drops significantly because the remaining prisoners are likely strikers or those who are admitted for serious felonies with longer sentences. As these prisoners remain behind bars, they do not recidivate as frequently as the jail ex-convicts. In addition, a fraction of the 3Nons, i.e. the non-violent, non-serious, and non-sex offenders, are released to county parole under which the county parole violators return to jail instead of prison. When the county parole violators are released, they move on to the High Risk Jail ExConvicts stocks. Hence, the number of jail recidivism increases and continues to rise after Realignment while prison recidivism remains stable. Additionally, the majority of jail offenders are convicted for misdemeanors, which is usually punished by jail time of less than a year. As Three-strikes Law does not apply to misdemeanor offenders, theoretically jail offenders may recidivate infinite times until they either cease committing crimes or die. However, if these habitual offenders commit felonies that result in prison sentence convictions, they will highly likely to be considered as strikers.

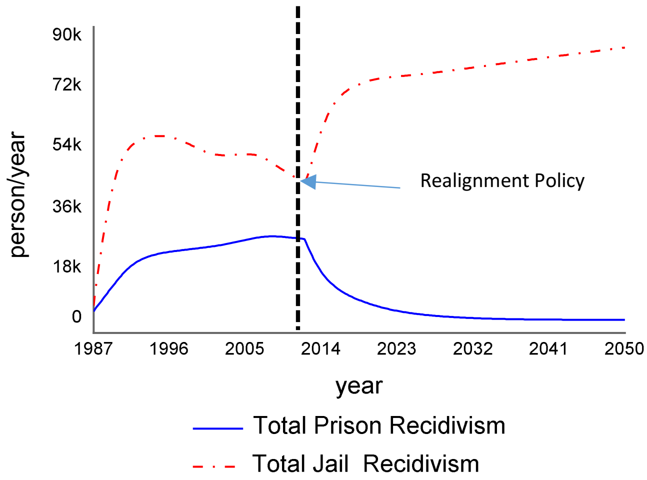


Figure 171 Simulated Total Prison and Jail Recidivism

Prison sentence conviction increases after the introduction of "war on drugs" policy in the 1980s (Figure 172a). After 1990, prison sentence conviction declines gradually until the implementation of Three-strikes Law in 1994. Then, the trend continues to rise increasingly until it peaks in 2006. From 2006 to the Realignment, prison conviction rate decreases gradually. The trend drops even more drastically after the Realignment. However, the fraction of recidivism made up by prison ex-convicts is rising from 1987 until the Realignment, after which, the fraction of prison recidivism of the total prison conviction rate declines rapidly until 2050. This is because some incoming offenders who would be eligible for prison sentences are convicted to jail sentence instead. The fraction of prison recidivism as the total prison convictions spikes right after the implementation of the Realignment policy because the offenders who receive prison sentence drops drastically. Those who receive prison sentences are mainly recidivists with felony commitmments. The fraction of recidivism as the total jail conviction also increases from 1987 until the Realignment. This fraction drops right after the Realignment due to the abrupt increase in jail conviction rate. Then, the fraction grows slowly and linearly (Figure 172b) because the recidivists who have committed felonies and deserve prison sentences are serving sentences in the prisons, possible being subject to the Three-stikes Law. As the first-time arrestees are growing slowly and linearly (Figure 170), they are mainly receiving jail sentences when they are convicted. Note that the fraction of innocent population being arrested is constant after Realignment (Figure 173).

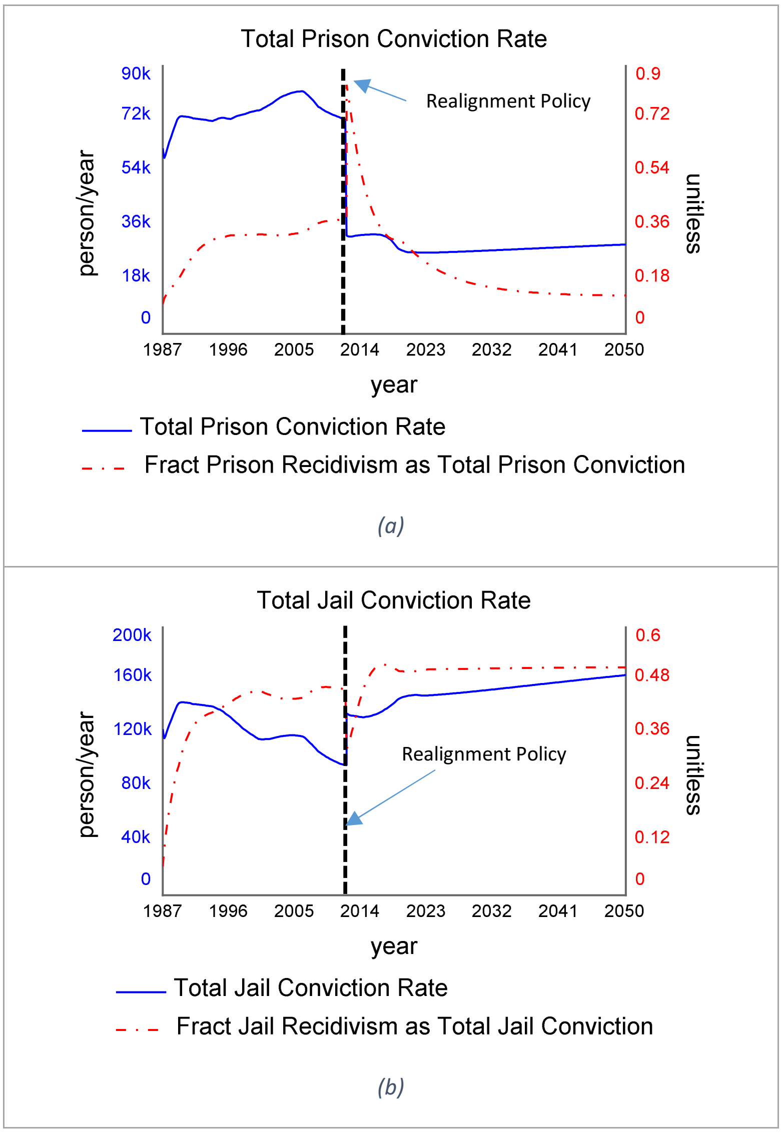


Figure 172 Simulated Prison Sentence, Jail Sentence, and Probation Conviction

(a) – Simulated Prison Sentence Conviction; (b) – Simulated Jail Sentence Conviction

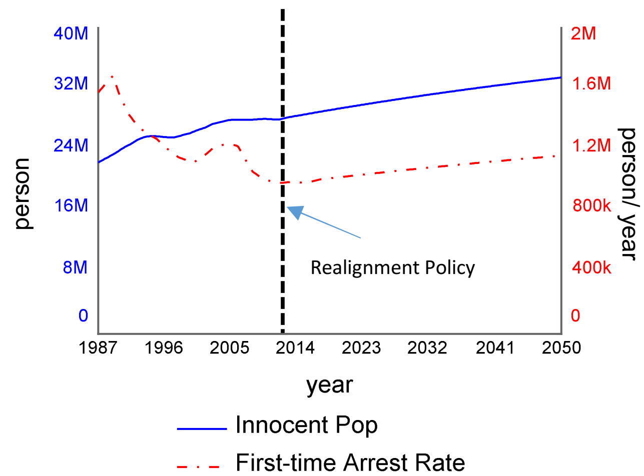


Figure 173 Trends of Innocent Population and the Fraction of Innocent Population Being Arrested

Realignment reduces the stock of prisoners wo MI considerably (Figure 174). From 2012 to 2025, Prisoners wo MI stock reduces 58,000 persons or 50%. The stock of prisoners wMI (Figure 174) experiences a 20,000 persons or 42% drop after the Realignment. Between 2012 and 2025, the fractional decrease in prisoners wo MI exceeds that of prisoners wMI. The MI prevalence peaks in 2019. At this point , the population of prisoners wMI peaks while the population of prisoners wo MI has already started to decline. As the stock of prisoners wo MI settles at a new lower level faster while the stock of prisoners wMI continues to drop, MI prevalence continues to decline. The Prisoners wo MI stock resumes growth after 2025.

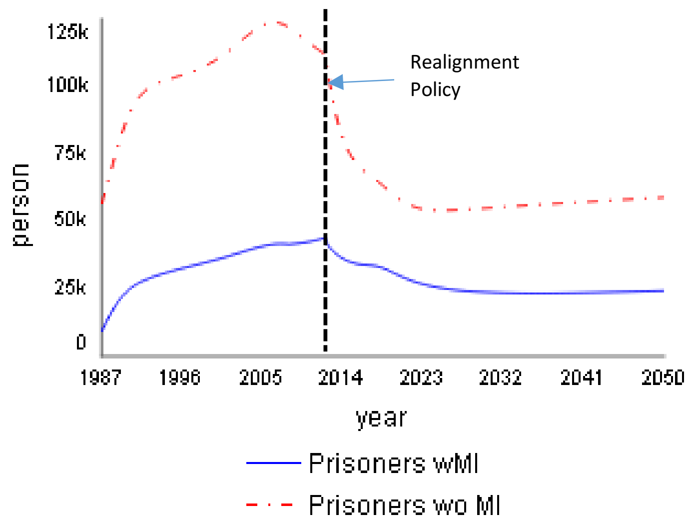


Figure 174 Prisoners with Mental Illness and Prisoners without Mental Illness Stocks

From 1987 to 1990, the aggressive law enforcement practice associated the "war on drugs" policy is the main exogeneous trigger for the drastic incremenent in prison convictions. After the Three-strikes Law was introduced and federal resources is redirected to other prioritized areas, the effect of previous incarceration time has a dominating effect on prison sentence conviction. The effect of previous incarceration time characterizes the effect of Three-strikes Law. As habitual reoffenders are confined for longer time in the prisons, the total incarceration time, which is the sum of previous incarceration time and current sentence time served per each released prisoners, grows. As the fraction of first and second strikers increase, the likelihood of the recidivists receiving longer sentence rises. Jail offenders serve much shorter time. The significant growth in the total incarceration time per ex-convict implies that the growth is attributable mainly to the increasing prison time served. The average incarceration time per ex-convict has a reinforcing relationship with the average prison time served. Higher average incarceration time served leads to higher average prison time served. This is the direct effect of Three-strikes Law. After the Realignment, the effect of previous incarceration time served diminishes slightly because of the reclassification of certain offenses. Some offenses are recategorized as misdemeanors instead of felonies. Thus, the inflow of prisoners is reduced.

4.2.2.2 Underfunded Prison Mental Health Care (MHC)

The influx of drug-related felony convictions to prison causes the growth of prison population. On one hand, the surge of incoming prisoners wMI leads to the increase in mentally ill prisoners in absolute terms (Figure 174); on the other hand, the fraction of incoming prisoners wMI also increases (Figure 175). The fraction of incoming offenders convicted to prison sentence increases mildly from 1990s because the fraction of recidivism committed by prison ex-convicts with mental illness increases gradually. The the fraction of incoming offenders convicted to prison sentence continues to rise after the federal resources are directed away after early 1990s is attributable to the recidivism by prison ex-convicts wMI. Together with the newly admitted prisoners wMI, the fraction of prisoners admitted with mental illness continues to rise. Between 2008 and 2012, the increase in the fraction of incoming prison convict wMI is predominantly positively affected by the increasing medical screening capacity at the reception center (Figure 175) because more incoming prisoners are diagnosed. After the Realignment, the fraction of incoming prison convict wMI decreases gradually until decreases from 0.33 in 2013 until it settles at 0.29 from 2032 onwards.

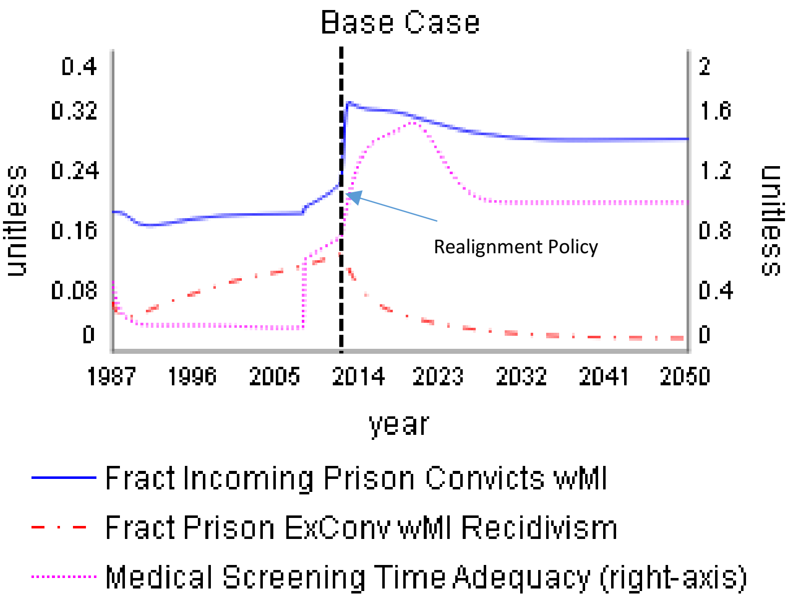


Figure 175 Simulated Fraction of Incoming Prison Convicts with Mental Illness

Starting from 2008, the medical screening capacity starts to build up at reception center, which serves as the entry points for incoming prisoners. Hence, an increasing number of prison convicts entering prison are identified if they are mentally ill. With low screening capacity before 2008, only a lower fraction of these prison convicts would be identified. As screening effectiveness grows and approaches the maximum, most of the prison convicts are identified and enter the Prisoners wMI stock. Ideally, they are directed to the community services for parolees wMI upon their release. When the parolees wMI receive proper and adequate community services to support their reentry, fewer of them are likely to recidivate and violate parole condition.

However, the prison MHC capacity fails to meet the upsurge in the needs for MHC before Realignment. Figure 176 shows the discrepancy between the perceived needs for MHC, which is characterized by “total discrepancy in mental functions”, and MHC capacity. “total discrepancy in mental functions” refers to *the difference between the desired total mental functions in prison and actual total mental functions in prison*. In 1987, the perceived needs for MHC is 900% higher than the MHC capacity. The MHC provision gap is shrinking until 2018 when MHC capacity meets the perceived needs. However, from 2018 to 2025, MHC capacity becomes excessive. The oscillation of MHC adequacy takes place from 2025 onwards until MHC capacity settles at a new level that meets the perceived needs for MHC. After 2012, the needs for MHC decreases for about 20 years due to fewer prisoners wMI. Then, the needs for MHC levels off until the end of the simulation.

MHC capacity receives little fund prior to Realignment because of the decision rule in prison health care resource allocation. Health care resources are allocated to the treatment capacity faces the most pressing need. According to this prioritization rule, infectious disease treatment and chronic disease treatment capacities receive the required resources first. This leads to an underfunded and underdeveloped MHC capacity. Starting from 2008, the Receiver initiated a reform to adjust prison health care capacity accordingly. Nevertheless, a large prison population combined with limited health care resources render a slow prison health care transformation. Only until the Realignment is implemented, MHC capacity adequacy starts to increase. As the MHC capacity increases gradually after the Realignment, more prisoners wMI receive MHC and thus recover. The recovered prisoners wMI move to the Prisoners wo MI stock. Therefore, the “total discrepancy in mental functions” reduces and so are the perceived needs for MHC.

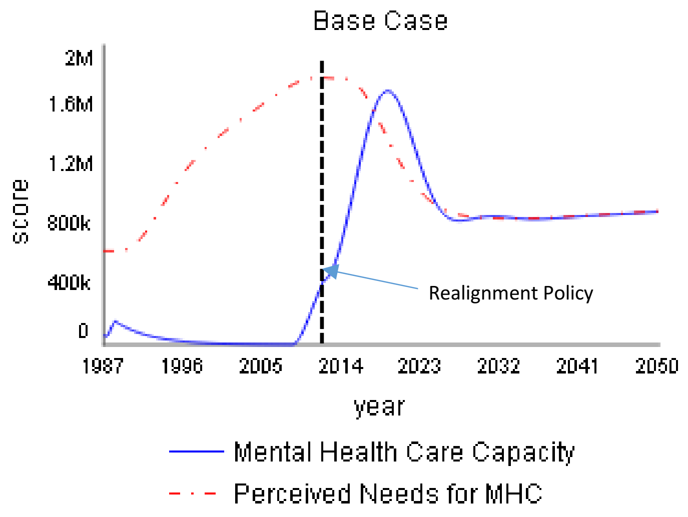


Figure 176 Mental Health Care Capacity and the Perceived Needs for MHC

MHC capacity overshoots the needs between 2016 and 2025 due to the aggressive capacity adjustment approach adopted after the Realignment. The times taken to perceive the needs for MHC and adjust MHC capacity reduce significantly (Figure 177). The intention of the reduction in the adjustment time is to develop a more responsive prison health care system. The adjustment time includes the time to observe, time to collect and report data, and time to make necessary changes to the system. The drawback of a lower adjustment times is the possibility of over- and under-adjustment (or under- or over-correction) when the size of the gap is significant. With shorter adjustment time, MHC capacity encounters larger corrections whenever a gap appears. Consequently, over-provision occurs between 2018 and 2025 while under-provision takes place between 2025 and 2030. The oscillation continues and eventually attenuates in the future.

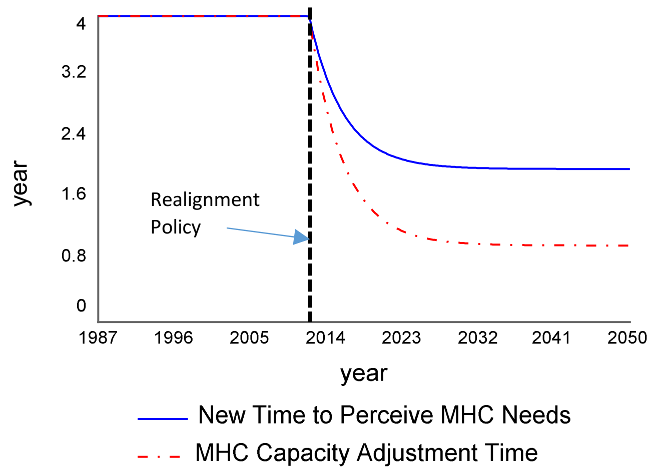


Figure 177 Prison Mental Health Care Capacity Adjustment Time

4.2.2.3 Medical Screening Capacity at the Reception Centers

Starting from 2008, the medical screening capacity at reception centers is building up. When medical screening capacity increases, screening becomes more effective and thus more incoming prisoners wMI are identified. Hence, the fraction of incoming prison convicts wMI increases from 2008 to 2012. Before 2008, the effectiveness in screening MI is assumed at 0.5 (Figure 178). As the screening capacity is gradually increasing, the effectiveness increases from 0.5 to 0.9 in from 2008 to 2012. Considering that some prisoners wMI may still be admitted without being identified, screening effectiveness only reaches 0.9 at the maximum.

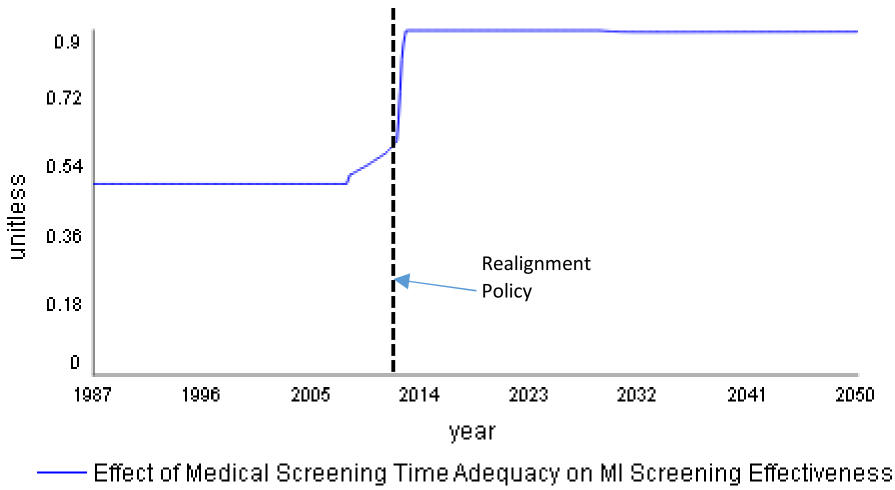


Figure 178 Effect of Screening Time Adequacy on MI Screening Effectiveness

4.2.2.4 Prison Time Served

The fourth factor contributes to the accumulation of mentally ill prisoners is the lengthening of prison time served (Figure 179). Prison time served is *the average sentence length a prisoner actually served before he or she is released*. The average prison time served by prisoners wMI increases from 2.5 years to 2.95 years between 1987 and 2018. This results in a slower outflow and hence the accumulation of prisoners wMI.

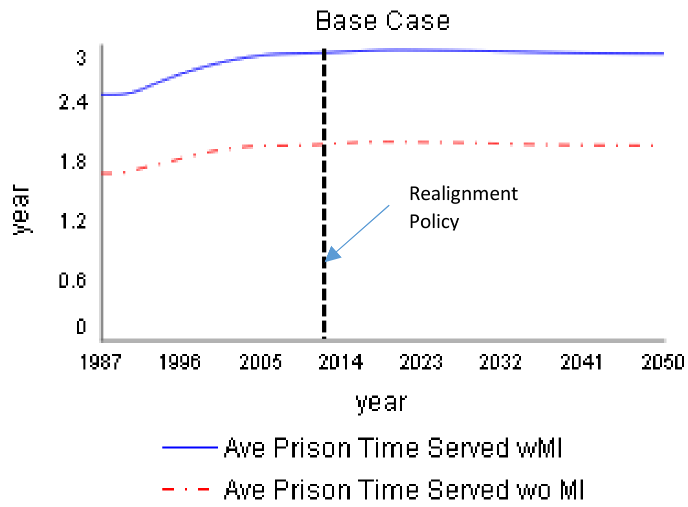


Figure 179 Simulated Average Prisoner Time Served by Prisoners with Mental Illness and Relative Average Previous Incarceration Time Served per Prisoner wMI

The lengthening of prison time served is influenced by the previous incarceration time of prisoners wMI (Figure 180). In fact, prison time served and previuos incarceration time of prisoners have a reinforcing relationship. This relationship is manifested by the increase in the frequency of recidivism per reoffender. The more frequent a reoffender commits new crimes, the longer the prison sentence the reoffender receive. The longer the prison sentence a reoffender serve, the longer the total incarceration time served per prisoner upon his or her release. The average previous incarceration time per prisoner wMI relative to the initial condition has increased by three folds from 1987 to 1997. After the introduction of Three-strikes Law, reoffenders with prison convictions serve longer sentences than before. The growing trend of ex-convicts and parolees wMI recidivism and the lengthening of average previous incarceration time served per prisoner wMI (Figure 180) imply that more prisoners wMI are staying in the prisons.

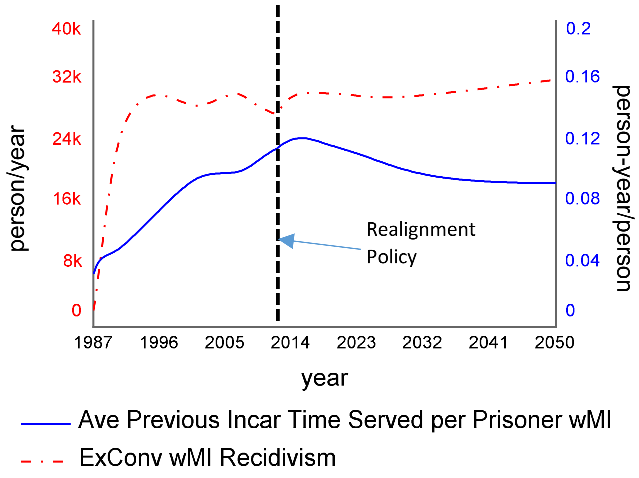


Figure 180 Development of Average Previous Incarceration Time Served per Prisoner with Mental Illness and Ex-convicts with Mental Illness Recidivism

The recidivism of ex-convicts and parolees wMI decreases gradually after the Realignment until 2037 where the trend starts to pick up again. With the average previous incarceration time per prisoner wMI decreases after Realignment while the recidivism by ex-convicts wMI increases again, this implies that the recidivism comes mostly from jail offenders wMI. After the Realignment, some offenses are reclassified from felonies to misdemeanors. Misdemeanors are less severe offenses and thus the offenders convicted for misdemeanors usually receive jail sentence with relatively shorter sentence length. When these people recidivate and are convicted to prison sentence, they enter the prison with shorter previous incarceration time served. So the average previous incarceration time served per prisoner wMI declines.

The high recidivism among ex-convicts and parolees wMI before Realignment symbolizes the "shifting the burden to the intervener" phenomenon. This phenomenon arises from the interaction between two balancing processes that aim to correct the same problem. In this case, the problem is the stock of increasing parolees wMI. The desired outcome is to facilitate the parolees wMI to reenter the community as soon as possible. Hence, the burden is on the community to provide adequate services to the parolees wMI in order to assist them to become financially independent through employment. When parolees wMI are employed, they adopt normal lives like other law-abiding individuals. Thus, the likelihood of the employed parolees wMI reoffend or violate parole condition will be reduced. However, due to the lack of funding to adjust community services for parolees wMI, the community services for parolees wMI fails to cope with the increasing demand. At the same time, information sharing procedures between CDCR and local government is absent before Realignment. The lack of reporting structure leads to a long community service capacity adjustment process. The lack of resources combined with long community service capacity adjustment process contribute to a high community service utilization level. As parolees wMI receive inadequate reentry support, the number of employed parolees wMI is lower than it would otherwise have been. So more parolees wMI flow out through the recidivism and parole violation RTP on the left side of the stock instead of flowing out through the right side of the stock (Section 3.2.2.2, Figure 34). When parolees move on to the adjacent stock to the right, they become less vulnerable to the risk of recidivism and re-incarceration. However, when more parolees wMI move back to the correctional system due to recidivism, the burden is shifted to California Department of Corrections and Rehabilitation (CDCR) to handle reoffenders wMI.

After the Realignment, the State government attempts to re-shift the burden to the local government by dispersing additional funds to help boost up community services. Lowering recidivism among parolees, parolees wMI remain in the Parolees wMI stock in order to be discharged from parole and move rightward. As they progress rigthwardly to the next stock, i.e. Hi Risk ExConv wMI, the fraction of recidivism is drastically reduced as there are fewer parolees left in the stock to recidivate or return to prison due to parole violation. At the population level, if the ex-convicts refrain from reoffending, they will gradually move out of the "Unrecovered Population with Criminal History" to the "Recovered Population with Criminal History".

4.2.2.5 Underdeveloped Community Services

The fifth factor for the increasing MI prevalence in prisons is the underdeveloped community services (Figure 181). "Desired Employed Parolees wMI" characterizes the goal for the Community Service Capacity for Parolees wMI. The desired number of parolees wMI who are employed, grows almost 400% from 1987 to 2012. However, community service capacity for parolees wMI only decreases 2.4% in the same period as more resources are alloted to develop community service capacity for parolees wo MI. At the State level, community services have to compete with other statewide priorities for resources. At the county level, community services for parolees wMI have to compete for resources with community services for parolees wo MI. After 2012, the decline in the population of parolees wMI leads to the lowering of the goal for the Communtiy Service Capacity for Parolees wMI. Thus, the community service capacity for parolees wMI also decreases gradually.

To prepare for Realignment, the State government allocated additional annual county Realignment fund from 2013 and the following five consecutive years. Only with these additional funds, the funded community service capacity increases after Realignment. The purpose of these additional funds are: (1) to facilitate the local correctional capacity to receive the offenders diverted from prison and parolees diverted from CDCR's supervision to encourage the communities to cater and (2) to boost up community services in order to prevent recidivism that leads to prison conviction. At the time of this study, the county Realignment fund for 2018 has been reported as $1.61 billion (CSAC, 2017). The fact that about $500 million additional fund is allocated to local law enforcement activities for crime prevention and to county sheriffs while $70 million for community services[84] is eliminated in 2018 implies that the State government prioritizes spending on local law enforcement over reentry services for released prisoners.

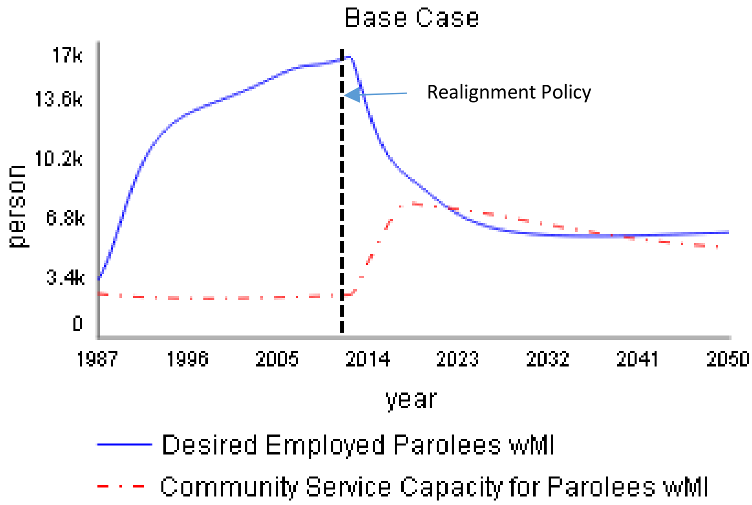


Figure 181 Community Service Utilization by Parolees with Mental Illness and Funded Community Service Capacity for Prison Parolees with Mental Illness

Without setting clear objectives on how county Realignment fund to be distributed among local law enforcement activities and community services, the structure of the system encourages the fund to go to the group of activities with most pressing need. The relative strength of community services claim decreases significantly after the Realignment and and continues to drop unil the end of the simulation (Figure 182). This is because that jail capacity utilization remains high when new jail construction are in the progress before 2024 (Figure 183). Even after the new jails are completed, local law enforcement claim still exceeds the community services claim because the community service utilization level continues to decline to a much lower level than the jail capacity utilization level. Thus, the local law enforcement claim will continue to dominate the allocation of county Realignment fund if the State government continues directing such fund to the county governments annually.

[84] Includes facilities for mental health, substance abuse disorder, and trauma-related services.

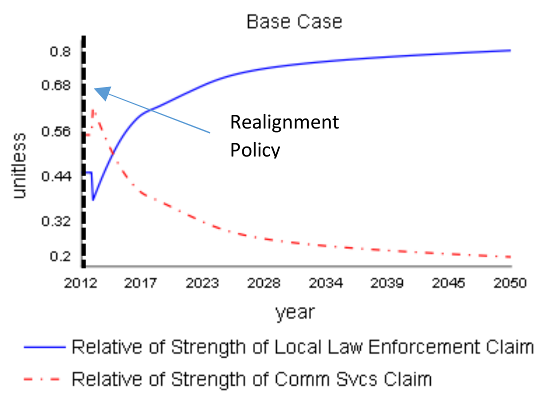


Figure 182 Relative Strength of Community Services and Local Law Enforcement Claims on County Realignment Fund (2012 – 2050)

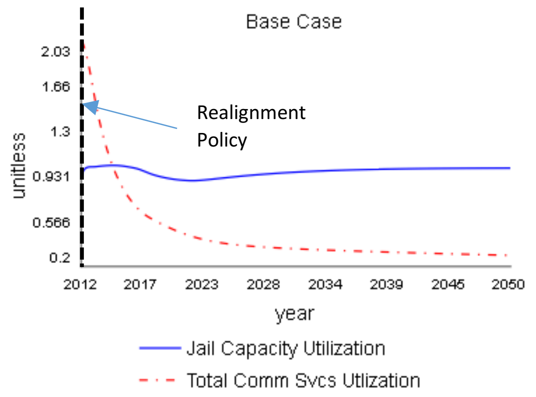


Figure 183 Total Community Service Utilization and Jail Capacity Utilization (2012 – 2050)

Another issue with community service funding stems from the adjustment process of the community correctional fund for community services. The correctional fund for community services distributed to the county governments differs from the annual county Realignment fund, which is dispersed based on the projection of needs annually. The correctional fund for community services is the regular budget appropriated to support or expand community services on a long-term basis. Currently the county governments adjust correctional fund for community services based on the expected population growth in their counties. Once the fund is approved, the fund is distributed to support or develop community services for parolees wMI and parolees wo MI respectively. Due to the lack of feedback from community services and CDCR, county governments lack the knowledge of the appropriate budget for adequate community service provision. The Correctional Fund to Community Services grows linearly from 1987 until the Realignment while the desired correctional fund grows at a larger rate (Figure 184). Hence, the gap between the required and actual correctional fund widens in this period. In 2011, the required correctional fund for community services exceeds the actual correctional fund by 80%. The required correctional fund for community services reduces drastically after the Realignment, but with the existing fund planning approach the correctional fund is over-distributed between 2019 and 2039. Then, the correctional fund is under-distributed from 2040 onwards.

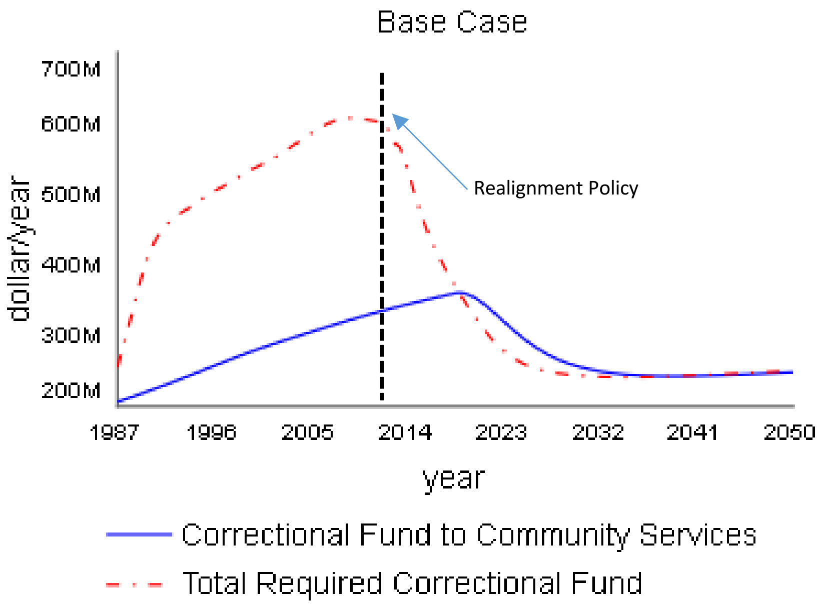


Figure 184 Comparison of Desired Correctional Budget to Community Services and Enacted Correctional Budget to Community Services

Underdeveloped community services has detrimental effects on social capital and recidivism. Without adequate community services, the employment level of parolees wMI is lower than the desired level, which is 0.6 (Figure 185). After the Realignment, the employment ratio for parolees wMI increases considerably and approaches the desired employment level. Due to the resource allocation rule, correctional fund for community serices is prioritized to ommunity services for parolees wo MI. Consequently, parolees wo MI receive more support than parolees wMI. The employment level among parolees wo MI is much higher and approaching the desired employment level even before the Realignment. Lower employment ratio attributes to the decreasing social capital (SC) among parolees from 1990 to 2011 (Figure 186). After the Realignment, SC of parolees wo MI resumes growth because a large number of these parolees are under the county supervision, which enables them to leave the correctional system faster. A larger fraction of these parolees also becomes the recovered population through desistance. As a larger fraction of prisoners wMI compared to prisoners wo MI are ineligible for county parole, they are released to the parole supervision under CDCR. Hence, SC of parolees wMI remains lower than parolees wo MI. Although the average SC per parolee wMI resumes growth ten years after the Realignment, it will only match the average SC of parolees wo MI near 2050. The SC for both groups of parolees appear to increase into the future after 2020.

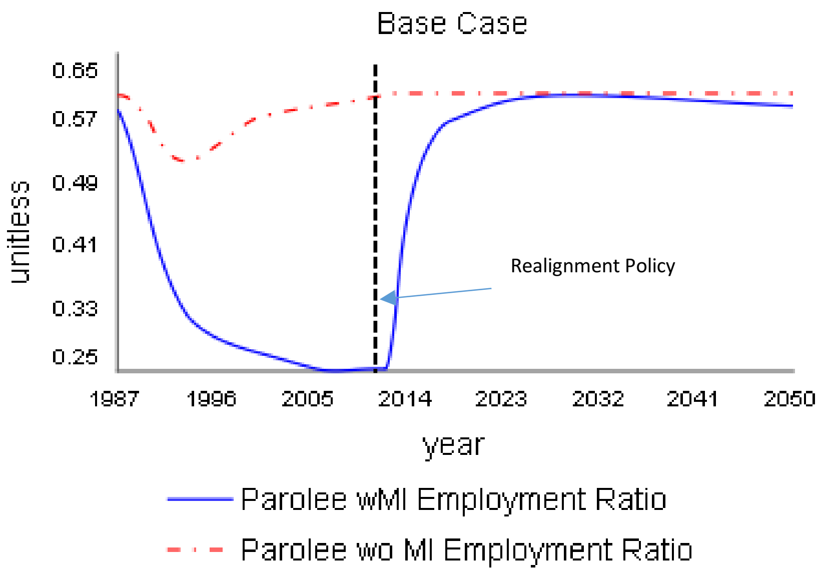


Figure 185 Parolees with and without Mental Illness Employment Ratios in Base Case

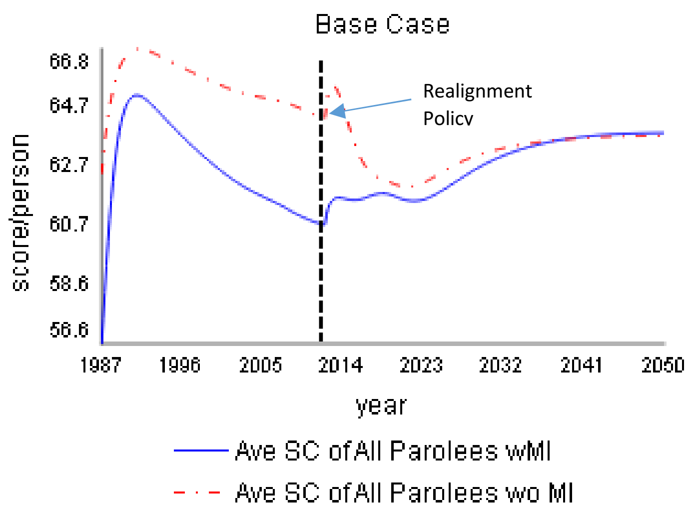
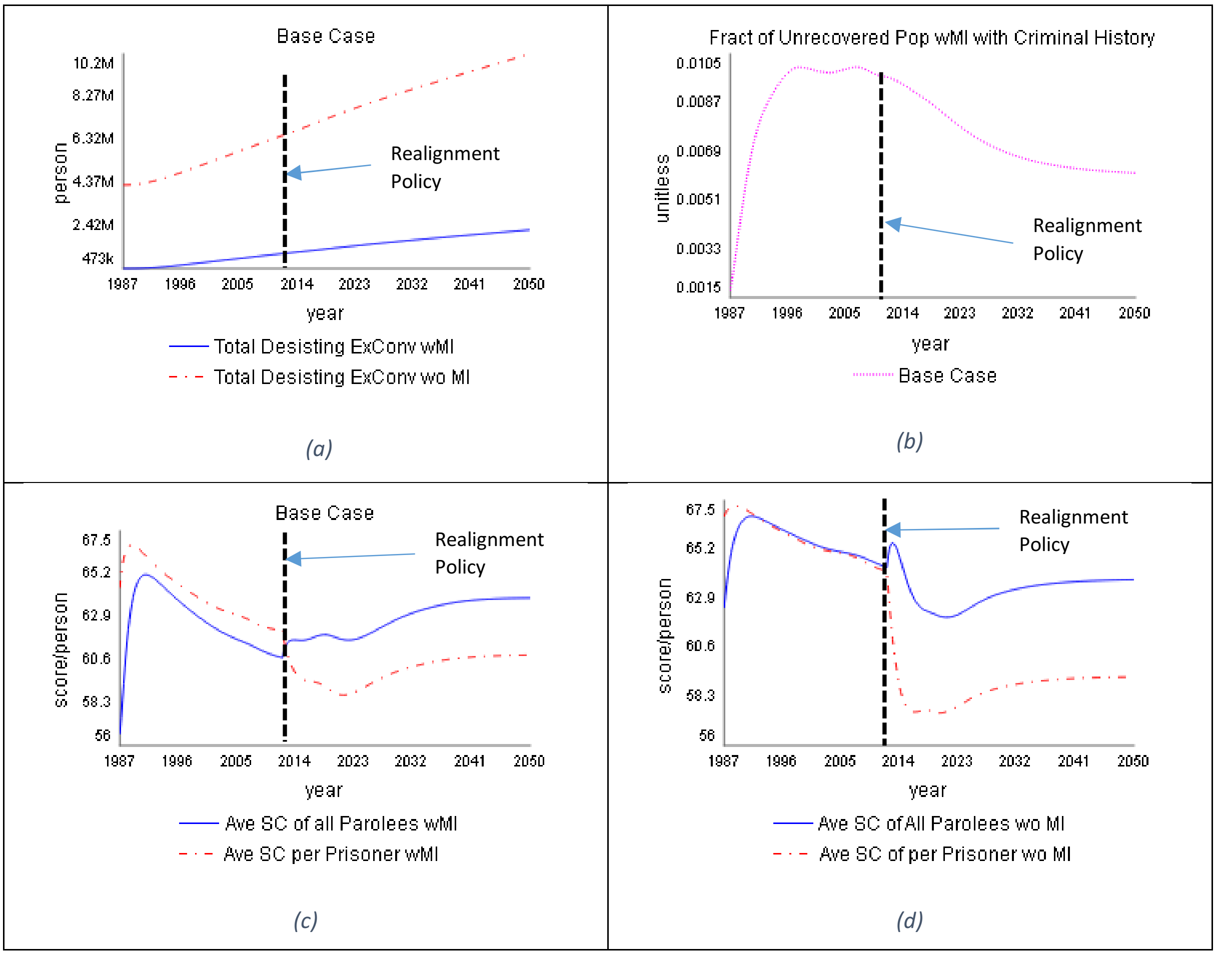
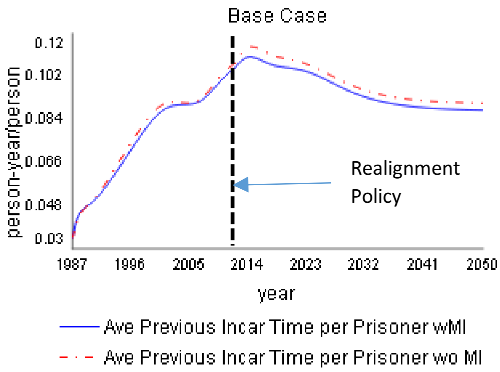


Figure 186 Average Social Capital per Parolees with Mental Illness and Parolees without Mental Illness

As more community service resources are available after the Realignment, parolees wMI are better supported. Hence, the number of desisting ex-convicts increases (Figure 187a). Subsequently, the fraction of recovered population wMI and criminal history decreases after the Realignment (Figure 187b). The average SC of all paroeles wMI resumes growth after the Realignment because the community service capacity for parolees wMI increases as a result of more correctional fund directed to support community services for parolees wMI. Otherwise, the SC of prisoners wMI, prisoners wo

MI, and parolees wo MI continue to drop. The average SC of parolees wo MI will eventually rebound and match the average SC of parolees wMI (Figure 187d). However, the average SC of prisoners wo MI will be lower than that of the prisoners wMI (Figure 187c and d) because that prisoners wo MI are more likely to have longer previous incarceration history than prisoners wMI (Figure 187e). Longer preivous incarceration history contributes to more severe SC deterioration. Those who remains in the unrecovered population wMI and criminal history are mostly habitual offenders who have lower SC. Therefore, insufficient community service capacity for parolees wMI may likely lead to higher MI prevalence in prisons by way of lowering SC of prisoners and parolees and subsequently increases the frequency of recididivsm and prolongs the previous incarceration histry. The increased in the frequency of recidivism and previous incarceration attribute to the increase in the length of subsequent prison sentences.





(e)

Figure 187 (a) – Total Desisting Ex-convicts with Mental Illness and Ex-convicts without Mental illness; (b)—Fraction of Unrecovered Population with Mental Illness and Criminal History; (c)— Average Social Capital of All Parolees with Mental Illness and Prisoner with Mental Illness; (c) – Average Social Capital of All Parolees without Mental Illness and Prisoner without Mental Illness; (e)

4.2.2.6 Mental Illness Development in Prison

The last factor that drives up MI prevalence in prison is the development of MI among prisoners wo MI. The gradual increase in the number of prisoners develop MI between 1987 and 2011 is primarily caused by the increase in prisoners wo MI (Figure 174). The actual number of prisoners developing MI could have been higher. Due to the lack of prison mental health care (MHC) capacity (Figure 188), these prisoners are not diagnosed even if their mental functions decline (Figure 189). Figure 189 also shows that despite the sharp decline in the mental functions of prisoners wMI , the prisoner mental illness development rate only increases moderately. After the Realignment, the increase in prison health care resources lead to the increase in prison MHC capacity. Thus, MHC capacity adequacy hikes and meets the needs for MHC a few years after the Realignment. Consequently, more prisoners are diagnosed of mental illness and thus the prisoner develop mental illness rate hikes. Nevertheless, the mental functions of prisoners wo MI drops further after the Realignment. This decline is caused by the reduction in the recidivism by parolees wo MI and the lower mental functions brought with these reoffenders. The reoffenders with higher mental functions are diverted to jails after the realignment. Due to adequate MHC provision, the average mental functions of prisoners wMI will be higher than that of prisoners wo MI (Figure 189). As the average mental functions of prisoners wo MI is persistently lower than that of prisoners wMI, the prisoner develop mental illness rate will also remains high after the Realignment. Consequently, the MI prevalence in prison increases and remains persistently high.

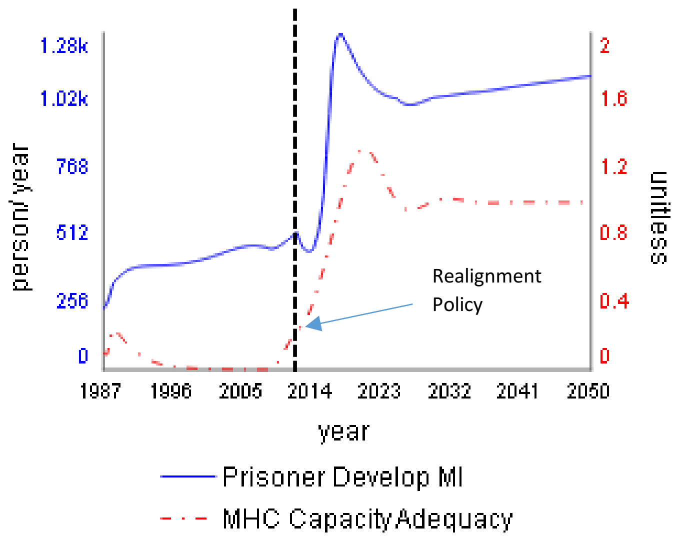


Figure 188 Number of Prisoners Develop Mental Illness and Prison Mental Health Care Adequacy

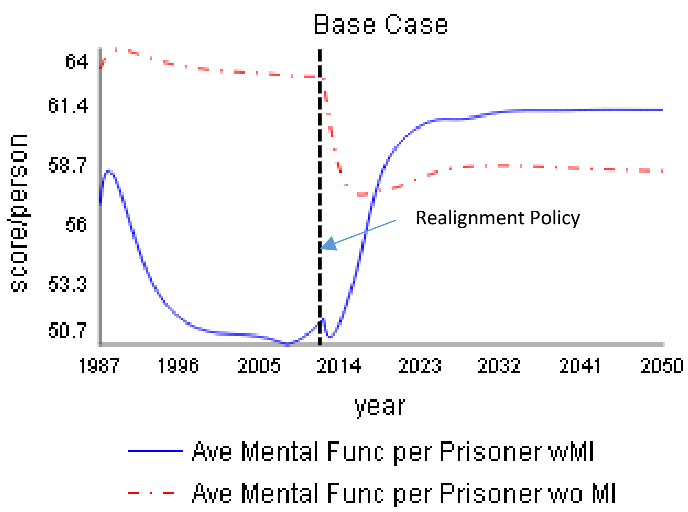


Figure 189 Average Mental Functions per Prisoner with Mental Illness

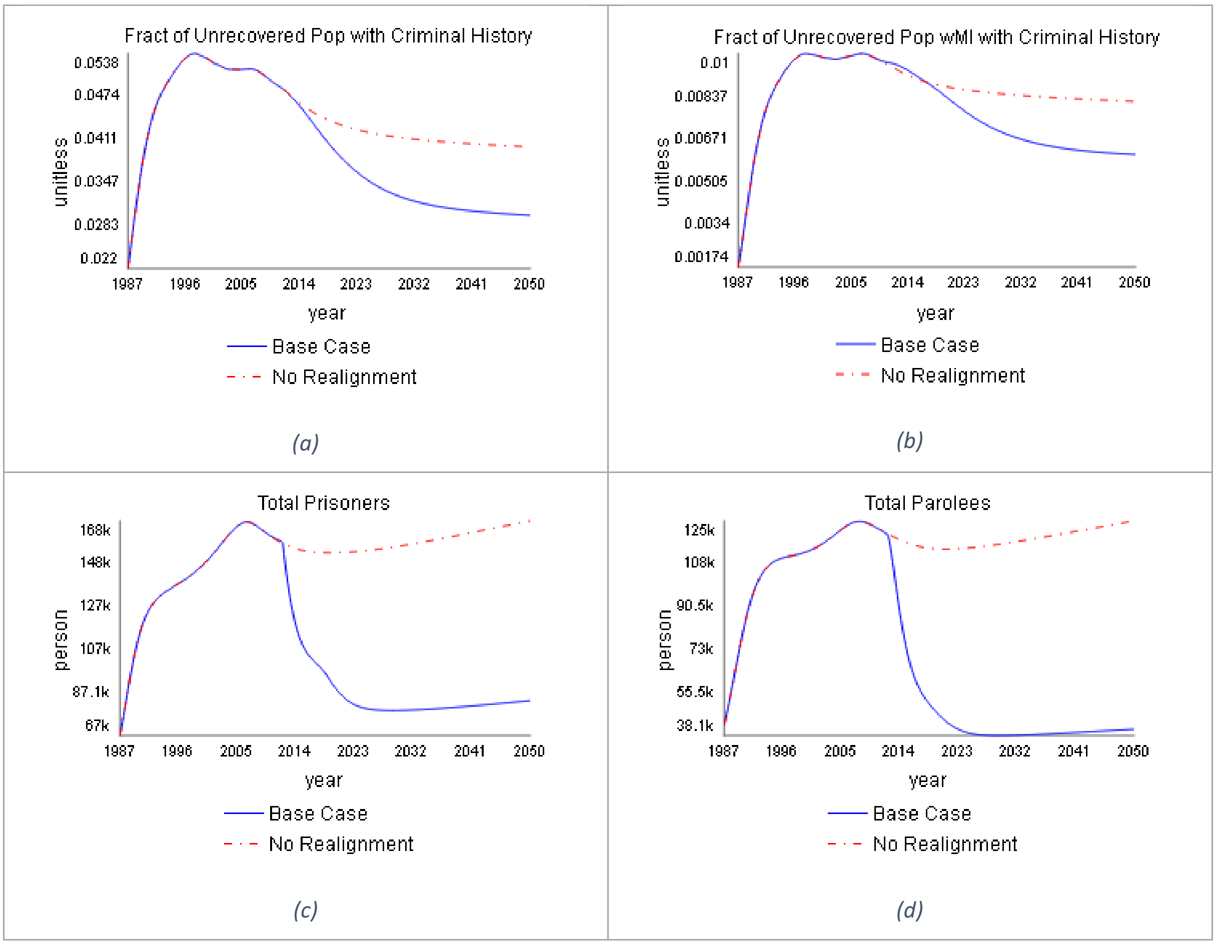
4.2.3 Analysis of the Impact of the Realignment Policy

The preceding section demonstrates the base case scenario that covers pre- and post-Realignment periods. In this section, we assess the impact of the Realignment policy on the criminal justice system by testing a scenario without Realignment. Then we conduct scenario analysis to understand the conditions required for Realignment policy to bring larger positive impacts on individuals wMI and criminal history.

4.2.3.1 Impacts of Realignment on the Criminal Justice System and the Composition of Population with Criminal History

First, we simulate the base case scenario without Realignment. Then, we analyze the simulated behaviors at the population level followed by detail analysis of the impact on prisoners wMI.

4.2.3.1.1 Impacts on Population



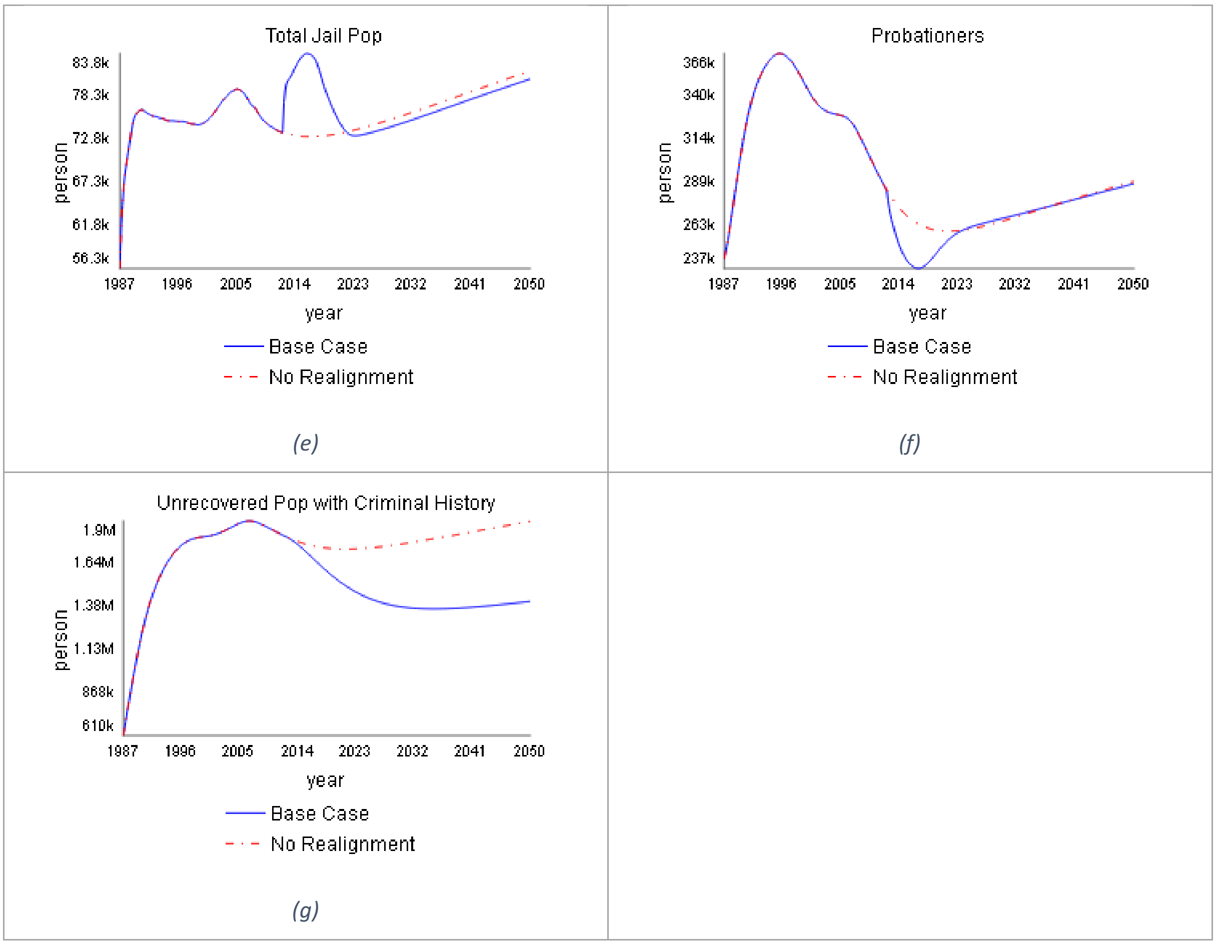


Figure 190 Comparison of Stocks in Base Case and No Realignment Policy Scenarios

(a) Fraction of Unrecovered Population with Criminal History; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) Total Prisoners; (d) Total Parolees; (e) Total Jail Population; and (f) Probationers; (g) Unrecovered Population with Criminal History

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **No Realignment** Scenario at 2050	Difference in Number	% Change
Fract of Unrecovered Pop with Criminal History	0.03	0.04	0.01	33.0%
Fract of Unrecovered Pop wMI with Criminal History	0.0061	0.0082	0.0021	34.4%
Recovered Pop with Criminal History	12,366,638	11,67,681	-398,957	-3.2%
Total Prisoners	83,580	167,810	84,230	101.0%
Total Parolees	40766	125,438	84,672	208.0%
Total Jail Pop	80,329	81,545	1,216	1.5%
Probationers	287,796	289,073	1,277	0.44%

Table 7 Comparison of Values in Base Case and No Realignment Scenarios for Selected Population-level Stocks and Parameters

The comparison in Table 7 and Figure 190 show that without Realignment, the fraction of unrecovered population with criminal history is 36% higher than in the base case. The fraction of unrecovered population wMI with criminal history increases 25%. The recovered population is 4% lower. The prison population is 160% while the parolee population is 300% higher without Realignment. The jail and probationer populations increase by 2% and 0.5% respectively. The significant increase in the number of individuals in the correctional system, i.e. prisoners, parolees, jail offenders, and probationers, and the decreases in the recovered population suggest that more individuals linger and circulate in the criminal justice system.

4.2.3.1.2 Impacts on Public Finance

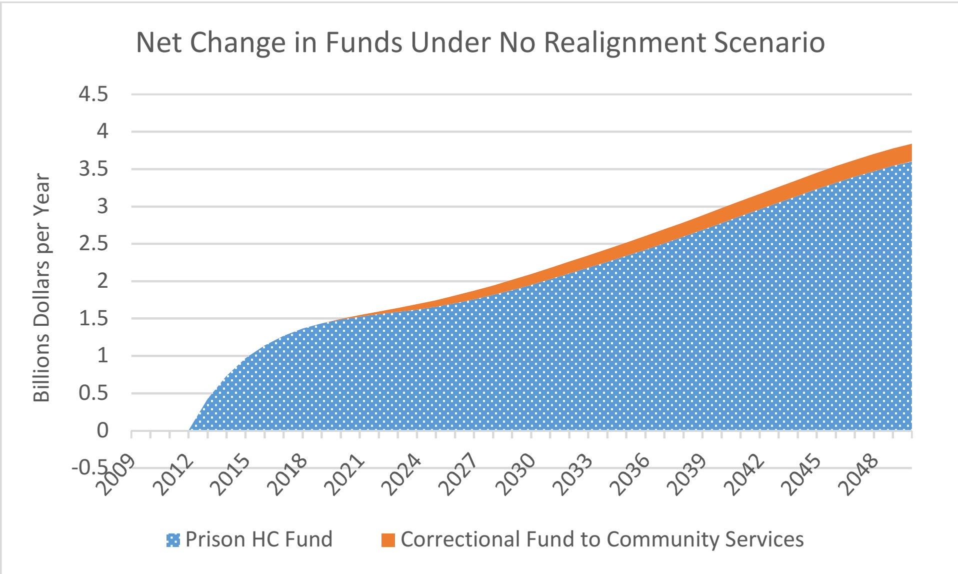
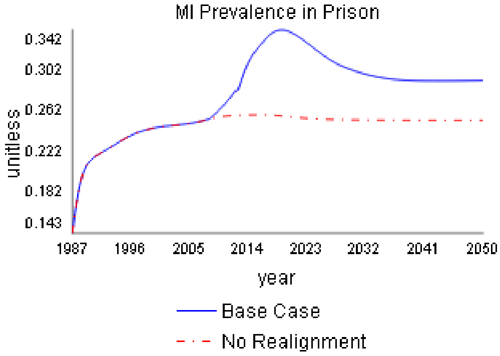


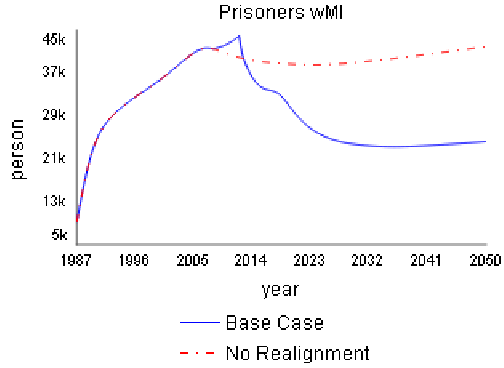
Figure 191 Net Increase in Prison Health Care and Community Services Spendings under the No Reliagnment Policy Scenario (2009 - 2050)

Counterintuively, it costs California more without the Realignment policy. The cumulative additional spending in prison health care and community services spending from 2009 to 2050 amounts to $87 billion. The cumulative additional spending in prison HC fund between 2009 and 2050 leads to $82 billion (Figure 191). The correctional fund to community services presents a cumulative additional spending with $4.9 billion.

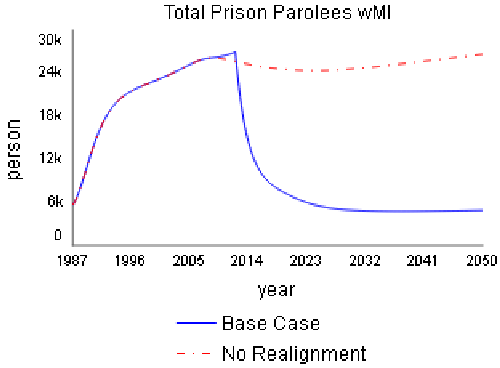
4.2.3.1.3 Impacts on Institutions and Community Services



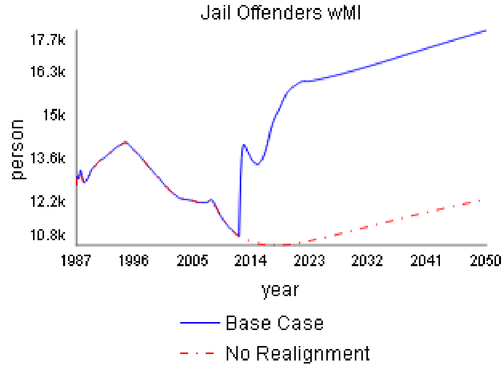
(a)



(b)



(c)



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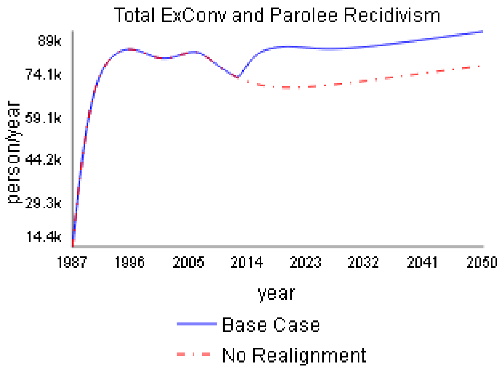
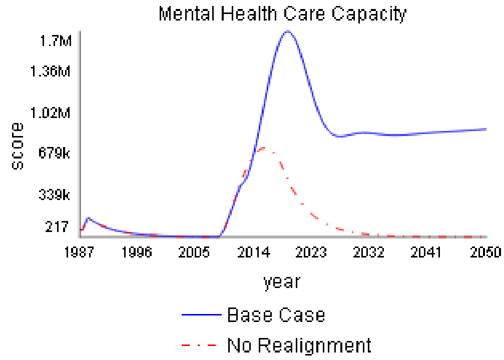
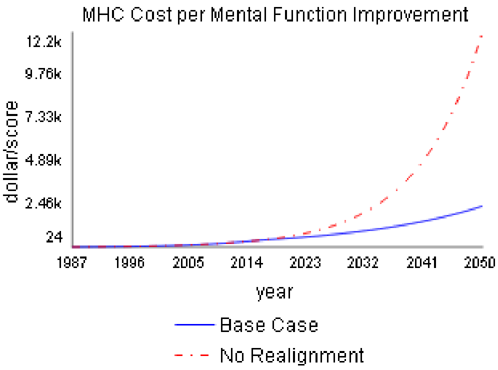


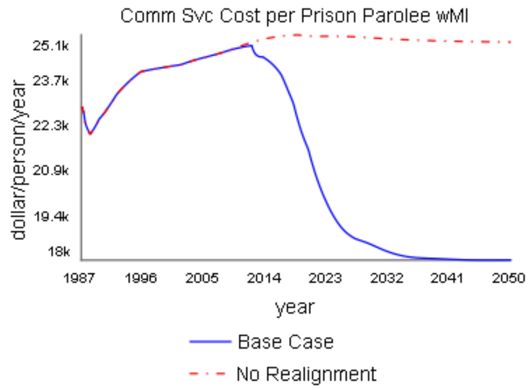
(e)



(f)



(g)



(h)

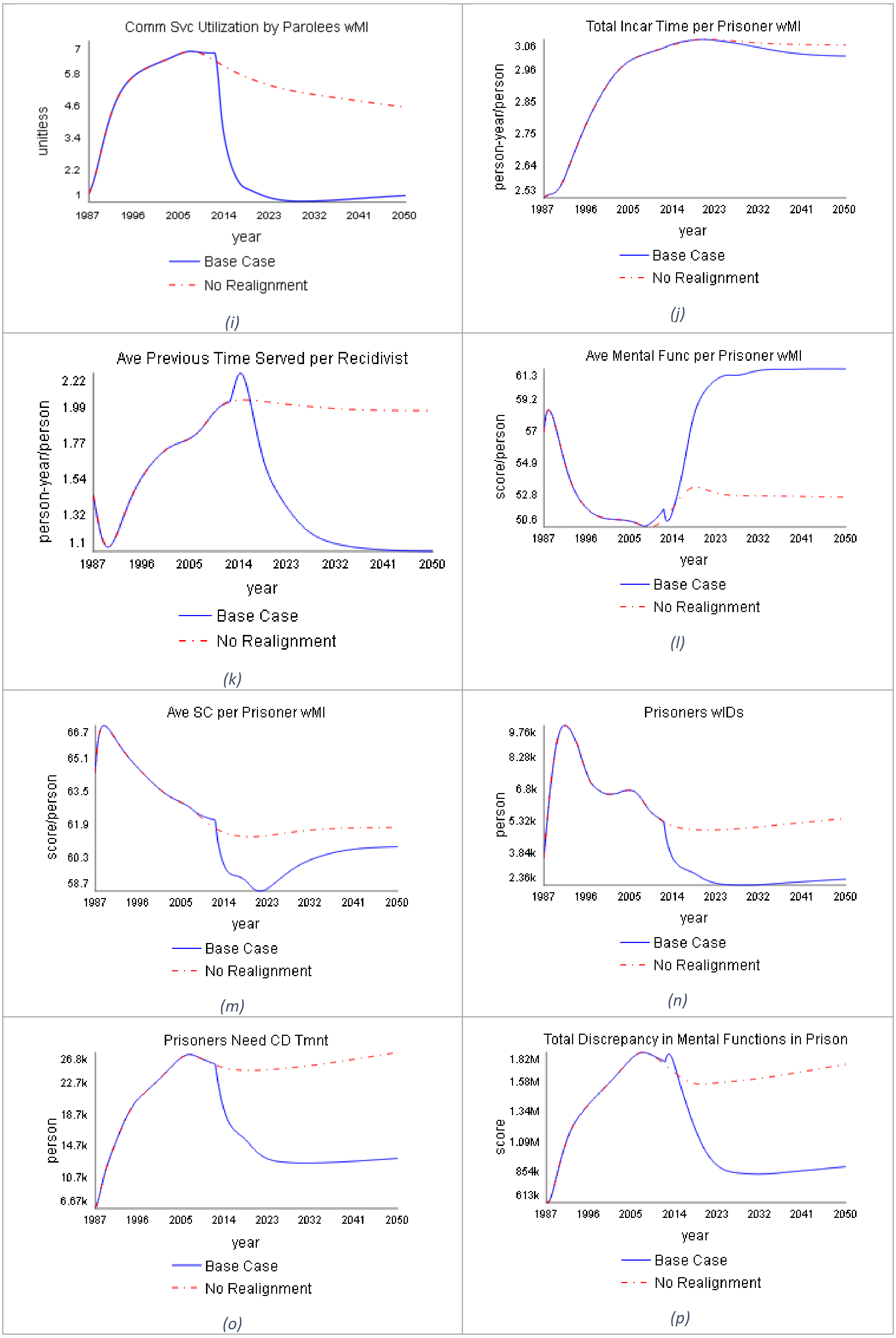


Figure 192 Comparison of Values in Base Case and No Realignment Scenarios for Selected Stocks and Parameters Associated with Individuals wMI with Criminal History

(a) Mental Illness Prevalence in Prison; (b) Prisoners with Mental Illness; (c) Total Prison Parolees with Mental Illness; (d) Jail Offenders with Mental Illness; (e) Total Ex-convicts and Parolees Recidivism; (f) Mental Health Care Capacity; (g) Mental Health Care cost per Mental Function Improvement; (h) Community Service Cost per Prison Parolee with Mental Illness; (i) Community Service Utilization by Parolees with Mental Illness; (j) Total Incarceration Time per Prisoner with Mental Illness; (k) Average Previous Time Served per Recidivist; (l) Average Mental Functions per Prison Parolee with Mental Illness; (m) Average Social Capital per Prisoner with Mental Illness; (n) Prisoners with Infectious Diseases; (o) Prisoners Need Chronic Disease Treatment; (p) Total Discrepancy in Mental Functions in Prison

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **No Realignment** Scenario at 2050	Difference in Number	% Change
(a) MI Prevalence in Prison	0.292	0.253	-0.0039	-13.4%
(b) Prisoners wMI	24,322	41,903	17,581	72.3%
(c) Total Prison Parolees wMI	46,68	26,656	21,770	446.0%
(d) Jail Offenders wMI	17,640	12,300	-5,340	-30.3%
(e) Total ExConv and Parolee Recidivism	88,962	77,181	-11,781	-13.2%
(f) MHC Capacity Adequacy	0.995	0.000128	-0.995	-99.9%
(g) MHC Cost per Mental Function Improvement	2,342	12,193	9,851	421.0%
(h) Comm Svc Cost per Prison Parolee wMI	18,001	24,923	6,922	38.5%
(i) Comm Svc Utilization by Parolees wMI	1.17	4.53	3.36	287.2%
(j) Total Incarceration Time per Prisoner wMI	3.01	3.04	0.03	1.0%
(k) Ave Previous Time Served per Recidivist	1.1	1.98	0.88	80.0%
(l) Ave Mental Func per Prison Parolee wMI	62.7	53.8	-8.9	-14.2%
(m) Ave SC per Prisoner wMI	60.9	61.8	0.9	1.48%
(n) Prisoners wIDs	2,637	5,455	2,818	106.9%
(o) Prisoners Need CD Tmnt	13,127	26,765	13,638	104.0%
(p) Total Discrepancy in Mental Functions in Prison	901088	1,722,032	820,944	91.1%

Table 8 Comparison of Values in Base Case and No Realignment Scenarios for Selected Stocks and Parameters Associated with Individuals with Mental Illness and Criminal History

Simulation results show that without Realignment, the prisoners wMI population is 18,000 persons or 72% higher. Population (Table 8 and Figure 192a). MI prevalence is 13% higher. Prison parolees wMI is 22,000 persons or 450% higher because no prisoners to be released to county parole (Figure 192c). The jail population wMI is 5,000 persons or 30% lower because no convicts are diverted to jail sentence (Figure 192d). Without medical screening capacity, fewer offenders wMI are identified at the reception center. Hence, some of the prison convicts wMI enter Prisoners wo MI stock instead. After they enter the prisons, the undiagnosed prisoners with mental illness continue suffering from mental functions deterioration without getting proper treatment. Thus, a larger fraction of prisoners develop MI during custody.

Without the Realignment, the recidivism by all parolees and ex-convicts appears to be lower because more of the convicts and recidivists are trapped in the prisons. The total recidivism by parolees and ex-convicts is 13% lower (Figure 192e).

Without the Realignment, prison MHC capacity remains underdeveloped (Figure 192f). As mental illness severity progresses, the cost to treat prisoners wMI is by 420% higher (Figure 192g). Once the untreated prisoners wMI are released to community, the community service cost for them is 40% higher (Figure 192h). Since the mentally ill parolees are not treated in the prison and their mental illness likely to progress, the community service cost per prison parolee wMI, which includes community mental health care and other community service costs, is higher compared to the base case. At the same time, the untreated parolees wMI rely more on community services. Therefore, the community service utilization by parolees wMI is 290% higher (Figure 192i).

The total incarceration time per prisoner wMI appears to be 1% longer (Figure 192j). When Realignment policy is in place, the less severe offenders exit the correctional system at a faster rate. Without Realignment, more prisoners wMI remain behind bars. When some of the prison parolees or ex-convicts wMI recidivate, they carry longer previous incarceration time served with them back to the prison (Figue 192k).

Apparently, the mental functions per prisoner wMI declines due to the lack of MHC in prison. When these prisoners wMI are placed on parole, they reenter the community with 14% lower mental functions (Figure 192l). Due to a larger prison population in the absence of Realignment policy, the number of prisoners with infectious diseases and prisoners need chronic disease treatment are 107% and 104% higher (Figure 192n and 192o). The total discrepancy of mental functions in prison appears to be 120% higher without Realignment (Figure 192p).

Testing the base case scenario without the Realignment shows that the total number of unrecovered population with criminal history is larger. Without the Realignment, parolees are released to CDCR parole supervision. Parole violators under CDCR supervision return to prisons for longer confinement period before serving parole again. On the contrary, the parole violators under county parole supervision escape from returning to prison. Under county parole supervision, county parole violators are sent to jail to serve the remaining of the sentence and then re-released to community. A shorter path to reentry prevents the social capital from deteriorating further. Higher social capital leads to lower probabilities of parole violation and recidivism. Without the Realignment, parolees do no benefit from a shorter route to reentry. At the outset, looking at the reduction in MI prevalence and recidivism may be positive signs. However, focusing on one or a few indicators that characterize institutional performance while ignoring the consequences at the system level may give an impression that MI prevalence is less severe without Realignment. Assessing the impact of the Realignment at the population and institutional[85] levels concurrently reveals that without Realignment, unrecovered population is 34% higher than in the base case. Besides, without the Realignment policy, the cumulative additional spending on prison health care and community services total $87,180 trillion from 2009 to 2005. Thus, it costs the taxpayers more without the Realignment.

4.2.3.2 Conditions for a Successful Realignment Policy

The previous analysis reveals that the MI prevalence in prison increases sharply after Realignment. The increment is due to the more effective screening of incoming prisoners and the considerable reduction in prisoners wo MI relative to the reduction in prisoners wMI. In the base case, the prisoners wo MI population reduced 150% between 2012 and 2050 while the prisoners wMI population decreases 58%. Hence, the Realignment policy influence the prisoners wo MI and prisoners wMI population positively. The scenario testing in this section aims to identify the conditions in which Realignment will continue to succeed or produce more favorable impact on the system, i.e. lower fraction of population with criminal history and MI prevalence in prison. A sustainable successful Realignment policy is a pre-condition to improve prison condition, prison mental health care, and community services for parolees wMI. Therefore, taking a broader view of the system as a whole enables us to assess the impact of Realignment from a holistic perspective instead of a myopic one.

We will conduct the following five tests to determine the impact at the population and institutional level.

1. Decrease Fraction of Innocent Population Being Arrested
2. No Constraint for Total Prison Health Care Budget
3. Decrease Correctional Budget to Community Services
4. Retain Pressure on Community Services Claim for County Realignment Fund
5. Three-strikes Law Exemption to Prisoners with Mental Illness

[85] Institution here refers to the formal entities created by the governments.

4.2.3.2.1 Decrease Fraction of Innocent Population Being Arrested

In this test, we simulate a scenario with a STEP[86] function to reduce the "arrest rate" in the "Individuals with Criminal History" module by 50% in the base case scenario. Hence, the constant "fract innocent pop arrested" decreases from 0.034 to 0.017 from year 2015 onwards.

With a 50% reduction in arrest rate, fewer individuals from the Innocent Pop stock are arrested. This leads to a lower fraction of the population with criminal history (Figure 193). A 100% increase in the arrest rate results in a higher fraction of population with criminal history. When arrest rate reduces 50%, MI prevalence appears to be higher in the beginning because the influx of prisoners wo MI lowers the ratio. At the end of the simulation, this ratio is lower than in the base case (Figure 194).

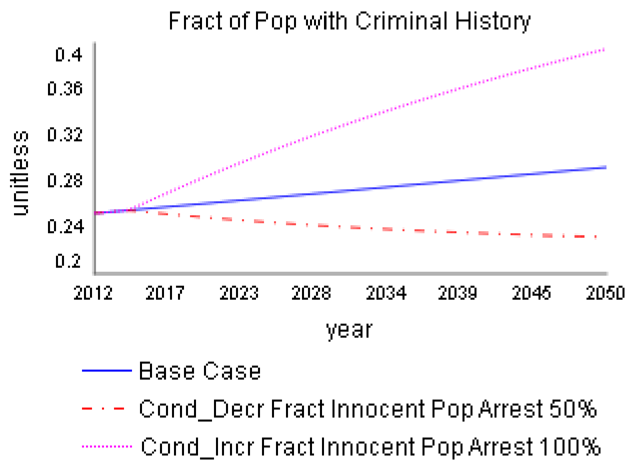


Figure 193 Comparison of the Behaviors of the Fraction of Population with Criminal History in Base Case and the Scenario with 50% Reduction and 100% Increase in Arrest Rate

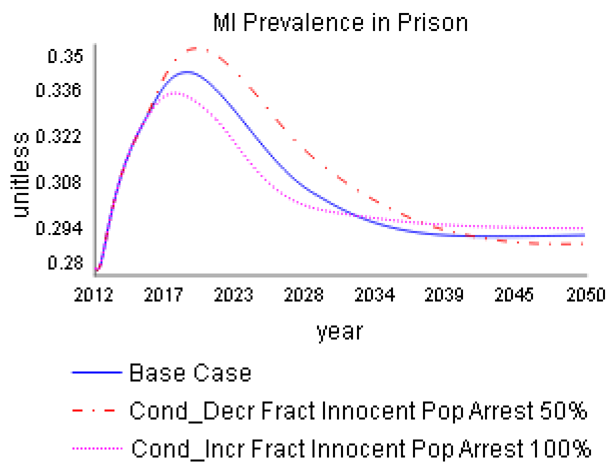


Figure 194 Comparison of the Behaviors of Mental Illness Prevalence in Prison in the Base Case and the Scenario with 50% Reduction and 100% Increase in Arrest Rate

[86] STEP is a built-in function in Stella Architect. The function aims to generate an instantaneous exogenous change throughout the simulation.

4.2.3.2.2 No Constraint for Total Prison Health Care Fund

In this scenario, the State government reduce 50% of the desired adjustment for health care (HC) fund requested by the local governments from 2015 onwards. This test aims to study the effect of lack of treatment in prison on other part of the system. In this scenario, changes at the population level are insignificant as the fraction of population with criminal history remains unchanged. However, the impacts at the institutional level are more visible. MI prevalence is more oscillatory tha in the base case after the test is initiated (Figure 196). This is because that with the desired adjustment to the HC fund is reduced by the State government, i.e. when the desired adjustment to the HC fund is greater than zero, the government only appropriates 50% while in the case with a negative desired adjustment to the HC fund, the government increase the reduction by 50% more, the over- and under-correction exercebated the adjustment to all the treatment capacities in the prisons. By the end of the simulation, MI prevalence in prison is higher than that in the base case. Thus, this test suggests that withholding the requested adjustment to the prison HC fund does not only lead to an oscillatory MI prevalence, it will might also lead to a higher MI prevalence in the prison.

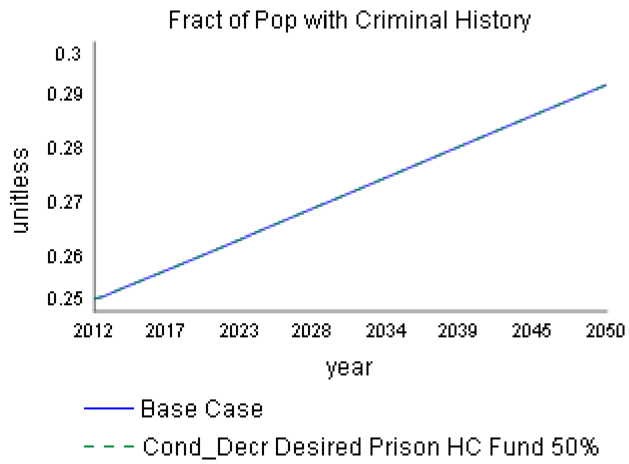


Figure 195 Comparison of Fraction of Population with Criminal History in the Base Case and Realignment with Prison Mental Health Care Fund Constraint Scenario

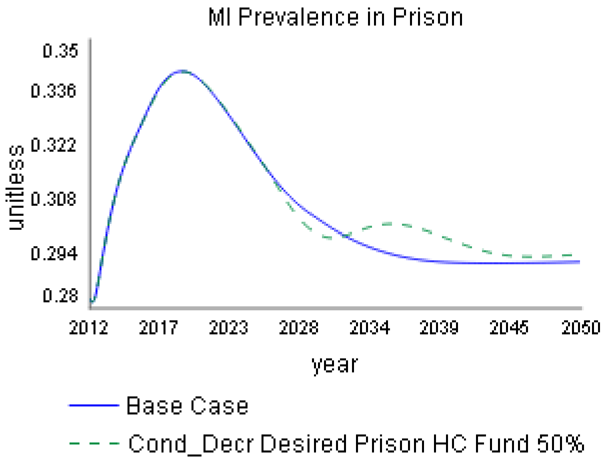


Figure 196 Comparison of Mental Illness Prevalence in Prison in the Base Case and Realignment with Prison Mental Health Care Fund Constraint Scenario

Mental functions of prisoners wMI also shows an oscillatory behavior and ends up lower than that in the base case (Figure 197a). Consequently, the mental functions of prison parolees wMI is also lower (Figure 197b). The lack of treatment also affects the mental functions of prisoners wo MI. The average mental functions per prison wo MI also decreases slightly because the prisoners wo MI who develop MI remain in the Prisoners wo MI stock due to the lack of diagnosis capacity.

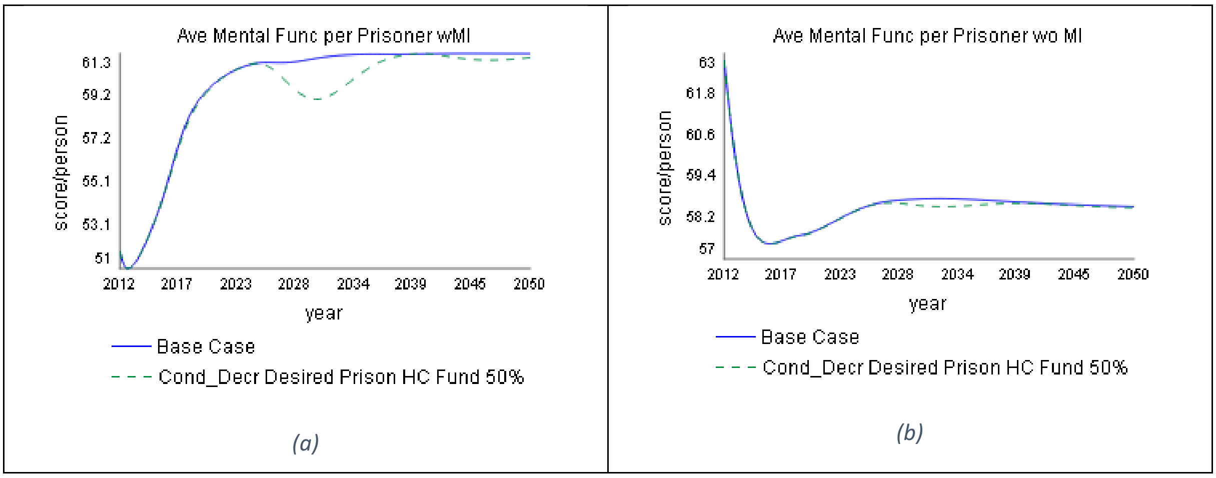


Figure 197 Comparison of the Base Case and Realignment with Prison Mental Health Care Fund Constraint Scenario; (a) Average Mental Functions per Prisoner with Mental Illness; (b) (a) Average Mental Functions per Prisoner without Mental Illness

Correctional fund to community services (Figure 198a) is higher because the community service cost per prison parolee wMI (Figure 198b) rises as parolees' mental functions deteriorate (Figure 198c). The cumulative additional spending in community services between 2012 and 2050 amounts to $14 million.

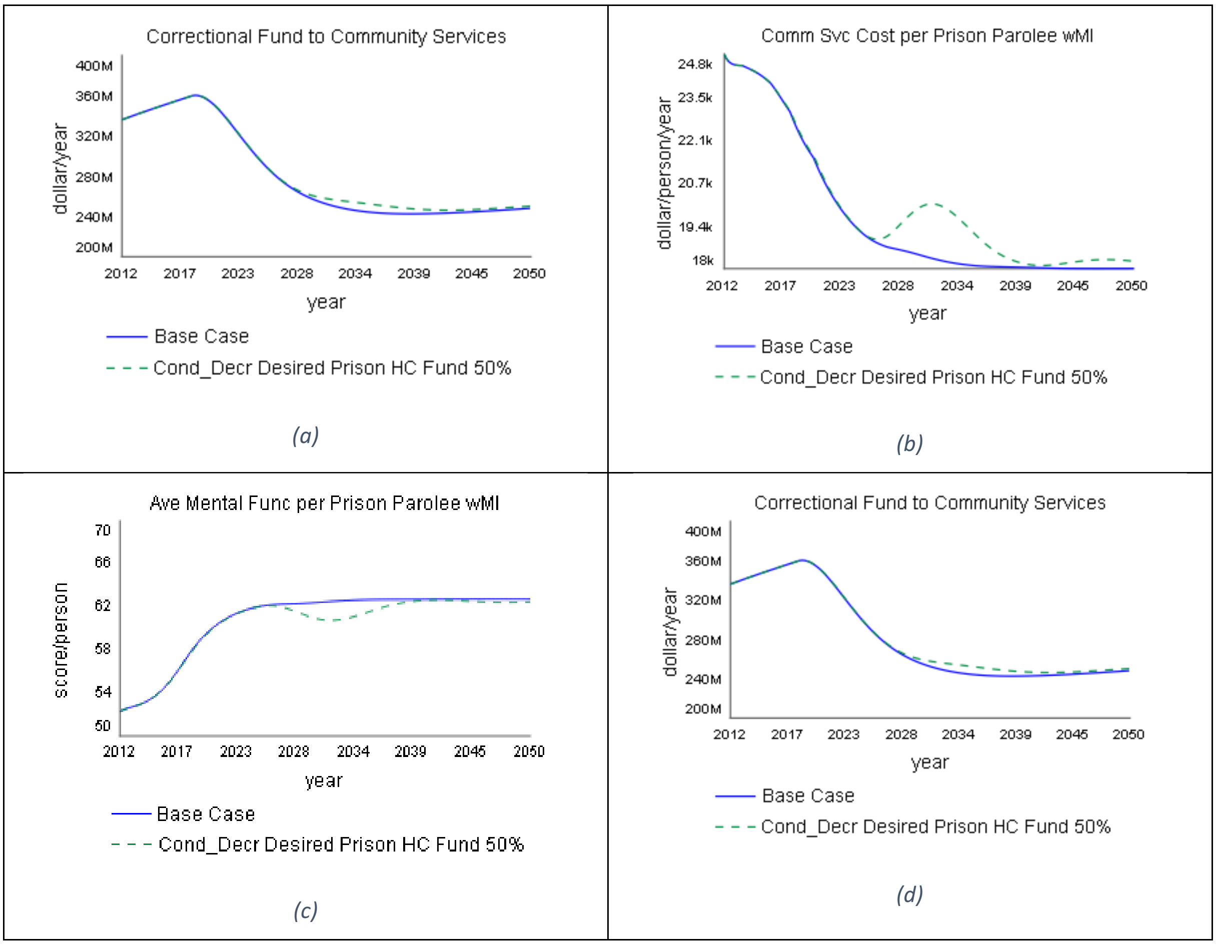


Figure 198 Comparison of the Base Case and Realignment with Prison Mental Health Care Fund Constraint Scenario; (a) Correctional Fund to Community Services; (b) Community Service Cost per Prison Parolee with Mental Illness; (c) Average Mental Functions per Prison Parolee with Mental Illness; (d) Correctional Fund to Communtiy Services

The other implication of the worsening mental functions of parolees is higher MHC treatment cost. The cost for treating MI in prison is 16% higher (Figure 199a).

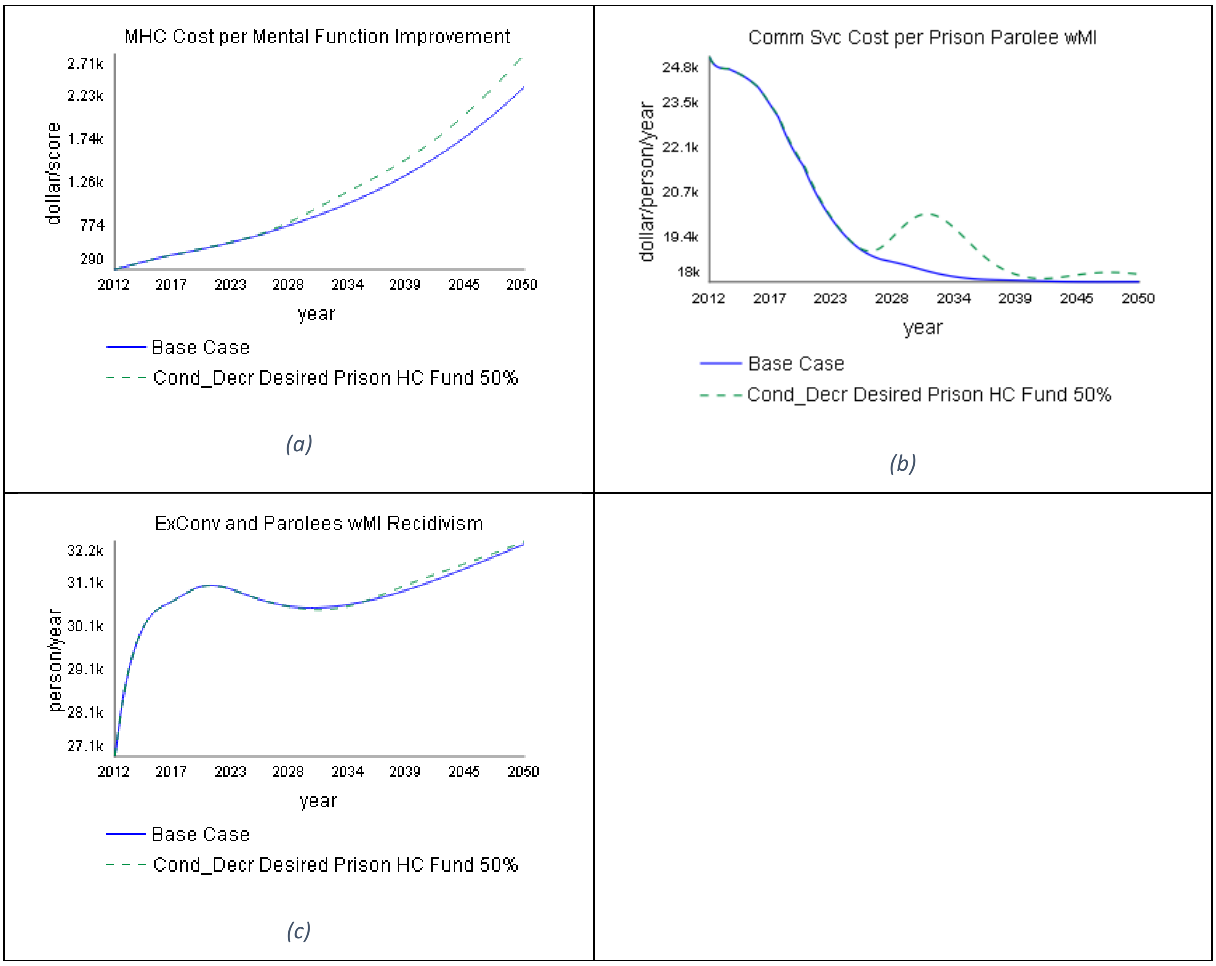


Figure 199 Comparison of the Base Case and Realignment with Prison Mental Health Care Budget Constraint Scenario; (a) Prison Mental Health Care Cost per Mental Function Improvement; (b) Community Service Cost per Prison Parolee with Mental Illness; (c) Ex-convicts and Parolees with Mental Illness Recidivism

This analysis shows the rippling effects arise from the reduction of prison MHC fund and the spillover effects to the community and feeds back to prison. With a 50% reduction in additional MHC fund from 2012 annually, the mental functions of prisoners deteriorates. More prisoners who develop MI remain undiagnosed. Thus, when these prisoners are placed on parole, it costs the community more to serve them (Figure 199b) due to their worsening mental health. As the community service utilization for parolees wMI is higher (Figure 199c), the recidivism among these parolees are also higher. Therefore, the incoming prisoners wMI increase. The consequence of the attempted savings from prison mental health care spills over to community services. Despite a $458 million cumulative savings by the prison authority between 2012 and 2050, it costs the county governments $14 million cumulative additional spending. This savings is based on the expense of worsen mental functions of prisoners, higher recidivism, and higher community service costs and utilization. Thus, we learn that sufficient prison health care fund is a pre-condition for the success of the Realignment policy.

4.2.3.2.3 Depleting Correctional Fund to Community Services

In this scenario, the growth rate of Correctional Fund to Community Services decreases annually from from 2012 onwards until the fund approaches zero. A STEP built-in function is inserted to the "chg in county correctional resources" bi-flow to decrease the community service fund growth rate. By the end of the simulation, the Correctional Fund to Community Services stock has decreased $178 million (Figure 200).

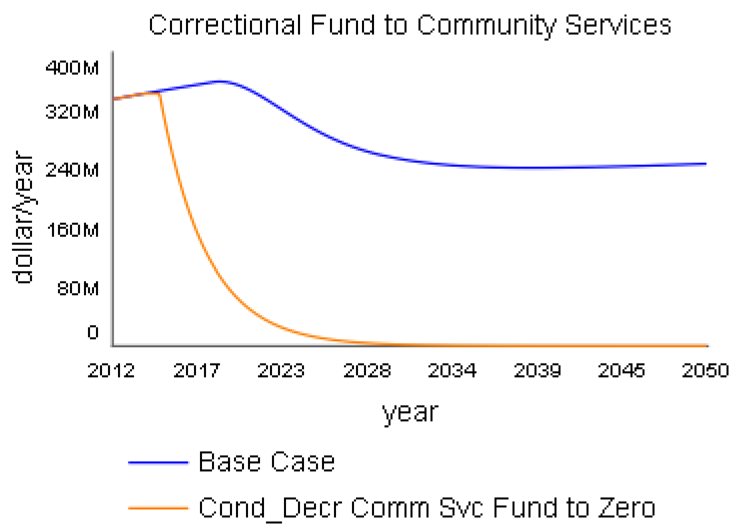


Figure 200 Comparison of Correctional Fund to Community Services in the Base Case and the Depleting Correctional Fund to Community Services Scenario

In this test, the impact at the population level is insignificant. The cumulative difference between the two scenarios result in 650 individuals remain in the unrecovered population whereas about 3,300 fewer individuals in the recovered population (Figure 201).

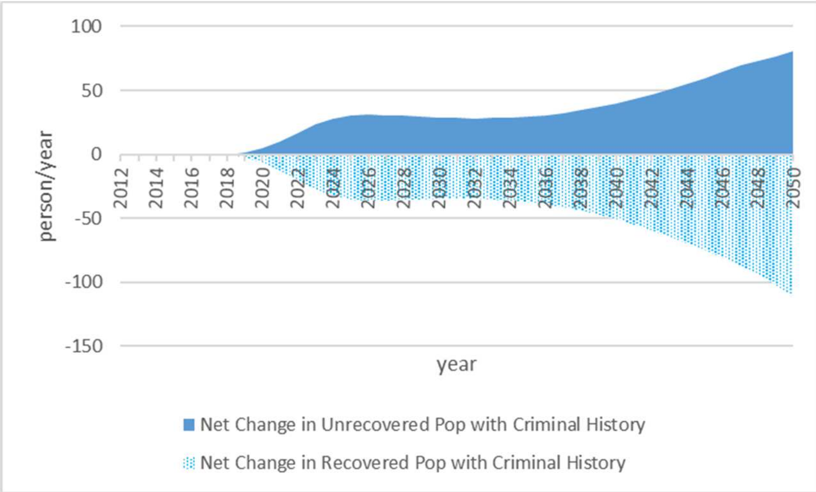


Figure 201 Net Change in Unrecovered and Recovered Populations in the Base Case and Depleting Correctional Fund to Community Services Scenario

The MI prevalence changes little because the proportionate increase in prisoners wMI and wo MI are similar for both groups. However, the cumulative net increase in total recidivism totals 3,400 persons (Figure 202). The two contributing factors to the increase in recidivism are lower employment ratio and social capital among the parolees.

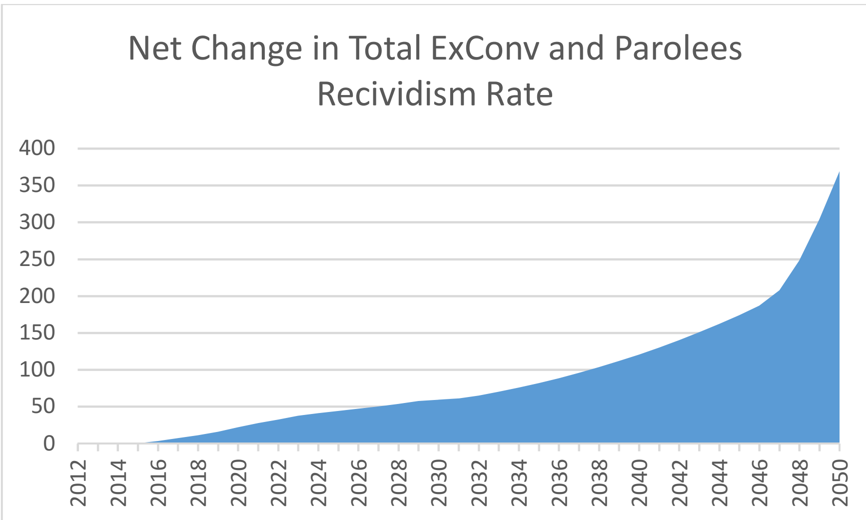


Figure 202 Net Change in Total Ex-convicts and Parolees Recidivism in the Base Case and Depleting Correctional Fund to Community Services Scenario

This test results in an additional $50 million spending in prison HC (Figure 203).

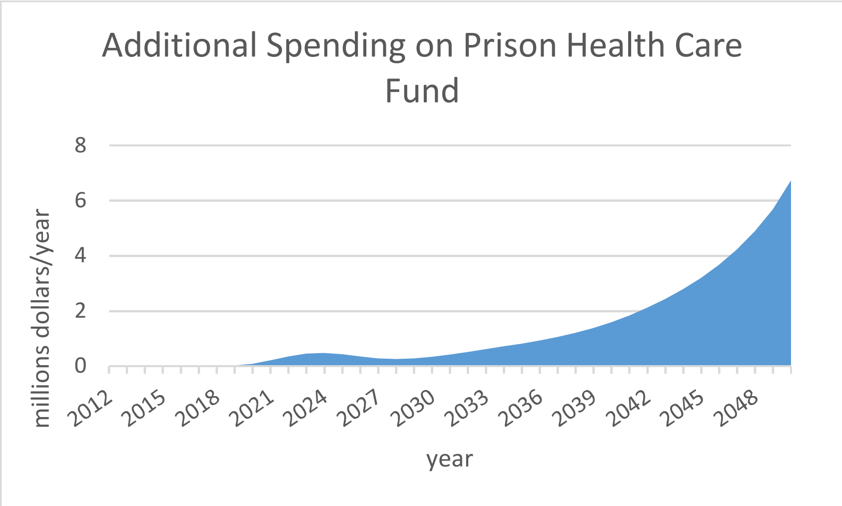


Figure 203 Cummulative Additional Spending on Prison Health Care Fund in the Base Case and Depleting Correctional Fund to Community Services Scenario

4.2.3.2.4 Retain Pressure on Community Services Claim for County Realignment Fund

In this test, the County Realignment Fund is prioritized to community services by setting the weight for local law enforcement claim to 0.1 and the weight for community services claim to 0.9. The local governments do not allot the fund to these two groups of activities based on demand, but based on goals, i.e. the prioritization of community services. Figure 204 shows that the realignment resources for community services is higher than in the base case. The cumulative increase in realignment resources for community services amounts to $2.4 billion between 2012 and 2018.

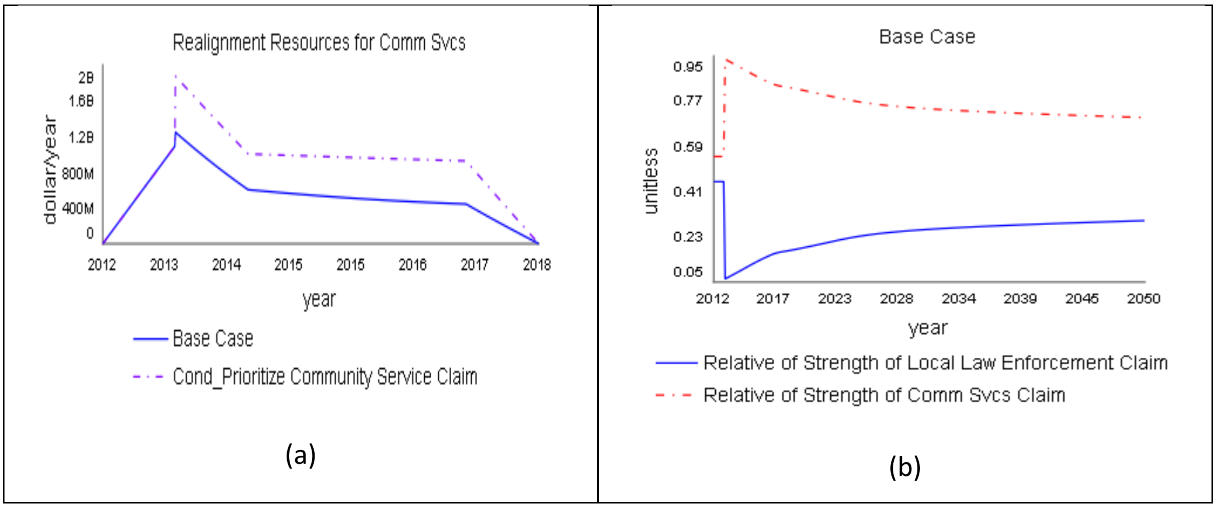


Figure 204 Comparison the Base Case and Depleting Correctional Fund to Community Services Scenario; (a) Realignment Resources for Community Services; (b) Relative Strenght of Local Law Enforcement and Community Services Claims

With the existing funding approach for community services, the reduction in County Realignment Fund to boost community services, the community service capacities for parolees wMI and wo MI are 240 and 12,000 person fewer than in the base case in 2050 (Figure 205).

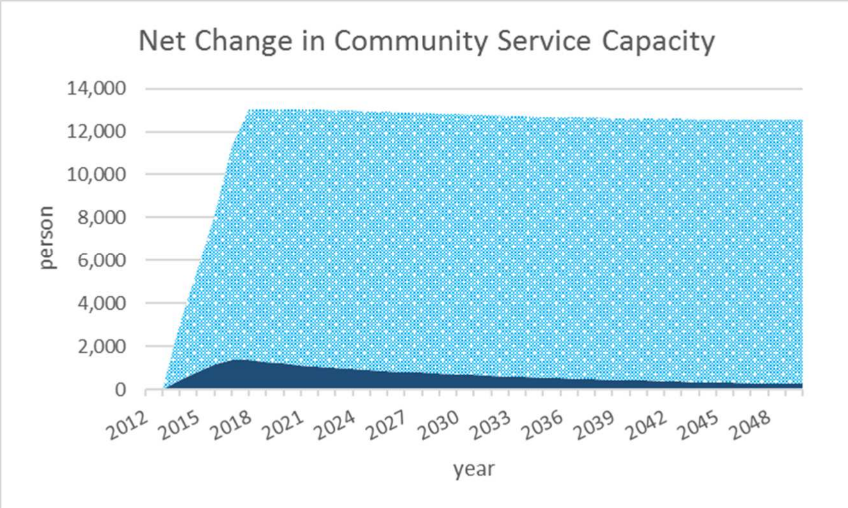


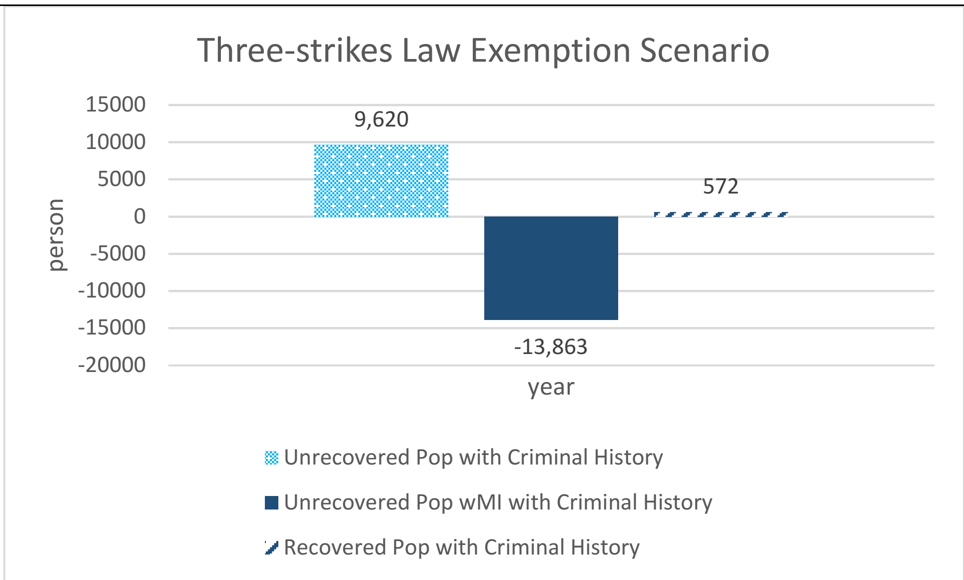
Figure 205 Cummulative Net Loss of Community Service Capacity for Parolees with Mental Illness and without Mental Illness in the Base Case and Depleting Correctional Fund to Community Services Scenario

Although the impact on the unrecovered and recovered populations with criminal history is not noticeable, if the local governments rely on County Realignment Fund to maintain or grow the community services for parolees for the subsequent years after 2018, losing strength to claim the County Realignment Fund for community services attributes to lower than expected community service capacity for parolees.

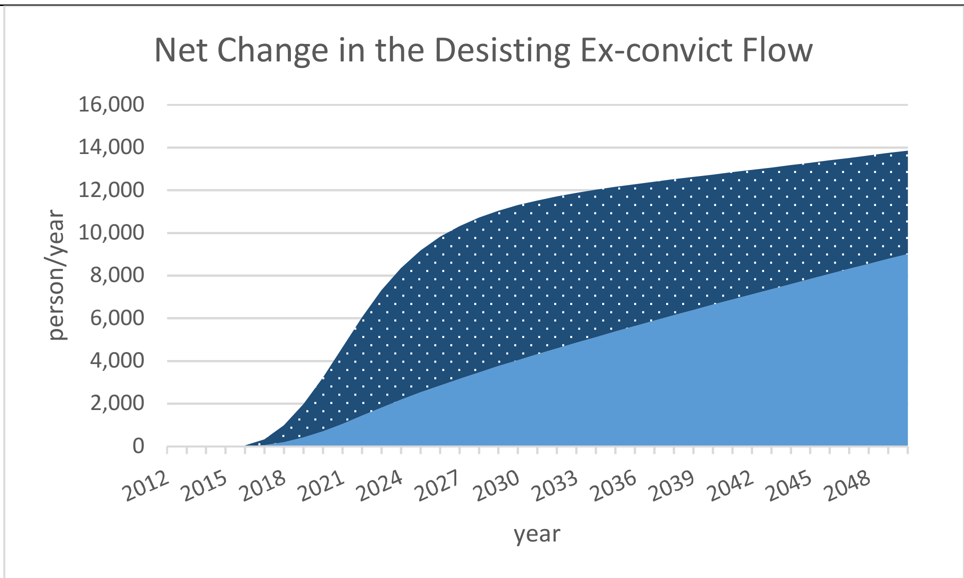
4.2.3.2.5 Three-strikes Law Exemption

Under this scenario, a parameter named "incarceration year switch" is added as an input to "ave prison time served at current release wMI". When the value of this switch is one, the average prison time served by prisoners wMI for the current offense is influenced by the effect of Three-strikes Law. This means that the previous incarceration year served by prisoners wMI has a positive relationship with the average prison time served. The longer the average previous incarceration year served by prisoners wMI compared to the initial condition, the longer the average prison time served for the current offense will be. To disable this effect in the model, a STEP function is inserted to "effects of incarceration year switch" equation. The value for "effects of incarceration year switch" changes from one to zero. From 2015 onwards, "ave prison time served at current release wMI" takes the value of "ref ave prison time served at current release wMI", which is a constant.

In this scenario, the unrecovered population with criminal history and unrecovered population wMI and criminal history are 0.8% and 0.4% lower in 2050. This translates into a 11,000 and 1,200 persons respectively. In this scenario, the recovered population encounters an increase of 20,000 individuals (Figure 206a).



(a)



(b)

Figure 206 Comparison of the Base Case and the Three-strike Law Exemption Scenario; (a) Cumulative Changes in the Stocks of Unrecovered Population with Criminal History, Unrecovered Population wMI and Criminal History, and Recovered Population with Criminal History; (b) Net Change in the Flows of Desisting Ex-convict with Mental Illnes and Desisting Ex-convicit without Mental Illness

The net changes in the stock of the unrecovered population with criminal history, unrecovered population wMI and criminal history, and recovered population with criminal history seem insignificant compared to the entire California population. This is because that these stocks have death outflows. But when looking at the cumulative net changes of the desisting ex-convict wMI and ex-convict wo MI flows (Figure 206b), it reveals that the accumulated additional desisting ex-convicts total 162,000 and 188,000 persons between from 1994 to 2050 (the Three-strikes Law was implemented in 1994).

Although the change in MI prevalence is insignificant (-2% in 2050), the total prison population is 14% lower in 2050 (Figure 207). The reduction in prison population includes the reduction in prisoners wMI and prisoners wo MI.

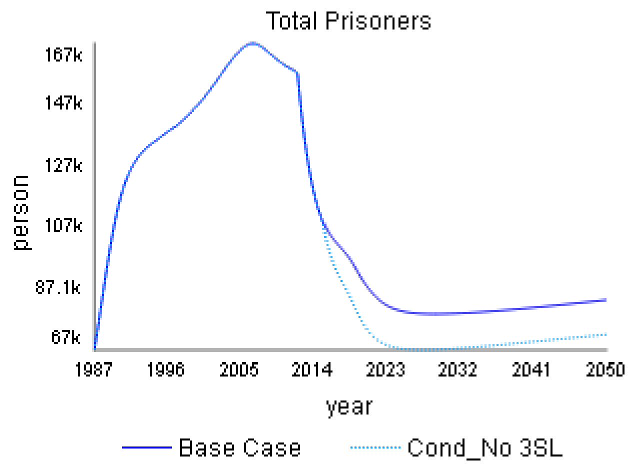


Figure 207 Comparison of Total Prisoners in Base Case and the Three-strike Law Exemption Scenario

Prison HC fund accumulates $17 billion in net savings (Figure 208) in the Three-strike Law exemption scenario whereas the cummulative net savings in Correctional Fund to Community Services reaches $12 million (Figure 209). Note that the savings in prison HC fund materializes before the correctional fund to community. This is because that the elimination of Three-strikes law is only applicable to the new prisoners. Those who are already in the prison are unaffected by this change. Therefore, it takes some time before the effect of the elimination of Three-strikes law shows on the correctional fund. Initially, the Correctional Fund to Community Services is higher than in the base case due to a larger outflow of prisoners to become parolees. To handle the needs to the larger population of parolees, county governments spend more to increase the community service capacities. Once more parolees fulfill parole conditions rather than recidivate, the needs for community services reduces.

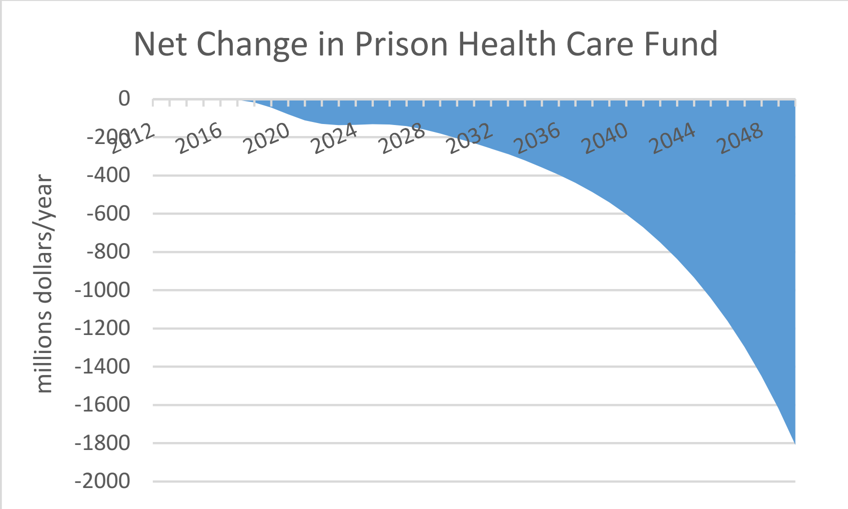


Figure 208 Comparison of Prison Health Care Fund in Base Case and the Three-strike Law Exemption Scenario

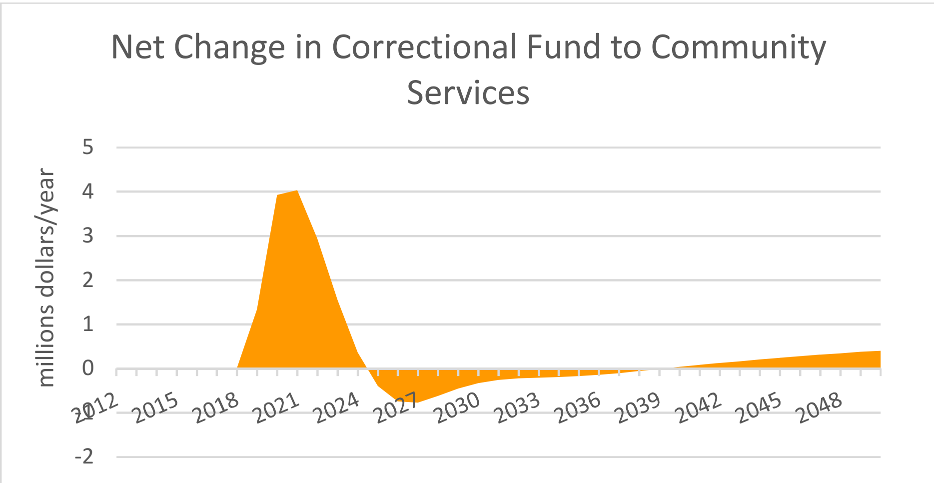


Figure 209 Comparison of Correctional Fund to Community Services in Base Case and the Three-strike Law Exemption Scenario

The reduction in prisoners has four positive impacts on prison HC system. First, the reduction leads to lower prison capacity utilization. The probability of prisoners developing MI reduces due to a less dense environment. Hence, MHC capacity adequacy increases. Second, lower contact rate between prisoners due to lower density reduces the infectivity of infectious diseases. Third, the reduction also attributes to a 10% decline in average age in prison because some older prisoners wMI leave the prison at a faster rate. As it is costly to treat chronic diseases, which mostly related to age, fund for chronic disease treatment reduces. Finally, with fewer prisoners wMI more MHC resources are allocated to treat each prisoners wMI and to prevent MI onset among prisoners wo MI. Consequently, MHC capacity fund is lower.

This test demonstrates that in the absence of Three-strikes law, fewer individuals remain in the unrecovered population with criminal history because more individuals are able to recover. As a subset of the unrecovered population, the unrecovered population wMI also experiences a significant drop. The reduction in the unrecovered population leads to reduction in prison health care and community services spending. As a conclusion, without Three-strikes law, the Realignment policy will further impact the system positively.

4.3 Chapter Summary

In this chapter, various validation tests conducted are explained. The second half of the chapter analyzes simulation outcomes from the model. First, we analyze the base case to trace the cause of the increasing concentration of mentally ill prisoners. Subsequently, we assess the impact of the Realignment policy by simulating the base case without the Realignment. Finally, we conduct scenario analysis to reveal the conditions required to further reduce the number of individuals with MI and criminal behavior under the Realignment.

Even though our study focuses on individuals with MI and criminal history, when conducting analysis, we take a public health perspective by assessing the impact of the Realignment at the population level first followed by the impact at institutional-level. Subsequently, we analyze how the Realignment affects the characteristics of the individuals wMI in the systems. These changing characteristics, such as age, mental functions, incarceration history, and social capital, which eventually feed back to the system.

Analyses reveal that the increasing number of mentally ill prisoners being incarcerated in the prison is caused by the structure of the system. When the community fails to provide adequate support to assist parolees to adapt to normal life in the community, some parolees recidivate. As these individuals experience decrease in mental functions and social capital, it becomes even harder for them to reenter the community. If the community services persistently fall short on meeting the needs of parolees, the fundamental structure of the system makes it easier for the parolees and ex-convicts to return to prison than staying in the community. Thus, the prisons absorb these habitual offenders while the county governments are released from the obligation of providing adequate community services to rehabilitate the parolees. This phenomenon is characterized as “shifting the burden to the intervener”. The Realignment appears to be an effective policy in reducing prison population and increase prison HC resources. However, the mechanism for community service planning is lacking. Therefore, community service capacity for parolees wMI lags behind the needs. The lack of capacity planning has a more adverse impact on parolees wMI because resources tend to be allocated to fund community services for parolees wo MI. Consequently, the burden still falls on the correctional system because more individuals remain in the criminal justice system are habitual offenders. As individuals wMI and criminal history are less likely to benefit from Realignment, in conjunction with lower mental functions and social capital, and higher previous incarceration time served, the existing Realignment policy has less impact on this population compared to the population wo MI.

Scenario analysis shows that when the following four conditions are in place to supplement the Realignment policy, fraction individuals wMI and criminal history will be reduced.

1. Reduce fraction of innocent population being arrested;
2. Continue providing adequate MHC resources in prison;
3. Continue providing adequate for community services and ensure resources being allocated to fund community service capacity;
4. Exempt convicts to prison sentence from Three-strikes Law

5 Data Limitation and Sensitivity Analysis

5.1 Data Limitation

In the conceptualization and formulation stage, data availability is crucial to understand and define the dynamic problem of this study. A dynamic problem arises from a complex system. A complex system changes over time with actors within the system interacting with each other. Through data collection and analysis, we realize that most of the quantitative and time series data pertinent to our study concentrate in the criminal justice system, namely the prison system, jail system, and judiciary system. Community-level quantitative data points are mostly extracted from literature or public reports. Population attributes data, such as mental functions, social capital, and incarceration year served are defined and estimated through qualitative data extraction by the author. Age is the only attribute that is extracted from data from the criminal justice system. Table 8 lists the type of data sources. Full data sources for the model are presented in Appendix K. Although data used to populate the model is incomplete and fragmented, if the endogenous structure of the model is a robust abstraction of the real system, the model still contains high explanatory power.

Quantitative Data	
Sector	Source Type
Criminal Justice System	• Governmental reports and statistics from: ○ California Department of Corrections and Rehabilitation (CDCR) ○ Board of State & Community Corrections (BSCC) ○ State of California Department of Justice ○ Chief Probation Officers of California (CPOC) ○ Judicial Council of California ○ California State Controller's Office ○ California Department of Finance ○ California State Auditor ○ California's Legislative Analyst's Office (LAO) ○ Bureau of Justice Statistics (BJS) ○ Substance Abuse and Mental Health Services Administration (SAMHSA) • Court and legal documents associated with cases such as *Coleman v. Wilson*, *Plata v. Schwarzenegger*, *Coleman v. Schwarzenegger*, and the *Three-judge Court*. • Research reports from academic and non-profit research institutions • Scholarly and scientific publications
Community	• Governmental reports and statistics from: ○ Board of State & Community Corrections (BSCC) ○ California State Association of Counties (CSAC) ○ California's Legislative Analyst's Office (LAO)

	o Substance Abuse and Mental Health Services Administration (SAMHSA) o Bureau of Justice Statistics (BJS) • Research reports from academic and non-profit research institutions • Scholarly and scientific publications
Population Attributes	• Governmental reports and statistics from: o California Department of Corrections and Rehabilitation (CDCR) o Substance Abuse and Mental Health Services Administration (SAMHSA) o California's Legislative Analyst's Office (LAO) • Research reports from academic and non-profit research institutions • Scholarly and scientific publications
Qualitative Data	
Criminal Justice System	Reports and scholarly or scientific publication from the following fields: • Criminal justice • Law • Corrections • Sociology • Public health • Mental health & psychiatry • Public finance
Community	Reports and scholarly or scientific publication from the following fields: • Law • Corrections • Sociology • Public health • Mental health & psychiatry • Public administration
Population Attributes	Reports and scholarly or scientific publication from the following fields: • Criminal justice • Corrections • Sociology • Public Health • Philosophy • Global health and developmental studies by international non-profit organization, such as OECD

Table 9 List of Data Source Types

Table 9 shows that most of the quantitative data available are in the criminal justice system. The community and population attributes sectors (except for age) rely on scant quantitative data extracted from governmental sources or qualitative data from various disciplines. Thus, sensitivity analysis is conducted to evaluate the uncertainty of model behavior due to the lack of data in the community and population attribute sectors.

5.2 Sensitivity Analysis

The behavior of a system dynamics model is driven by the model structure and its parameters. Often, model constants and initial values are estimated crudely due to the lack of data. Additionally, some constants may be changing over time. Hence, the uncertainty leads to the need to assess whether the model behavior is reasonable within a plausible range of values defined in the uncertain parameters. Uncertainties in the model parameters may also affect model behavior and thus the conclusion. Sensitivity analysis is used in most formal modeling process to study the model's responses to model changes (Tank-Nielsen, 1980). Although sensitivity analysis can also generate insight between the model structure and its behaviors as well as the understanding of the real system, the sensitivity analysis in this section focuses on testing alternative parameter values within a plausible range to assess the impacts on model conclusions. Since the data relevant to our study mostly collected for the prison system and some for the jail population and judiciary system, the data from the local government are scant and fragmented. Thus, we aim to address the data limitation issue by conducting sensitivity analysis to evaluate the impact of the uncertainty generated from the sectors where data are scant on model behavior. The second objective of the sensitivity analysis is to direct future research for further information and data collection.

Sensitivity analysis can be conducted through parameter change or structural change. Parameter change involves *changing the constants, initial values, or table functions*, whereas structural change requires the *modification of causal relationship in the model, including the redefinition of model boundary*. The following table presents the summary of the sensitivity tests and results (Table 10). The detailed results are presented in Appendix M.

Parameter Change			
Test No.	Test Name	Details	Result
1	Fraction of Prison Convicts wMI	"Ref fract prison convicts wMI" parameter is varied between 50% and 150% of the constant value, which is 0.32, from 1988 onwards.	The general model behavior has not changed under this test. Hence, the model is *not* sensitive to this test. The following stocks and variables show more significant variation in values: • MI prevalence in prison • Prisoners wMI • Fraction of unrecovered pop wMI with criminal history • Total discrepancy in mental functions in prison • Correctional Fund to Community Services • Comm svc utilization by parolees wMI • Ave mental func per recidivist • Ave previous incar time served per prisoner wMI • Ave previous incar time per prisoner wo MI • Ave previous time served per recidivist • Ave incar time served per HI risk jail exConv wMI • Ave SC per prison parolee wo MI • Ave SC per HI risk jail exConv wMI
2	High Risk Prison Ex-convict wMI Recidivism Rate	"Hi risk exConv wMI recidivism rate" is varied between 50%, and 150% of the constant value, which is 0.08, from 1988 onwards.	In general, the model is *not* sensitive to this test. The following stocks and variables show more significant variation in values: • Ave age in prison • MHC Capacity Fund
3	Fraction of Prisoners Develop Mental Illness	"Ref fract prisoners devMI" is varied between 50%, 150%, and 500% of the constant value, which is 0.02, from 1988 onwards.	This test yields more significant changes in values of the following stocks and variables. But the behavior patterns of these stocks and parameters do not change. • MI prevalence in prison • Prisoners wMI • Fract of unrecovered pop wMI and criminal history • Ave SC per prison parolee wMI

			• Ave SC of all parolee wMI
4	Initial Value of Prisoners with Mental Illness	The initial value for Prisoners wMI stock is varied between 50%, 150%, and 500% of the constant value, which is 9,136, from 1987 onwards.	Model is *not* sensitive to this test. The variation of initial value changes the development of "MI prevalence in prison" in the beginning. Then, the effect of varying initial value fades.
5	Fraction of County Parolees with Mental Illness Reoffend	"Fract county parolee wMI reoffend" is varied between 50%, 150%, and 500% of the constant value, which is 0.15, from 2012 onwards. The county parolees stocks are developed after the Realignment policy.	Model is *not* sensitive to this test. This test yields more significant changes in values of the following stocks and variables. But the behavior patterns of these stocks and parameters do not change. • Total jail pop • Jail capacity utilization • Ave previous time served per recidivist
6	New Time to Perceive Mental Health Care Needs	"Ref perception delay in MHC needs" is varied between 50%, 150%, and 500% of the constant value, which is 4 years, from 2012 onwards.	The model is *not* sensitive to this test.
7	Prisoners wo MIs' Mental Function Loss per Year	"Prisoner wo MI mental func loss per year" is varied between 50% and 150% of the constant value, which is one score per person per year, from 1988 onwards.	The model is *not* sensitive to this test. The following stocks and variables show more significant variation in values: • MI prevalence in prison • Ave mental func per recidivist
8	Prisoners wMIs' Mental Function Loss per Year	"Prisoner wMI mental func loss per year" parameter is varied between 50% and 150% of the constant value, which is two score per person per year, from 1988 onwards.	The model is *not* sensitive to this test. The following stocks and variables show more significant variation in values: • MHC Capacity Fund • Ave mental func per recidivist
9	Annual Prisoner's Social Capital Loss per Year	"Ref annual prisoner SC loss per person" is varied between 50% and 150% of the constant value, which is two score per person per year, from 1988 onwards.	The model is *not* sensitive to this test.
10	Initial Value of Correctional Fund to Community Services	The initial value for Correctional Fund to Community Services stock is varied between 50%, 150%, and 500% of the constant value, which is $206,444,387/year, from 1987 onwards.	The model is *not* sensitive to this test. The following stocks and variables show more significant variation in values. However, the overall behavior of the model does not change. • Comm svc utilization by parolees wMI • Comm svc utilization by parolees wo MI • Parolees wMI employment ratio

			• Parolees wo MI employment ratio
11	Effect of Incarceration Time Served by Prisoners on Social Capital Loss per Prisoner wMI	The relationship between "relative ave previous incar time served per prisoner wMI" in the **Incarceration Year Served** module and "annual prisoner SC loss per prisoner wMI" in the **Social Capital** module is modified through changing the steepness of the graph in the table function in "effect of incar time per prisoner on SC loss per prisoner wMI"	The model is *not* sensitive to this test.
12	Effect of Incarceration Time Served on Prison Time Served wMI	The relationship between "relative ave previous incar time served per prisoner wMI" in the **Incarceration Year Served** module and "ave prison time served at current release wMI" in the **Individuals with Criminal History** module is modified through changing the steepness of the graph in the table function in "effect of incar time on prison time served wMI". The steepness of the table function is varied to characterize the delay in the effect of the input parameter.	The model is *not* sensitive to this test. This test yields more significant changes in the values for the following stocks and variables: • MI prevalence in prison • Prisoners wMI • Ave ag per prisoner wMI • Total discrepancy in mental functions in prison • Ave mental func per prisoner wMI • Ave mental func per prison parolee wMI • Ave mental func per recidivist • Ave mental func of all parolees wMI • Total incar time per prisoner wMI
13	Effect of Incarceration Time Served on Prison Sentence Conviction	The relationship between "relative ave previous incar time served per recidivist" in the **Incarceration Year Served** module and "fract convicts in custody convicted to prison sentence" in the **Individuals with Criminal History** module is modified through changing the steepness of the graph in the table function in "effect of incar time on fract prison sentence conviction".	The model is *not* sensitive to this test. This test leads to more variance in the values for the following stocks and variables, but not the model behaviors. • MI prevalence in prison • Prisoners wMI • Total prisoners • Total parolees • Total jail pop • Probationers • Prisoner develop MI • Total discrepancy in mental functions in prison • MHC capacity adequacy • Ave mental func per prisoner wMI

			• Ave mental func per prisoner wo MI • Ave mental func per recidivist • Ave mental func of all parolees wMI
14	Effect of Incarceration Time Served of Jail Offenders on Social Capital Loss	The relationship between "relative ave previous incar time served per jail offender wMI" in the **Incarceration Year Served** module and "losing SC in jail wMI" outflow in the **Social Capital** module is modified through changing the steepness of the graph in the table function in "effect of incar time per jail offender on SC loss per jail offender wMI",	The model is *not* sensitive to this test.
15	Effect of Social Capital on Recidivism by High Risk Jail Ex-convicts wMI	The relationship between "relative SC per hi risk jail offender wMI" in the **Social Capital** module and "high risk jail exConv wMI recidivism rate" in the **Individuals with Criminal History** module is modified through changing the steepness of the graph in the table function in "effect of SC on hi risk jail exConv wMI recidivism"	In general, the model behavior is not sensitive to this test.

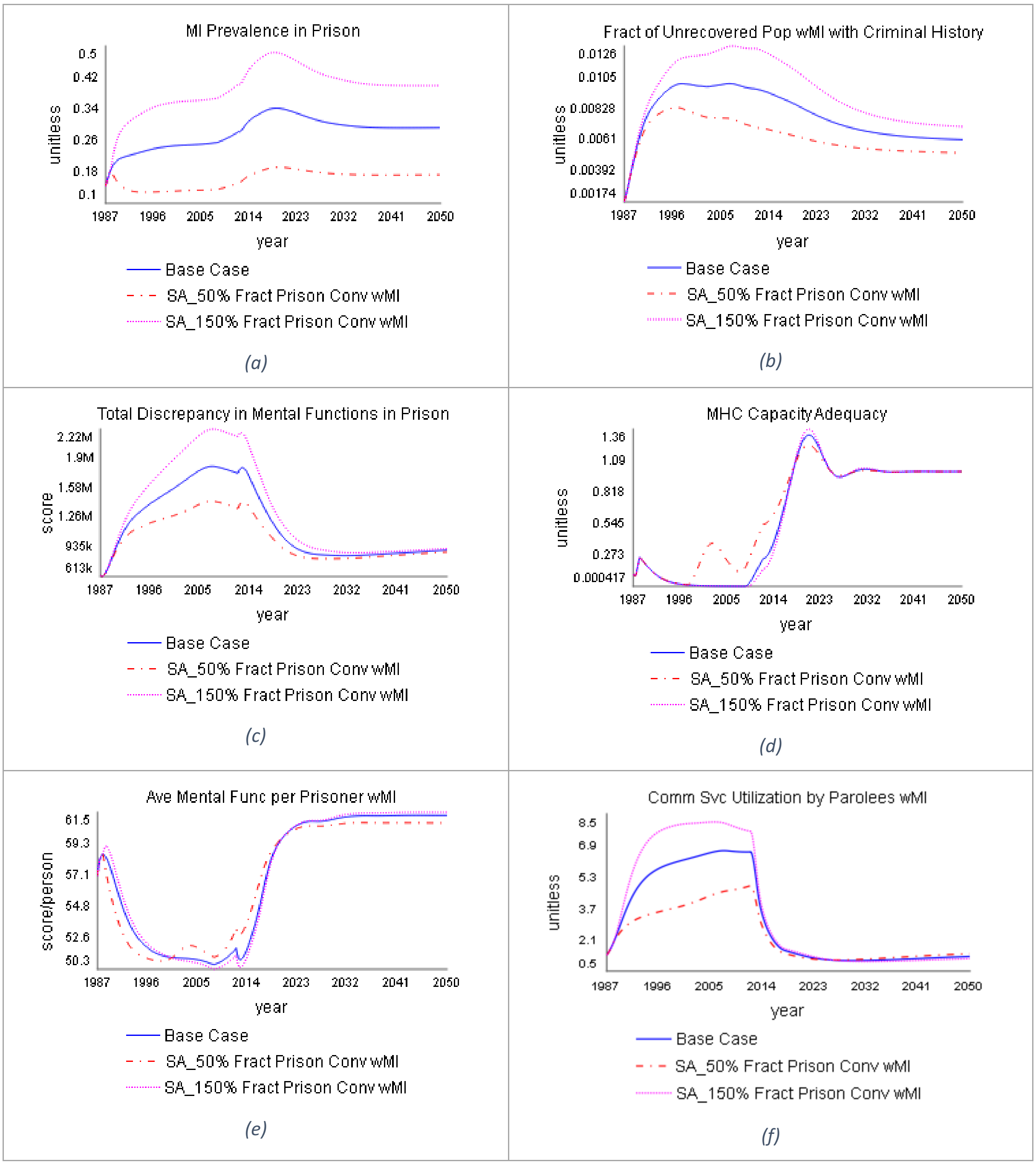
Table 10 Details and Results of Sensitivity Tests 1 - 15

Sensitivity testing reveals that the model is more sensitive when "ref fraction prison convicts wMI" (Test 1), "ref fraction prisoners devMI" (Test 3) , "fract county parolee reoffend" (Test 5), initial value of correctional fund to community services (Test 10), "effect of incar time on prison time served wMI" (Test 12), and "effect of incar time on fract prison sentence conviction" (Test 13) are varied. Under these six tests, the values of MI prevalence on prison and the attributes of individuals with criminal history change significiantly. Although the values of these model parameters change more significantly, the overall model behavior does not change under these tests.

5.2.1 Summary from Sensitivity Analysis

This section presents the results of MI prevalence and the fraction of population with criminal history under selected the sensitivity testing. These results show the impacts on MI prevalence and the fraction of population with criminal history when certain parameters or causal loops are weakened or strengthened.

Selected Results from Sensitivity Test 1 – Fraction of Prison Convicts wMI



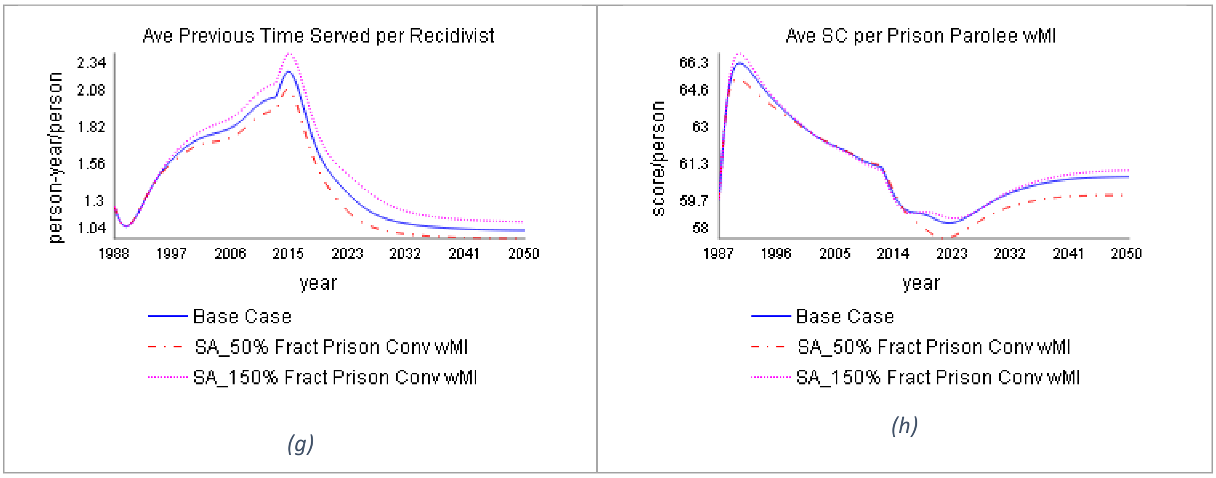


Figure 210 Comparison of Selected Results from Sensitivity Analysis Test 1 – Fraction of Prison Convicts with Mental Illness

(a) – Mental Illness Prevalence in Prison; (b) Fraction of Unrecovered Poulation with Mental Illness and Criminal History; (c) Total Discrepancy in Mental Functions in Prison; (d) Mental Health Care Capacity Adequacy; (e) Average Mental Functions per Prisoner with Mental Illness; (f) Community Service Utilization by Parolees with Mental Illness; (g) Average Previous Time Served per Recidivist; (h) Average Social Capital per Prison Parolee with Mental Illness

When fewer prison convicts wMI enter the prison, MI prevalence in prison (Figure 210a) and fraction of unrecovered population wMI and criminal history (Figure 210b) are lower. Consequently, the total discrepancy in mental functions in prison decreases (Figure 210c). Thus, MHC resources are shared among fewer prisoners wMI. MHC adequacy becomes higher in an earlier stage (Figure 210d). Higher MHC resources per capital leads to higher mental functions among prisoners wMI (Figure 210e). When some of the ex-convicts recidivate, the mental functions of these recidivists are also higher. Hence, the average mental functions of prisoners wMI continue to be higher until the recidivism reduces and more ex-convicts wMI proceed towards desistance. The remaining recidivists are the habitual offenders with lower mental functions. Eventually, the average mental functions of prisoner wMI becomes lower than in the base case. As community service utilization for parolees wMI reduces significantly (Figure 210f), more parolees wMI receive community services that facilitate their reentries. As more of them are employed, they proceed towards desistance instead of returning to prison. Therefore, average previous time served per recidivist (Figure 210g) is lower. The average SC per prison parolee wMI is lower (Figure 210h) because those with higher SC progress towards desistance. The remaining parolees are more likely habitual offenders.

Selected Results from Sensitivity Test 3 – Fraction of Prisoners Develop MI

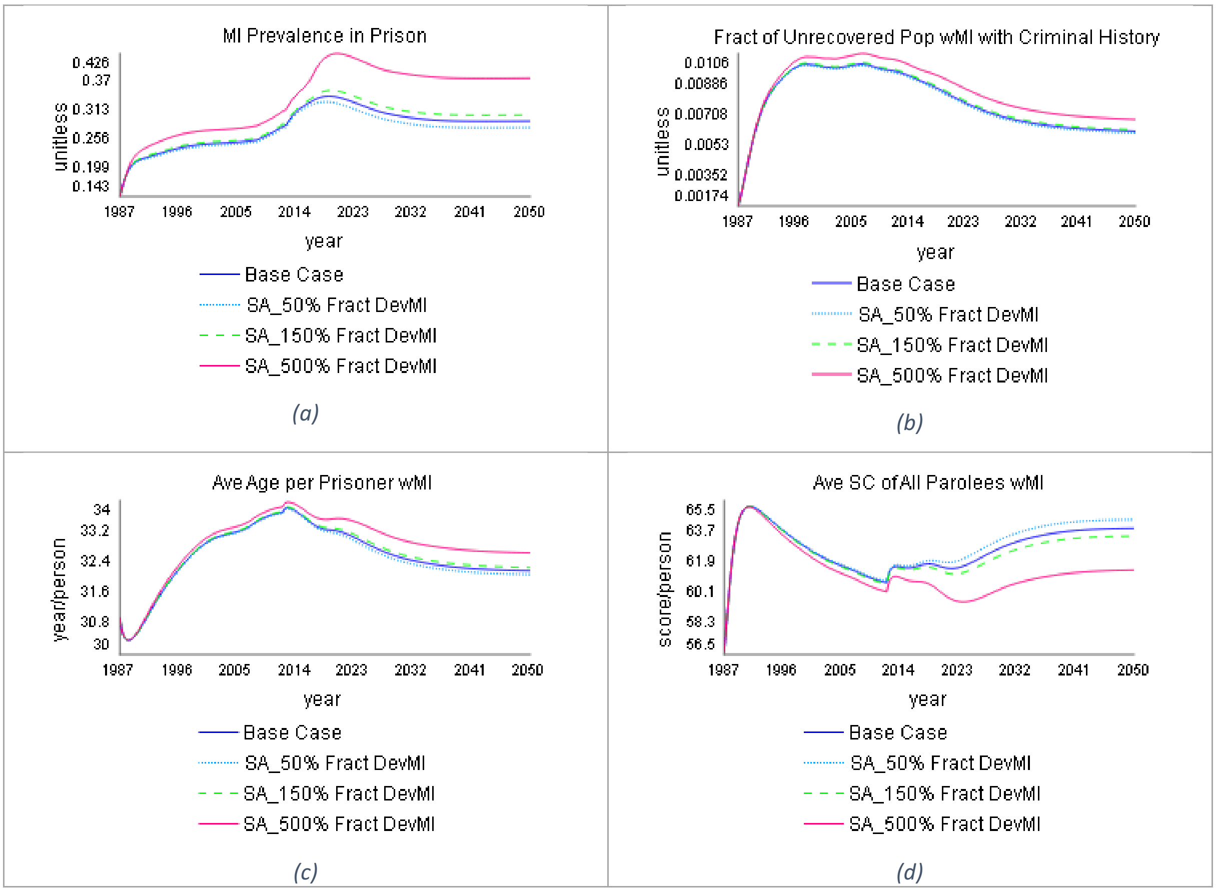


Figure 211 Comparison of Selected Results from Sensitivity Analysis Test 3 – Fraction of Prisoners Develop Mental Illness

(a) – Mental Illness Prevalence in Prison; (b) Fraction of Unrecovered Poulation with Mental Illness and Criminal History; (c) Average Age per Prisoner with Mental Illness; (d) Average Social Capital of All Parolees with Mental Illness

Under Sensitivity Test 3, MI prevalence reduces when the fraction of prisoners develop MI decreases (Figure 211a). However, this change becomes more apparent after the Realignment. This test also demonstrates that the slight reduction in the fraction of unrecovered population wMI and criminal history (Figure 211b). The average age and SC of prisoners and parolees also show visible variations (Figure 211c and d).

Selected Results from Sensitivity Test 5 – Fraction of County Parolees Reoffend

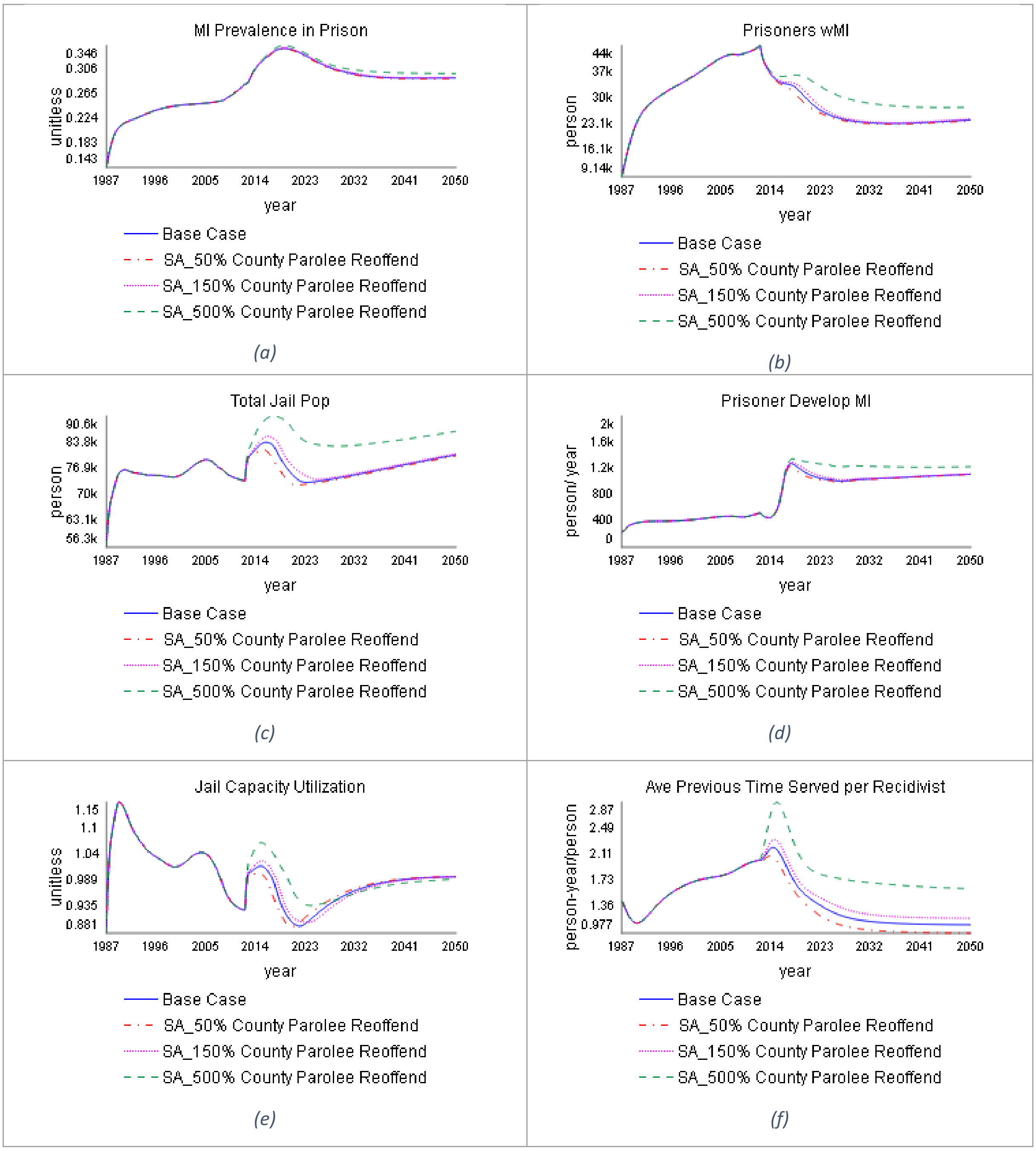


Figure 212 Comparison of Selected Results from Sensitivity Analysis Test 5 –Fraction of County Parolee Reoffend

(a) – Mental Illness Prevalence in Prison; (b) Prisoners with Mental Illness; (c) Total Jail Population; (d) Prisoner Develop Mental Ilness; (e) Jail Capacity Utilization; (f) Average Previous Incarceration Time Served per Recidivist

When the fraction of county parolee reoffend is lower, MI prevalence in prison is slightly lower (Figure 211a). There are also fewr prisoners wMI (Figure 211b) because more county parolees proceed toward desistance. The lower density in prison and higher MHC resources per capita contribute to fewer prisoners developing mental illness (Figure 211d). Also, the total jail population is also lower (Figure 211c). The jail capacity utilization (Figure 211e) is lower due to fewer county parolees returning to the criminal justice system for recommitting crimes. Consequently, the previous incarceration time served per recidivist is also lower (Figure 211f).

Selected Results from Sensitivity Test 10 – Initial Value of the Correctional Fund to Community Services

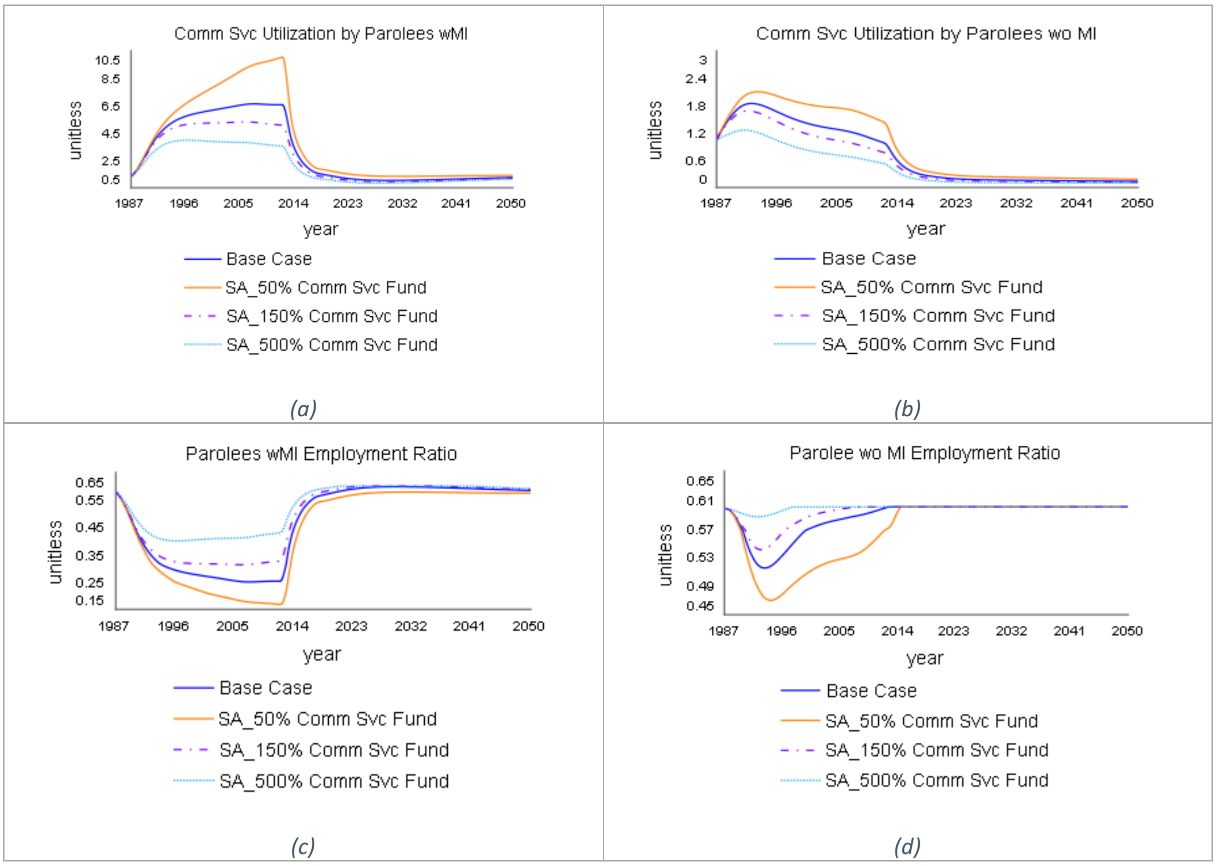
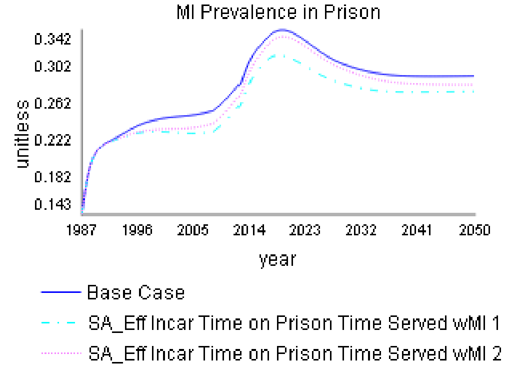


Figure 213 Comparison of Selected Results from Sensitivity Analysis Test 10 –Initial Value of Correctional Fund to Community Services

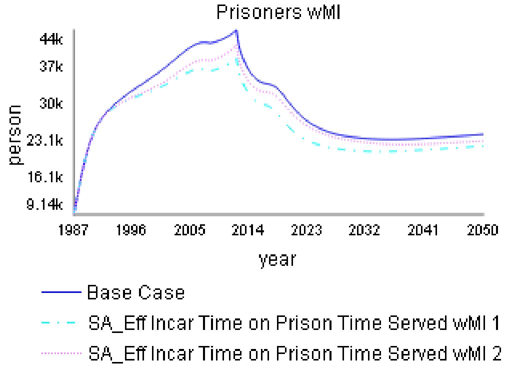
(a) – Community Service Utilization by Parolees with Mental Illness; (b) Community Service Utilization by Parolees without Mental Illness; (c) Parolees with Mental Illness Employment Ratio; (d) Parolees without Mental Illness Employment Ratio

In Test 10, when the initial value of the correctional fund to support community services is 50% lower, community service utilization levels for parolees wMI and parolees wo MI are higher (Figure 213a and b). This attributes to the lower employment levels among these two groups of parolees (Figure 213c and d). However, the adverse impacts of the lower initial value for community fund are more pronounced before the Realignment. This is because that after the implementation of the Realignment policy, correctional fund appropriation is based on the goals for employment levels among both groups of parolees and resources are prioritized to community services for parolees wMI.

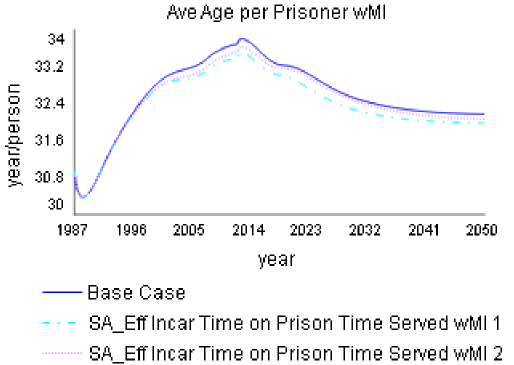
Selected Results from Sensitivity Test 12 – Effect of Incarceration Time on Prison Time Served by Prisoners with Mental Illness



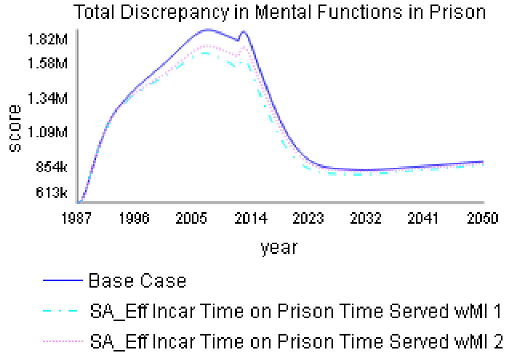
(a)



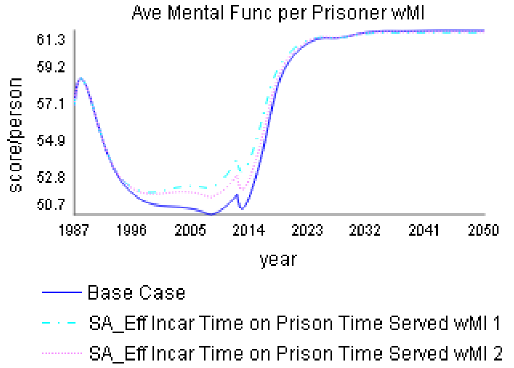
(b)



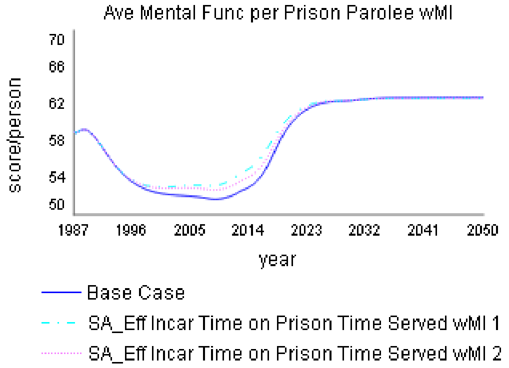
(c)



(d)



(e)



(f)

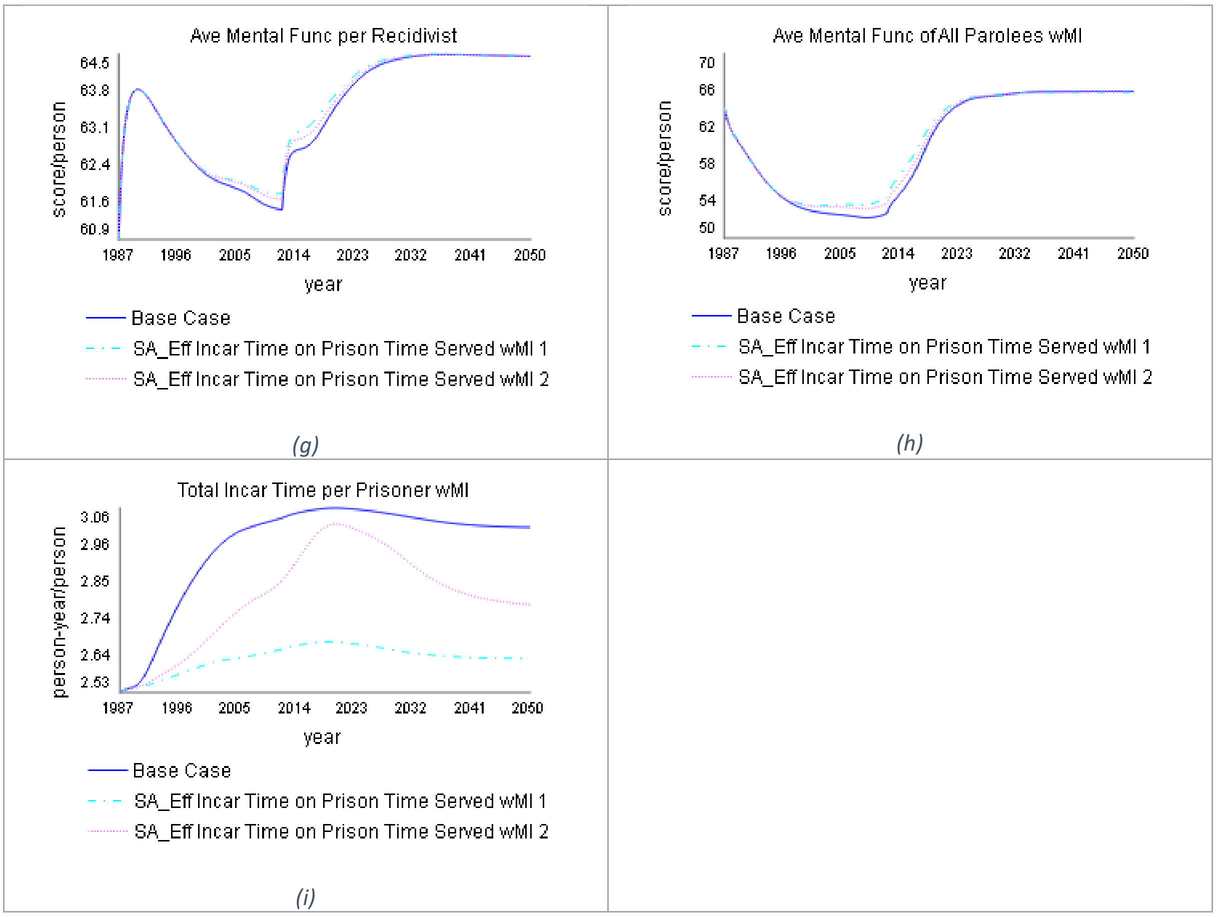
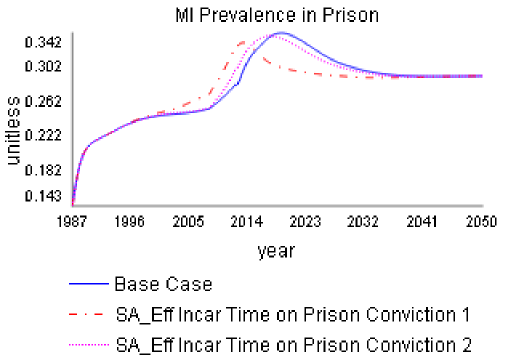


Figure 214 Comparison of Selected Results from Sensitivity Analysis Test 12 –Effect of Incarceration Time on Prison Time Served of Prisoners with Mental Illness

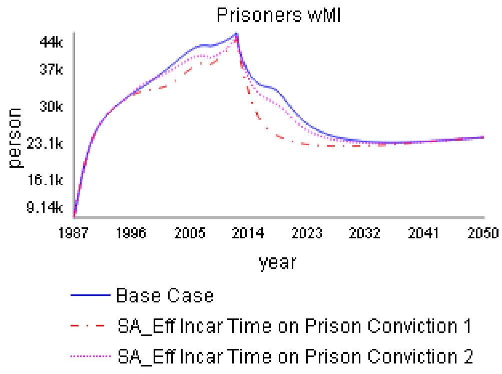
(a) – Mental Illness Prevalence in Prison; (b) Prisoners with Mental Illness; (c) Average Age per Prisoner with Mental Ilness; (d) Total Discrepancy in Mental Functions in Prison; (e) Average Mental Functions per Prisoner with Mental Illness; (f) Average Mental Functions per Prison Parolee with Mental Ilnness; (g) Average Mental Functions per Recidivist; (h) Average Mental Functions of All Parolees with Mental Illness; (i) Total Incarceration Time Served per Prisoner with Mental Illness

In Test 12, we learned that if the effect of previous incarceration time on the prison time served by prisoner wMI is delayed, MI prevalence in prison will be lower (Figure 214a) because there are fewer prisoners wMI (Figure 214b). The average age of prisoner wMI (Figure 214c) is lower because more of them are able to proceed to desistance at a faster rate rather than stay in the prison for longer sentences associated with reoffense. The need for MHC, or total discrepancy in mental functions in prison, is also lower (Figure 214d). As fewer prisoners staying behind bar longer with their mental functions deteriorate, the average mental functions of prisoners wMI and prison parolees wMI are also higher (Figure 214e and f). Consequently, the average mental functions of recidivists and all parolees wMI are also higher (Figure 214g). Apparently, the total incarceration time served by each released prisoner wMI is also much lower (Figure 214i).

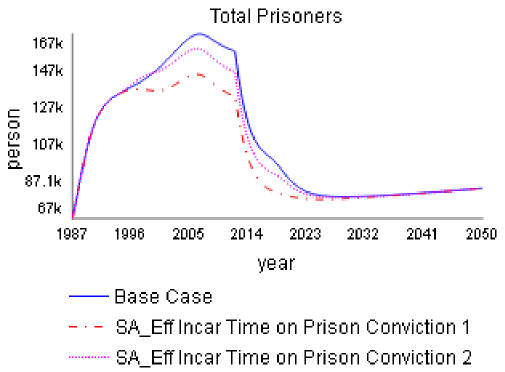
Selected Results from Sensitivity Test 13 – Effect of Incarceration Time on Prison Sentence Conviction



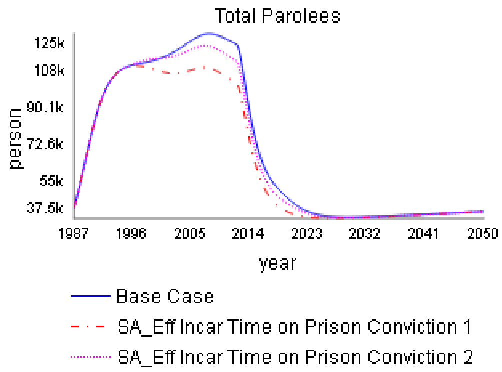
(a)



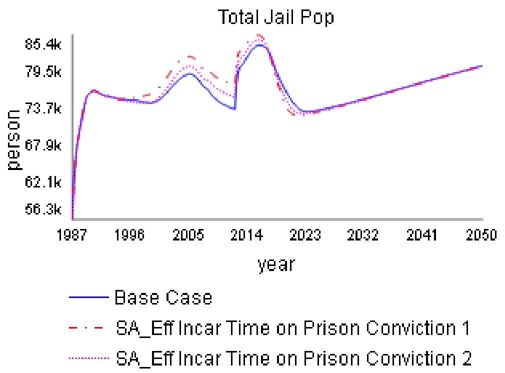
(b)



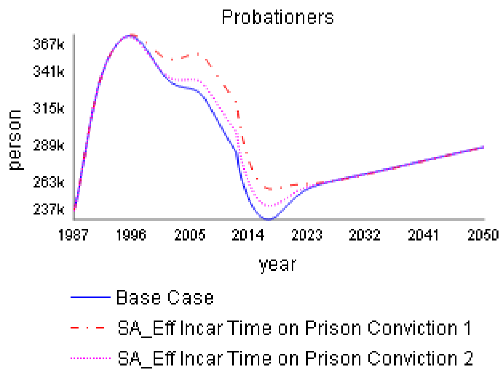
(c)



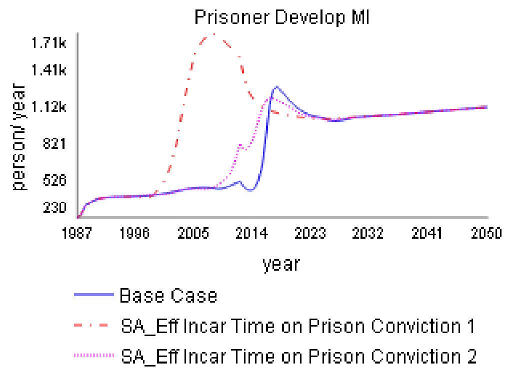
(d)



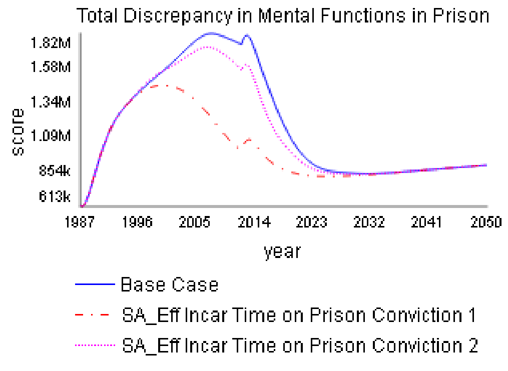
(e)



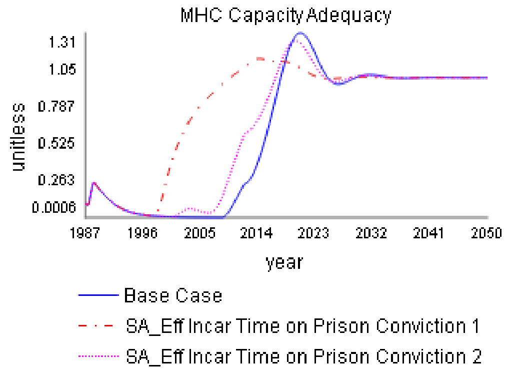
(f)


Prisoner Develop MI
person/ year
1.71k
1.41k
1.12k
821
526
230
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

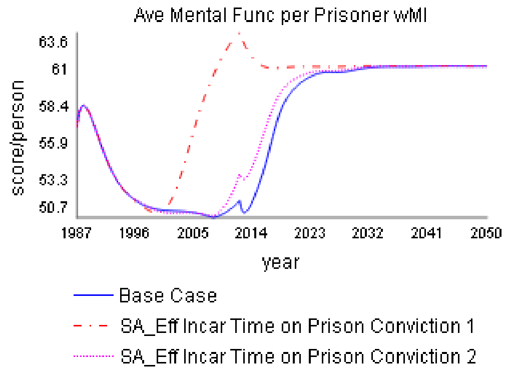
(g)


Total Discrepancy in Mental Functions in Prison
score
1.82M
1.58M
1.34M
1.09M
854k
613k
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

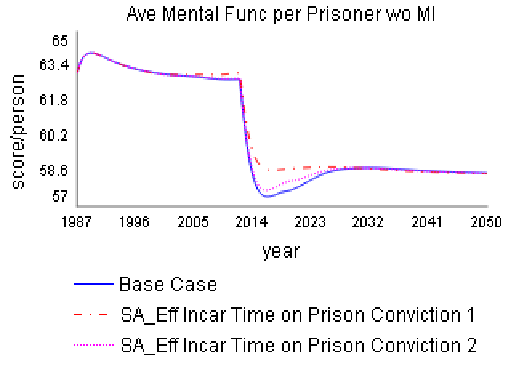
(h)


MHC Capacity Adequacy
unitless
1.31
1.05
0.787
0.525
0.263
0.0006
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

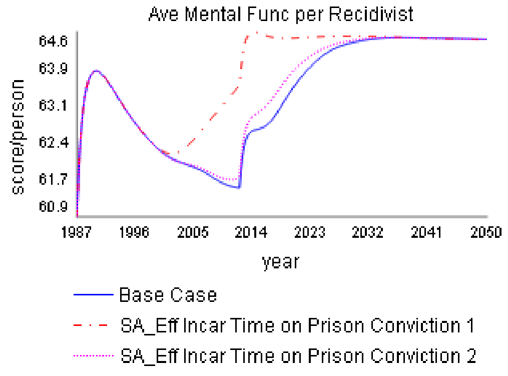
(i)


Ave Mental Func per Prisoner wMI
score/person
63.6
61
58.4
55.9
53.3
50.7
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

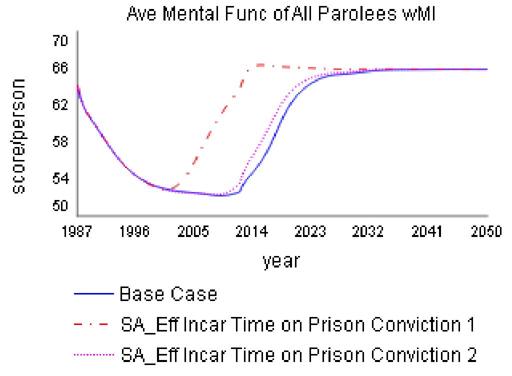
(j)


Ave Mental Func per Prisoner wo MI
score/person
65
63.4
61.8
60.2
58.6
57
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

(k)


Ave Mental Func per Recidivist
score/person
64.6
63.9
63.1
62.4
61.7
60.9
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

(l)


Ave Mental Func of All Parolees wMI
score/person
70
66
62
58
54
50
1987 1996 2005 2014 2023 2032 2041 2050
year
Base Case
SA_Eff Incar Time on Prison Conviction 1
SA_Eff Incar Time on Prison Conviction 2

(m)

Figure 215 Comparison of Selected Results from Sensitivity Analysis Test 12 –Effect of Incarceration Time on Prison Time Served of Prisoners with Mental Illness

(a) – Mental Illness Prevalence in Prison; (b) Prisoners with Mental Illness; (c) Total Prisoners; (d) Total Parolees; (e) Total Jail Population; (f) Probationers; (g) Prisoners Develop Mental Illness; (h) Total Discrepancy in Mental Functions in Prison; (i) Mental Health Care Adequacy; (j) Average Mental Functions per Prisoner with Mental Illness; (k) Average Mental Functions per Prisoner without Mental Illness; (l) Average Mental Functions per Recidivist; (m) Average Mental Functions of All Parolees with Mental Illness

When the effect of previous incarceration time served on prison conviction is delayed, the MI prevalence in prison peaks in the earlier stage (Figure 215a). This is due to the larger magnitude in the reduction of the population of prisoners wo MI compared to the reduction in the population of prisoners wMI (Figure 215b). The total prison population (Figure 215c) is lower and so is the populations of parolees (Figure 215d). However, the population of jail offenders and probationers are higher in this test (Figure 215e and f) because more of the ex-convicts are in the high-risk ex-convicts and low-risk ex-convicts stocks. When these individuals recidivate, their chances of receiving jail and probation sentences increase. As the MHC resources per capita increases, more prisoners wo MI who suffer from mental illness are diagnosed in the earlier stage (Figure 215g). Nevertheless, the total discrepancy in mental functions in prison, which characterizes the needs for MHC, is lower (Figure 215h). Thus, MHC adequacy also rises in the earlier stage and peaks slightly over 1 (Figure 215i). This implies that MHC capacity only exceeds the demand slightly as compared to the situation where the effect of previous incarceration time has a stronger effect on prison conviction. The average mental functions of prisoners wMI and prisoners wo MI are higher when the previous incarceration time has a delayed effect on prison conviction (Figure 215j and k). This benefit also spills over to the population of all recidivists and parolees wMI (Figure 215l and m).

Through these six sensitivity testing, we learned that by reducing the inflow of prisoners wMI, diagnosing and treating prisoners wMI earlier, preventing their mental functions from deteoriating coupled with reduced impact of Three-strikes law, and increasing community service capacities, ex-convicts wMI proceed to desistance faster. Although after the Realignment, each treatment capacity has its own capacity and resource planning process that prevents MHC from underfunded, minimizing the impact of Three-strikes law still lead ex-convicts to the shorter path to desistance.

5.3 Chapter Summary

This chapter presents data limitation for our study. Quantitative data and time series are mostly available in the criminal justice system. Even so, the data in the criminal justice system are collected by various authority and incomplete. Despite the lack of data in other sectors, we extract quantitative and qualitative data from public reports and literatures. To ensure that the lack of complete data does not affect model conclusions, comprehensive sensitivity testing and analysis are conducted. Sensitivity analysis results show that the overall model behavior does not change under the 15 sensitivity testings. Hence, we conclude that the uncertainties associated with the 15 parameters tested do not change the model behavior.

6 Policy Recommendation

The analysis in Chapter 4 and 5 show that the increasing number of mentally ill prisoners is caused by the structure of the system. We monitored five performance indicators from previous tests in Validation and Analysis (Chapter 4) and Data Limitation and Sensitivity Analysis (Chapter 5), and learned that under several conditions, these performance indicators show favorable behaviors. A performance indicator is *either a quantitative or a qualitative indicator that reveals the state or progress of an organization or individual* (Popova et al., 2010). An organizational-level *performance is evaluated by measuring the contribution and satisfaction of organizational process in achieving the organizational goal*. On the other hand, a population-level performance indicator *measures the state or progress of a system in achieving its system-wide goal*. The system-level performance indicator reflects the MI prevalence of the population in the the context of a coordinated system instead of the independent operation of specific actors, such as the prison, health care, or community sectors (U.S. Department of Housing and Urban Development, 2015). A system-level performance indicator provides a more complete picture of the state, progress, or policy impact (U.S. Department of Housing and Urban Development, 2014). Table 11 presents the five performance indicators used to design policy recommendation.

	Organizational-level	**System-level**
MI Prevalence in Prison	Evaluate the fraction of prisoners with mental illness	--
Mental Functions per Prisoner wMI	Evaluate the severity of mental illness among prisoners with mental illness	--
Mental Functions per Parolee wMI	Evaluate the severity of mental illness among prison parolees with mental illness	--
Community Service Utilization for Parolees wMI	Evaluate the utilization level of community services among parolees with mental illness	--
Fraction of Unrecovered Population wMI and Criminal History	--	Evaluate the fraction of population with mental illness and criminal history. The sub-population with criminal history includes individuals who are arrested, waiting for trials, in probation, jails, and prisons, released and still have a probability to reoffend. The fraction of population with mental illness and criminal history is the subset of the sub-population with criminal history.

Table 11 Five Performance Indicators Used to Establish Favorable Conditions as the Basis for Policy Recommendation

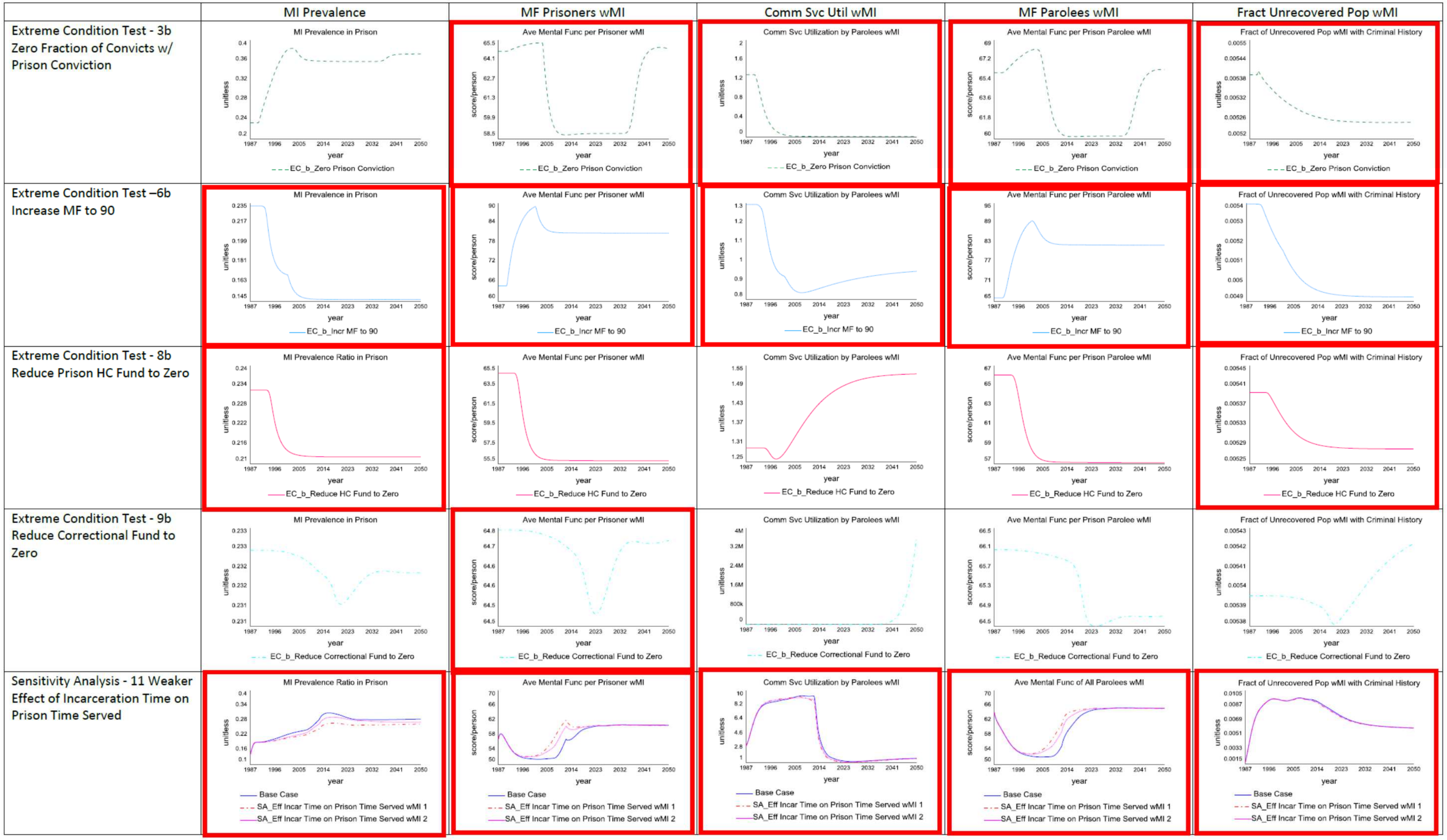


Figure 216 Selected Behaviors of the Five Performance Indicators Resulted from Various Tests

Note: Graphs with red frames highlight favorable behaviors.

The following conditions are established through distilling the test results with favorable behaviors in Figure 216:

- Fewer convicts receive prison sentence
- Admission of new prisoners with higher mental functions
- Sufficient prison health care fund
- Sufficient correctional fund to community services
- Weaker effect between incarceration time served on prison time served by prisoners wMI

When fewer convicts receive prison sentence (more receive jail or probation sentence), more health care resources are allocated to mental health care (MHC) in the prison. At the same time, mental health care resources per capita also increases. Due to a less crowded environment, the probability of developing of mental illness among prisoners without mental illness is lower. Hence, the community service utilization among parolees with mental illness decreases due to fewer prisoners with mental illness are released to parole. As the convicts with mental illness who receive sentences other than the prison sentence are not required to serve parole, they progress to desistance faster. Thus, the mental illness (MI) prevalence among individuals with criminal history (fraction of unrecovered population wMI and Criminal History) decreases. However, ex-convicts with mental illness (including parolees, high-risk prison ex-convicts, and low-risk prison ex-convicts) who reoffend tend to receive prison sentence when they are reconvicted. Therefore, the number of prisoners with mental illness increases faster than prisoners without mental illness. Despite the average mental functions of prisoners with mental illness (Ave Mental Func per Prisoner wMI) increases for a relatively short duration, the average mental functions of prisoners with mental illness drop and remain lower for a period. This is because that convicts with mental illness who receive jail or probabation sentence will receive prison conviction when they reoffend. More prisoners with mental illness will remain in the prison until the parolee discharge rate matches the inflow of new prisoners, which becomes zero in this test. Then, the average mental functions of prisoners and parolees increase. At this time, the fraction of prisoners without mental illness is lower than the fraction of prisoners with mental illness. Consequently, MI prevalence in prison remains high.

With the admission of new prisoners with higher mental functions, MI prevalence in prison decreases. The average mental functions of prisoners and parolees increases. Consequently, the utilization of community services among parolees with mental illness reduces. Due to lower recidivism among ex-convicts with mental illness, the MI prevalence among individuals with criminal history is lower because more of them proceed to desistance.

Sufficient prison health care fund and correctional fund to support mental health care in prison and community services for parolees with mental illness are crucial. The lack of prison mental health care leads to lower MI prevalence in prison because fewer prisoners are diagnosed and treated. Due to lower mental functions among prisoners, the community service utilization by parolees with mental illness increases considerably. When the community service capacity fails to keep up with the demand from the parolees, community service utilization level increases. This implies that the community service resources per capita is lower. Hence, the recidivism rate among ex-convicts with mental illness is higher than before. However, the recidivists with mental illness remained undiagnosed when they return to prisons. Consequently, more prisoners with mental illness remain in the prison even if they are unidentified. But the decline in the average mental functions of prisoners with mental illness implies that the need for mental health care in prison increases and so does the desired funding for mental health care. Despite the gradually decline average mental functions of prisoner with mental illness, when mental health care capacity in the prison catches up with the demand, average mental functions among prisoners with mental illness resumes increasing. Unfortunately, the average mental functions among parolees with mental illness declines and remains low as community service capacity for parolees with mental illness continues to diminish. Eventually, more ex-convicts recidivate and mental health care capacity in prison continues to escalate. The fraction of population with mental illness and criminal history continues to increase after community services obselete.

Lastly, the sensitivity analysis test shows that weaker effect of previous incarceration time served on the next sentence length served by prisoners with mental illness yields lower MI prevalence, higher average mental functions among prisoners and parolees with mental illness, lower community service utilization, and lower fraction of population with mental illness and criminial history. This implies that in the absence of the Three-strikes Law, all performance indicators reflect more the favorable outcomes.

So far, we have learned from various tests conducted in Chapter 4 and 5 that the Realignment policy will likely improve the system. More offenders will likely progress towards the state of desistance and the populations of prisoners, jail offenders, and the population of probabationers will likely reduce in the future. The adequacy of health care resources by prisoners and community services by parolees will likely increase as well. In this chaper, we aim to identify policy with marginal contribution to complement the Realignment policy to improve the system further. Thus, we recommend a policy that bundles the following four elements of structural change to the system:

1. An alternative confinement sentence
2. A more efficient community service capacity planning

3. An improvement in prison capacity planning
4. An improvement in jail capacity planning

The first change aims at separating the prisoners with severe mental illness (wSMI) from others in order to treat their MI and rehabilitate them while serving their sentences. The second structural change is a redesign of community service planning and resource allocation in order to provide adequate reentry services to parolees wMI. The main purpose of this policy is to reduce recidivism. The third and fourth change call for the inclusion of expected facility depreciation rates in prison and jail capacity planning. The inclusion of facility depreciation rates prevents persistent gaps between the available and required prison and jail capacities. With this approach to capacity planning, prison and jail utilization levels fall to reasonable levels (e.g. less overutilization). In the subsequent paragraphs, we document validation tests and analyses completed to assess the structural changes (policies) proposed and their impact on the dynamics of the system.

Note: In illustrating the recommended policy with stocks and flows, the structures in blue represent the pre-Realignment structures. Some pre-Realignment structure has been simplified. Green structures are the post-Realignment structures. The pink structures represents <u>our recommended policy</u> structures in the post-Realignment era.

6.1 Policy Element 1 - Alternative Confinement Sentence

Considering the complexity and resources required in handling individuals wMI and criminal history, we suggest that incoming prisoners wMI to be separated into two groups. The incoming prisoners wMI who possess higher mental functions above a certain threshold serve their sentence in a regular prison while those with *significant* lower mental functions below that threshold serve their sentence in an alternative facility. We define the prisoners who have higher mental functions above that threshold as “prisoners wMMI” (prisoners with mild or moderate mental illness) and prisoners with significantly lower mental functions below that threshold as “prisoners wSMI”. The severity of mental functions of prisoners is estimated with mental function diagnostic tools, such as the Global Assessment Functioning scale (see Appendix D). A score between 70 and 100 is considered an acceptable level of mental functions; a score between 51 and 60 is considered moderate; a score between 21 and 50 is considered serious or severe. Prisoners wSMI describes individuals with a score of 50 or less. Individuals with scores below 21 lack the ability to care for themselves and thus require inpatient services and close monitoring. Hence, these individuals are usually not imprisoned, but hospitalized.

The two main tasks of the alternative facility are to keep and rehabilitate prisoners wSMI. Prisoners wSMI receive appropriate MHC while serving their sentence. Targeted rehabilitative programs are specifically designed for this group of prisoners. The rehabilitative programs in regular prisons are targeted on regular or non-mentally ill prisoners. The main goals of these programs are to treat the mental illness of these prisoners until they recover to an acceptable level and then to facilitate their reentry into the society. Hence, the alternative facility is also tasked with the responsibility to oversee the reentry of the released prisoners. The sentence served in the alternative facility differs from a regular prison sentence in several ways. First, the duration for treatment and punishment is contingent upon the recovery of the prisoners. Second, rehabilitative programs are designed specifically for this group of prisoners. Third, the prisoners wSMI will only be fully discharged after they demonstrate the ability to live in the community independently. The "ability to live in the community independently" corresponds with the GAF score of close to 70 and above. When they are discharged, they become high-risk ex-convicts instead of parolees. In contrast to the parolees, who are newly released prisoners may require community supervision and community services, high-risk ex-convicts from the alternative facility are the individuals who used to have SMI, but have regained a certain level of mental functions and ability to lead normal social lives because community supervision (similar to parole) is part of the sentence and a condition for their release. Hence, they have lower risk in recidivism. Ideally, this punishment will not counted as a strike. Therefore, prisoners wSMI serving their sentence in the alternative facility will recover from MI and progress to desistance at a faster rate. Note that prisoners wMMI are required to serve several years of parole before becoming high-risk ex-convicts. Exempting prisoners wSMI in the alternative facility also prevents this group of ex-convicts from the Three-strike law reinforcing loop which may keep some individuals with criminal history from leaving the correctional system due to the strict criteria under this law.

On the other hand, prisoners wMMI serve regular prison sentence. Since the population of prisoners wMI is reduced due to the diversion of prisoners wSMI, the per capital MHC resources for prisoners wMMI increase. MHC resources available to be spent on diagnosing and preventing the onset of MI also increase. Altogether, with a reduction in prisoner density, the prisoners who develop MI will be diagnosed, treated, and have a higher probability to recover. Hence, a larger fraction of prisoners wMMI will successfully serve their parole and proceed to desistance.

The following sections explain the policy, i.e. the associated structure added to the full model. The structures with **pink** color denote this addition. The policy scenario runs from year **2018** to **2050**.

6.1.1 Prisoners with Severe Mental Illness in Alternative Facility (in Individuals with Criminal History Module)

This structure consists of a stock and four flows (Figure 216). The stock represents the prisoners wSMI who are serving their prison sentence in the alternative facility. The two inflows represent the incoming prisoners in custody or in community who suffer from severe MI being diverted to the alternative facility. The two outflows from this stock are release and deaths.

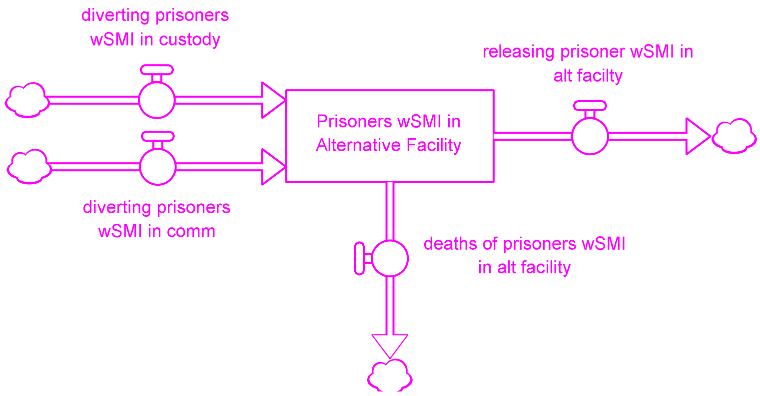


Figure 217 Stock and Flows of Prisoners with Severe Mental Illness in Alternative Facility

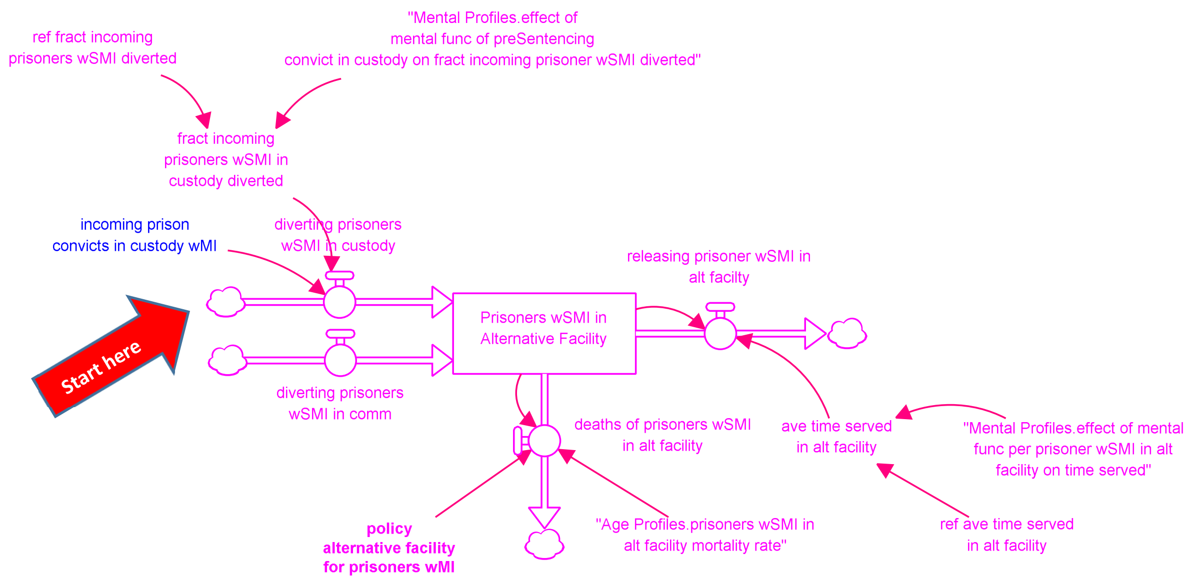


Figure 218 Full Stock-and-Flow Structure for Prisoners with Severe Mental Illness in Alternative Facility

Figure 217 shows the stock-and-flow structure with parameters characterizing Prisoners with Severe Mental Illness in an Alternative Facility. The inflows represent the fraction of incoming prison convicts in custody and in the community who are diagnosed with severe mental illness. As the formulation for incoming prison convicts in community wMI entering prison is similar to those prison convicts who are in custody, only the formulation for prison convicts in custody is shown. "Incoming prison convicts in custody wMI" is one of the inflows of offenders wMI who are in custody being convicted to prison sentence (another inflow of offenders wMI is "incoming prison convicts in comm wMI"). "fract incoming prisoners wSMI in custody diverted" is a product of "ref fract incoming prisoners wSMI diverted" and "effect of mental func of pre-Sentencing convict in custody on fract incoming prisoner wSMI diverted". "ref fract incoming prisoners wSMI diverted" is a constant and set to 0.05. This constant can be modified in a sensitivity analysis to determine its impact on the system. "effect of mental func of preSentencing convict in custody on fract incoming prisoner wSMI diverted" is represented by a table function from the **Mental Profiles** module to model the effect of the changes in mental functions of incoming prison convict on the fraction of prisoners wSMI being diverted. The rationale is that when the mental function of pre-sentencing convict in custody who receive prison sentence is higher than the initial condition, then the fraction of incoming prisoners wSMI also decreases. This effect is explained in Section 6.1.3.1.

Prisoners wSMI are released after an "ave time served in alt facility". This parameter is contingent upon the mental functions of the prisoners. "effect of mental func per prisoner wSMI in alt facility on time served" is a table function from the **Mental Profiles** module, which is explained in Section 6.1.3.2. "ref ave time served in alt facility" is a constant set to three years. This constant includes the prison time and community supervision duration by the alternative facility (under the responsibility of the alternative facility). "ave time served in alt facility" increases from three years when the average mental functions of prisoners wSMI is lower than the designated threshold. When the average mental functions of prisoners wSMI exceeds the designated threshold, "ave time served in alt facility" is slightly reduced. When prisoners wSMI leave, they move to the High Risk ExConvicts wMI stock through the outflow called "releasing prisoner wSMI in alt facility". A new inflow to the High Risk Exconvicts wMI stock named "prisoners wSMI fr alt facility being released" is also added to the High Risk ExConvicts wMI stock in the **Individuals with Criminal History** module (the module that consists of the fundamental stocks and flows of the model). "prisoners wSMI fr alt facility being released" is the co-flow of "releasing prisoner wSMI in alt facility". The second outflow from the Prisoners with Severe Mental Illness in Alternative Facility stock is deaths. The endogenous mortality rate for prisoners wSMI in alternative facility is formulated in the **Age Profiles** module (Section 3.2.3.3).

Diverting prisoners wMI is not a completely novice idea. In recent years, other states have recognized the limitation of regular courts in dealing with non-violent offenders wMI. A growing number of states have established mental health courts and mental health diversion programs to convict non-violent offenders wMI if the crime commitments stem from their mental illness (Administrative Office of the

Courts, 2012). California had more than 30 mental health court in 2012. Mental health courts review cases based on a collaborative principle that combines judicial supervision with intensive social and treatment services to non-violent mentally ill offenders in lieu of jail or prison confinement. Right after arrests take place, offenders are screened for the eligibility to be trialed at mental health court. Although some argue that preventive public mental health system is more effective in deterring people from entering the corrections, mental health courts feature an alternative judiciary process to address crimes that have already been committed based on the mental health status of the offenders instead of their violent behavior (Administrative Office of the Courts, 2012). Once convicts wMI under mental health courts fulfill court-monitored treatment, their charges will be dismissed or reduced.

However, our proposed diversion policy differs slightly from the existing mental health courts and mental health diversion programs in three ways. Our policy recommendation presents a higher-level concept rather than the operational level details.

1. At this time of our study, we suggest the eligibility of prison convicts for serving sentence in the alternative facility to be solely based on their mental functions.
2. Our proposed diversion policy includes the in-house mental health care (MHC) and rehabilitation program provision instead of relying on local partners because the variation in local influences and environmental factors limit the effectiveness of mental health courts and the mental health diversion program (Administrative Office of the Courts, 2012).
3. We recommend the charges on the convicts wMI to be reduced instead of dismissed. The reduction is reflected in the dynamically changing time served in the alternative facility as the time served in an alternative facility depends on the recovery of these convicts. When MHC in an alternative facility manages to improve mental functions of the convicts effectively, the average time these convicts spent in the alternative facility reduces.

6.1.2 Age Coflow for Prisoners with Severe Mental Illness in Alternative Facility (in Age Profiles Module)

The formulation of the age coflow structure for prisoners wSMI is similar to the fundamental structure in the previous section except that the age coflow has an additional inflow that increases the age of prisoners wSMI (Figure 219).

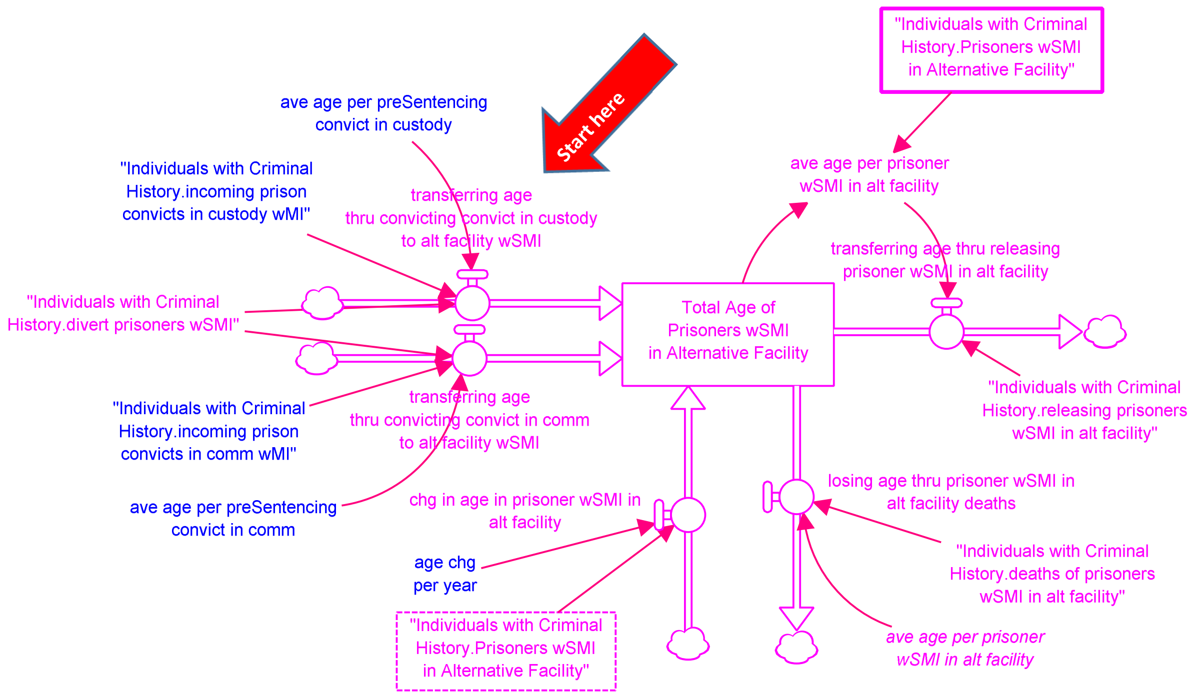


Figure 219 Age Coflow Structure for Prisoners with Severe Mental Illness in Alternative Facility

In this structure, the inflows consist of the total age of incoming prisoners wSMI who are in custody and those in the community. The average age per pre-sentencing convict in custody and community differ slightly because convicts in community tend to be offenders with less serious offense who have not accumulated long incarceration year served. Another inflow characterizes the aging process of prisoners wSMI. "age chg per year" is defined as one year per year per person. All the prisoners wSMI in the alternative facility gain one year of age per person annually. Hence, the inflow "chg in age in prisoner wSMI in alt facility" is the aggregate years gained for all prisoners wSMI.

Similar to the fundamental stock, the two outflows are release and deaths. When the prisoners wSMI leave or die, the average age per prisoner wSMI who leave or die flows out from the stock along with him or her. "ave age per prisoner wSMI in alt facility" is the ratio of the Total Age of Prisoners wSMI in Alternative Facility stock to the Prisoners wSMI in Alternative Facility stock.

6.1.3 Mental Functions Coflow for Prisoners with Severe Mental Illness in Alternative Facility (in Mental Profiles Module)

The mental profiles of prisoners wSMI is modeled as coflow to the fundamental stock. Figure 220 presents the inflows to the stock of Mental Functions of Prisoners wSMI in Alternative Facility. As the formulation for the inflow of mental functions of prisoners wSMI from the community is similar to the inflow of mental functions of prisoners wSMI in custody, only the inflow of mental functions of prisoners wSMI in custody are presented and explained.

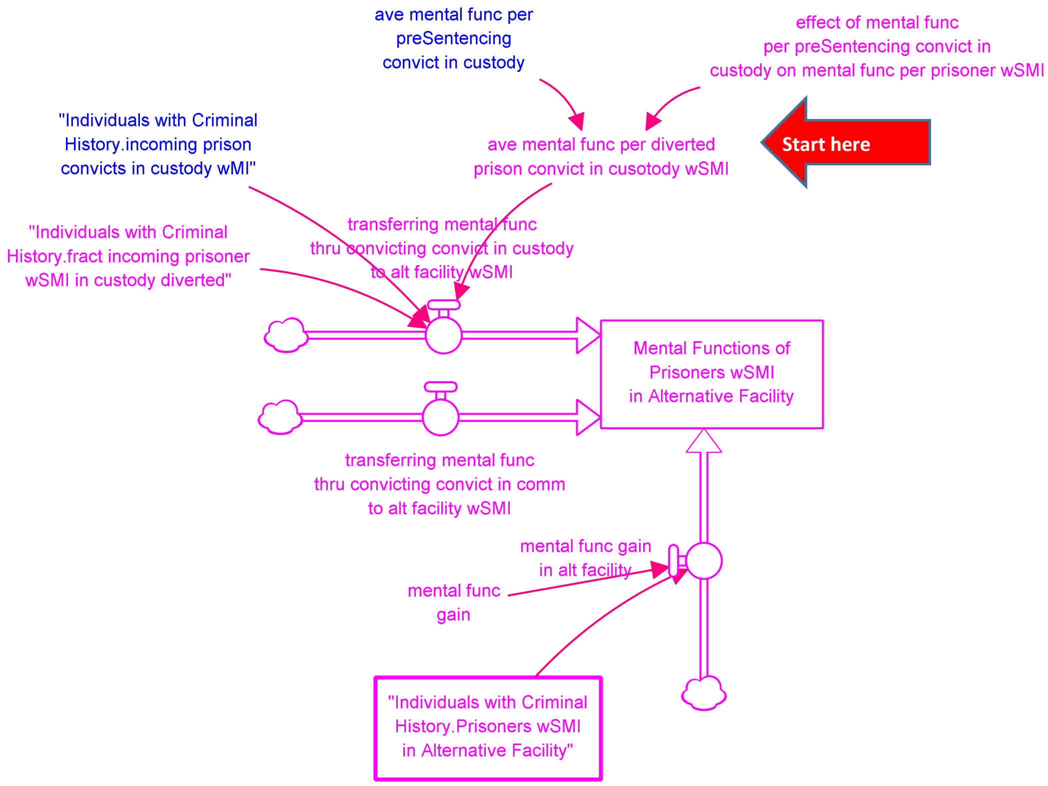


Figure 220 Inflows of the Coflow Structure for Mental Functions of Prisoners with Severe Mental Illness in Alternative Facility

The two inflows on the left represent the total mental functions that prisoners wSMI in custody and community bring into the alternative facility. The prisoners wSMI enter the alternative facility with lower average mental functions than the prisoners wMMI who enter the prisons. To model this difference, “ave mental func per diverted prison convict in custody wSMI” is modeled as a product of “ave mental func per preSentencing convict in custody” and “effect of relative mental func per preSentencing convict in custody on mental func per prisoner wSMI”. “relative mental func per preSentencing convict in custody”, which is the mental functions per pre-sentencing convict in custody relative to the initial value, has a positive relationship with the average mental functions per diverted prisoner wSMI. This relationship is represented in a table function explained in Section 6.1.3.3. The lower the average mental functions per pre-sentencing convict in custody compared to the initial value, the lower the “ave mental func per diverted prison convict in custody wSMI”. The inflow of mental functions is also affected by the number of prisoners wSMI being diverted to the alternative facility. The third inflow characterizes the effectiveness of mental health care in the alternative facility. “mental func gain” is set as a constant with two scores per person per year. The inflow aggregates all the mental functions gained in the alternative facility. As the effectiveness of MHC falls outside the boundary of this model, this formulation assumes that MHC in the alternative facility is effective in helping prisoners wSMI regain mental functions. This formulation is *different* from the “prisoner mental func reduction wMI” outflow from the Mental Functions of Prisoners wMI stock. Due to resource constraint in prison, the main objective of prison MHC is to prevent prisoners’ mental functions from further deterioration or to maintain an acceptable level of mental functions until they are discharged rather than aim at full recovery. The MHC in an alternative facility aims at helping prisoners wSMI regain mental functions sufficient for them to reintegrate to the society. Hence, prisoners wSMI will gain mental functions.

Figure 221 presents the two outflows from the Mental Functions of Prisoners wSMI in Alternative Facility stock: the mental functions of prisoners wSMI being transferred out when they are fully released or through deaths.

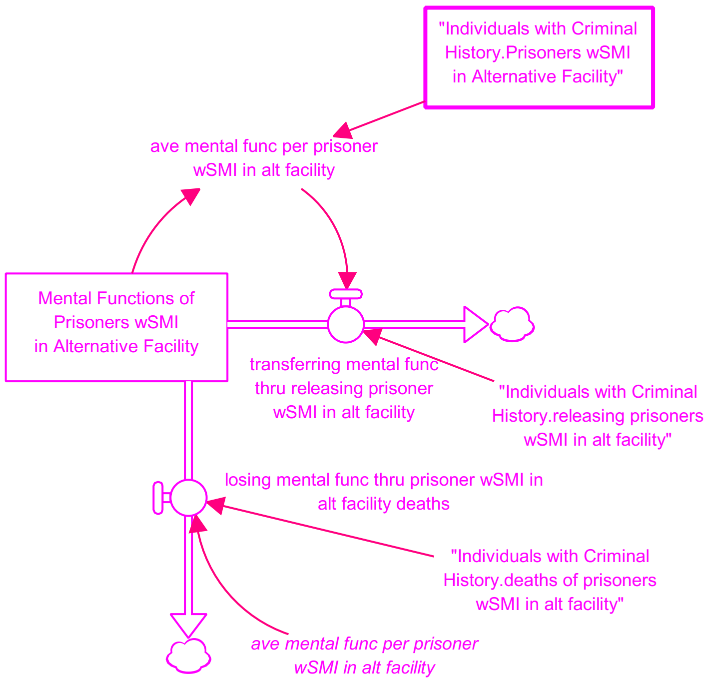


Figure 221 Outflows of the Coflow Structure for Mental Functions of Prisoners with Severe Mental Illness in Alternative Facility

The average mental functions per prisoner wSMI being transferred out is a ratio between levels of the stocks of Mental Functions of Prisoners wSMI in Alternative Facility to Prisoners wSMI in Alternative Facility, respectively.

Then, the average mental functions per prisoner wSMI in the alternative facility compares to the desired level of mental functions per prisoner wSM to determine the average time served in the alternative facility (Figure 222). "relative mental func per prisoner wSMI in alt facility" represents the ratio of the actual average mental function per prisoner wSMI to the desired level of mental functions per prisoner wSMI. The effect of this ratio on time served in the alternative facility is represented in a table function explained in 6.1.3.2. "relative mental func per prisoner wSMI in alt facility" has an inverse relationship with time served in the alternative facility. The smaller the relative mental function per prisoner wSMI, i.e. the lower the average mental function per prisoner wSMI compared to the desired mental functions per prisoner wSMI, the longer the time served in alternative facility. When the average mental functions per prisoner wSMI reaches the desired level, the time served in alternative facility equals to the "ref ave time served in alt facility", which is set to three years.

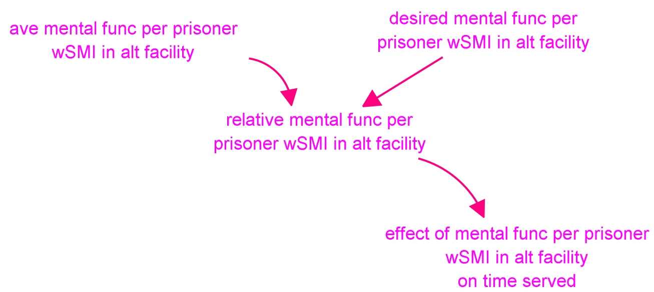


Figure 222 Formulation of the Relative Mental Function per Prisoner with Severe Mental Illness in the Alternative Facility

6.1.3.1 The Effect of Mental Functions of Pre-Sentencing Convicts on Fraction of Incoming Prisoners with Severe Mental Illness Diverted

This section explains the effect of the mental functions of pre-sentencing convicts on the fraction of incoming prisoners wSMI to be diverted to an alternative facility. This relationship is formulated with a table function shown in Figure 223. The effect of the mental functions of pre-sentencing convicts in in the community is similar to that of the convicts in the custody.

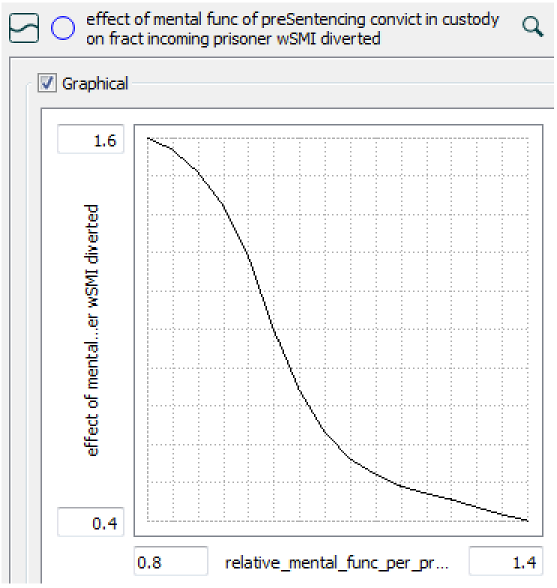


Figure 223 Effect of Mental Functions of Pre-Sentencing Convicts in Custody on Fraction of Incoming Prisoners with Severe Mental Illness Diverted

The input to the horizontal axis is the mental functions per pre-sentencing convict in custody relative to the initial mental functions per pre-sentencing convict in custody. When the relative mental functions of pre-sentencing convict remains unchanged, i.e. one, the fraction of prisoners wSMI being diverted equals the "ref fract incoming prisoners wSMI diverted". As the relative mental functions of pre-sentencing convict grows above one, the fraction of prisoners wSMI diverted decreases under the assumption that fewer numbers of prisoners wSMI are convicted. Hence, the fraction of incoming prisoners wSMI is lower than "ref fract incoming prisoners wSMI diverted". On the contrary, when the relative mental functions of pre-sentencing convict drops below one, that means the average mental functions per pre-sentencing convict is lower than the initial condition. Then, the fraction of incoming prisoners wSMI increases. The horizontal axis ranges between 0.8 and 1.4 (Figure 224). 0.8 is the division of 52 score per person by 65 score per person. As mentioned in Section 6.1.1, the threshold for severe mental illness diagnosis is 50 scores out of a total of 100. The initial mental functions per pre-sentencing convicts is about 65. Hence, 0.8 is the minimum value to the horizontal axis. When the average mental functions per pre-sentencing convict rises until 70, which is defined as an acceptable level of mental function for a normal individual, dividing 70 by 65 yields 1.08. When the relative mental functions of pre-sentencing convicts is 1.08, the fraction of incoming prisoners wSMI being diverted equals to “ref fract incoming prisoners wSMI diverted”. If the average mental functions per pre-sentencing convict grows to 90, the relative mental function per pre-sentencing convict reaches 1.4. Then, the fraction of prisoners wSMI being diverted is expected to be half of “ref fract incoming prisoners wSMI diverted”. The graph (Figure 223) is nonlinear because it is expected that when the mental functions of pre-sentencing convicts is lower than the initial condition, the fraction of incoming prisoners wSMI is larger; when the mental functions of pre-sentencing convicts are higher than the initial condition, the fraction of incoming prisoners wSMI reduces moderately. To begin with, prisoners wMI suffer from lower mental functions. The likelihood of this population having SMI is higher than the population at large. Therefore, it is more probable that the degrading of mental functions of pre-sentencing convicts implies a higher fraction of prisoners wSMI than otherwise.

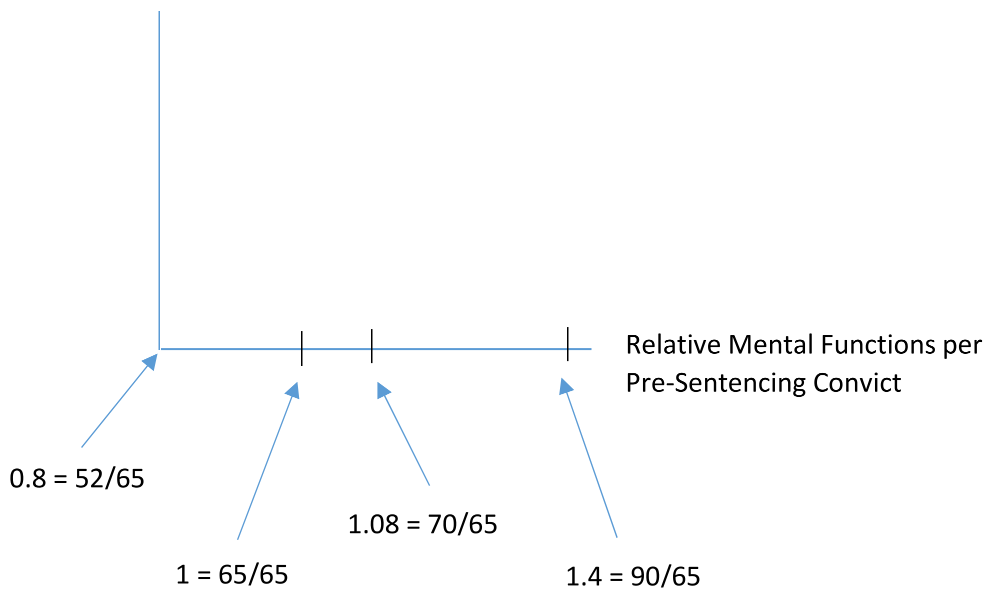


Figure 224 Explanation for the Horizontal Axis of the Effect of Mental Functions of Pre-sentencing Convict in Custody on Fraction Incoming Prisoners wSMI Diverted Table Function

6.1.3.2 *The Effect of Mental Functions per Prisoner with Severe Mental Functions on Time Served in Alternative Facility*

This section presents the nonlinear effect of mental functions of prisoners wSMI on the time they serve. As the purpose of an alternative facility is to ensure prisoners serve their sentence as well as to rehabilitate the prisoners, the duration of their incarceration depends on the mental health state of the prisoners' and prospect of living normal social lives after release.

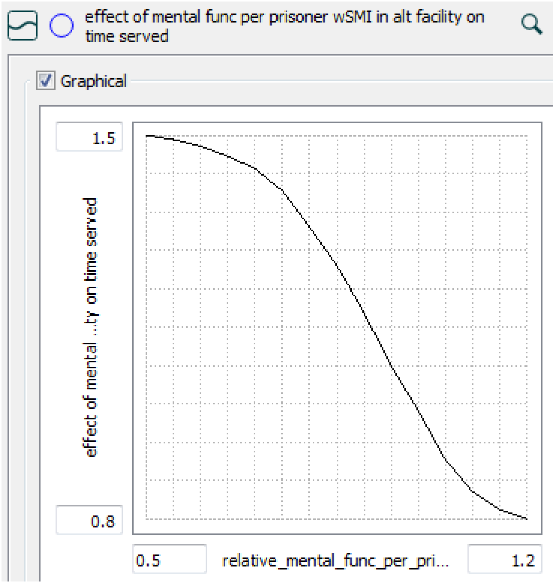


Figure 225 Effect of Mental Functions per Prisoner with Severe Mental Illness in Alternative Facility on Time Served

The effect of mental functions per prisoner wSMI on the time they served, including punishment, mental health treatment, and community supervision, is formulated in the table function in Figure 225. The horizontal axis reflects the input from "relative mental func per prisoner wSMI in alt facility". This is a ratio of the average mental functions per prisoner wSMI to the desired mental functions per prisoner wSMI. The horizontal axis ranges between 0.5 and 1.2. When the average mental functions per prisoner wSMI falls below the 35 score, which is the threshold for hospitalization, the relative mental functions per prisoner wSMI falls to 0.5. Then, the average time served in an alternative facility increases by 1.5 times. When the ratio equals to one, i.e. when the average mental functions per prisoner wSMI reaches the desired level, then the time served equals the "ref ave time served in alt facility". If the ratio falls below one, meaning that the average mental functions per prisoner wSMI is lower than the desired level, the average time served per prisoner wSMI is longer than the "ref ave time served in alt facility". If, on the contrary, the average mental functions per prisoner wSMI exceeds the desired level, the average time served is shorter than the "ref ave time served in alt facility".

6.1.3.3 The Effect of Relative Mental Functions per Pre-Sentencing Convict on Mental Functions per Incoming Prisoner with Severe Mental Illness

This effect captures the dynamics between the changes in the mental functions of pre-sentencing convicts and the mental functions of incoming prisoners wSMI. As the criteria for prisoners wSMI serving their sentence in an alternative facility is primarily based on their mental health state, the average mental functions that each of them brings along at least meets the threshold for severe MI diagnosis, which is 50 scores per person, or lower. The following table function is used to capture this relationship.

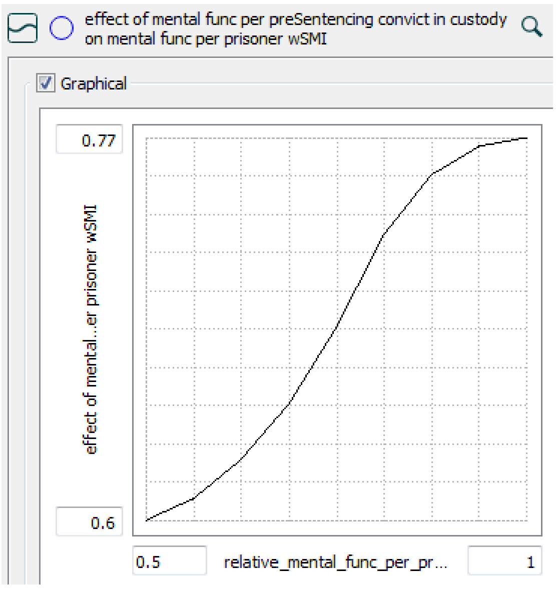


Figure 226 Effect of Mental Functions per Pre-Sentencing Convict in Custody on Mental Functions per Incoming Prisoners with Severe Mental Illness

Figure 226 illustrates that when the mental functions per pre-sentencing convict is lower than the initial condition, i.e. when the relative mental function per pre-sentencing convict in custody is lower than one, the mental functions per prisoners wSMI will be lower than the average mental functions per pre-sentencing convict. The average mental functions per pre-sentencing convict is a score of about 65 per person. When the average mental functions per pre-sentencing convict drops by 50%, the average mental function per incoming prisoner wSMI will be 40% lower than the average mental functions per pre-sentencing convict. When the average mental functions equals to the initial value, the average mental functions of incoming prisoner wSMI will be 77% of the average mental functions per pre-sentencing convicts. 77% of 65 scores equals to 50 scores, which is the cutoff point for the SMI diagnosis.

When prisoners wSMI leave the alternative facility, they bring the average mental functions per prisoner wSMI to the Mental Functions of High Risk ExConvicts wMI stock.

6.1.3.4 The Effect of Mental Functions per Pre-Sentencing Convict on Average Mental Functions per Prisoner with Moderate Mental Illness

This effect shows the positive relationship between the fraction of incoming prisoners wSMI being diverted and the mental functions of incoming prisoners wMMI. As prisoners with SMI, who have an average mental functions of 50 scores or lower, being directed away from prison, the remaining incoming prisoners who only experience moderate or mild MI will have an average score higher than the average mental functions per pre-sentencing convict wMI. This relationship is formulated in the table function in Figure 227.

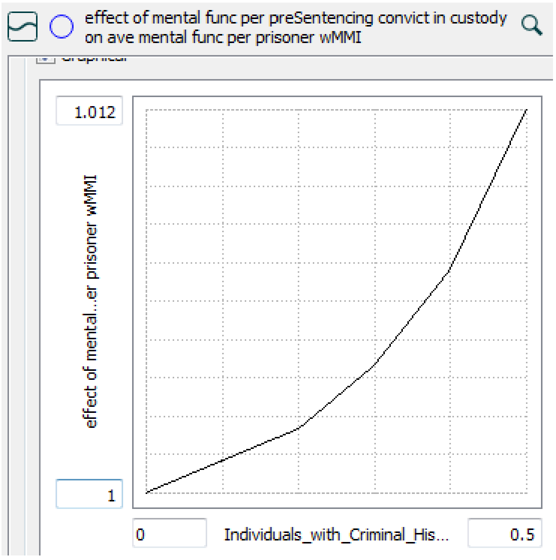


Figure 227 Effect of Mental Functions per Pre-sentencing Convict in Custody on Average Mental Functions per Prisoners with Moderate Mental Illness

The input to the horizontal axis is the fraction of incoming prisoners wSMI in custody being diverted, which ranges between zero and 0.5. When the fraction of incoming prisoners wSMI diverted equals to zero, the average mental functions per prisoner wMMI is one. This means the average mental function per prisoner wMMI equals to the average mental functions per pre-sentencing convict wMI. When the fraction of incoming prisoners wSMI diverted grows to 0.5, which means half of the incoming prisoners are severely mentally ill, the remaining incoming prisoners who only suffer from moderate or mild MI will have average mental functions higher than the average of pre-sentencing convicts.

6.1.4 Incarceration Year Served Coflow for Prisoners with Severe Mental Illness in Alternative Facility

The incarceration years served coflow is similar to the coflow for prisoners wMI in Section 3.2.9. Figure 228 presents the bare stock-and-flow structure for incarceration time served for prisoners wSMI in the alternative facility.

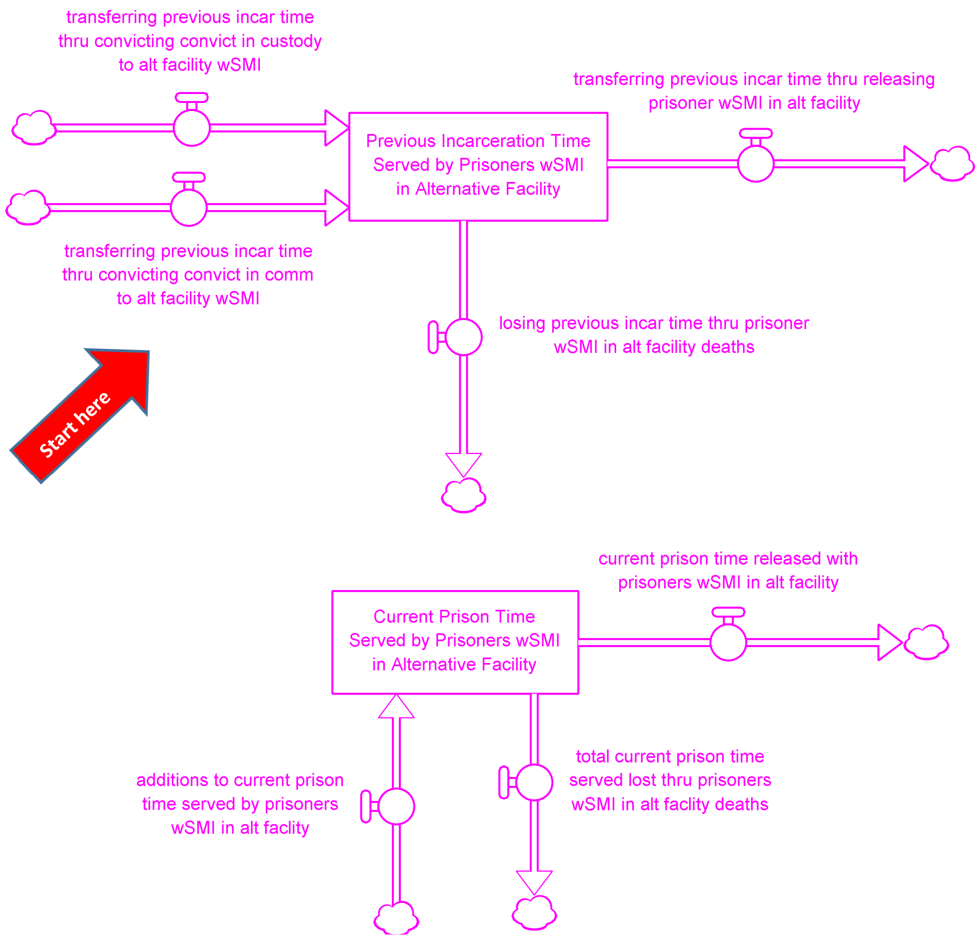


Figure 228 Simplified Coflow Structure of Incarceration Year Served for Prisoners with Severe Mental Illness in Alternative Facility

The incarceration years served is divided into the stocks of Previous Incarceration Time Served by Prisoners wSMI in Alternative Facility and Current Prison Time Served by Prisoners wSMI in Alternative Facility stocks. The inflows to the Previous Incarceration Time Served stock are the average previous time served per pre-sentencing convict in custody and in community the prisoners wSMI bring along when the recidivists are admitted to the alternative facility. Assuming that the distribution of average previous incarceration year served for prisoners wSMI and wMMI is the same, the average incarceration year served that is brought into the Previous Incarceration Time Served by Prisoners wSMI stock is the same as that is brought into the prisoners wMI stock.

The inflow to the Current Prison Time Served by Prisoners wSMI in Alternative Facility stock is the total annual years gained by all prisoners wSMI in the alternative facility. When prisoners wSMI leave the alternative facility, they bring the total incarceration time per prisoner wSMI with them. The total incarceration time per prisoner wSMI combines the previous and current incarceration time. The total incarceration time of prisoners wSMI who leave the alternative facility flows into the Total Incarceration Time Served by Hi Risk Prison ExConv wMI stock. The other outflows from the stocks of Previous Incarceration Time Served by Prisoners wSMI in Alternative Facility and Current Prison Time Served by Prisoners wSMI in Alternative Facility are deaths. When prisoners wSMI die, the average previous incarceration time per prisoner wSMI and average current time served per prisoner wSMI flow out from both stocks.

6.1.5 Social Capital Coflow for Prisoners with Severe Mental Illness in Alternative Facility

This section presents the social capital (SC) coflow structure for prisoners wSMI in alternative facility. As its structure is similar to that for prisoners wMI in Section 3.2.11, only the bare stock-and-flow structure is presented, followed by a brief explanation.

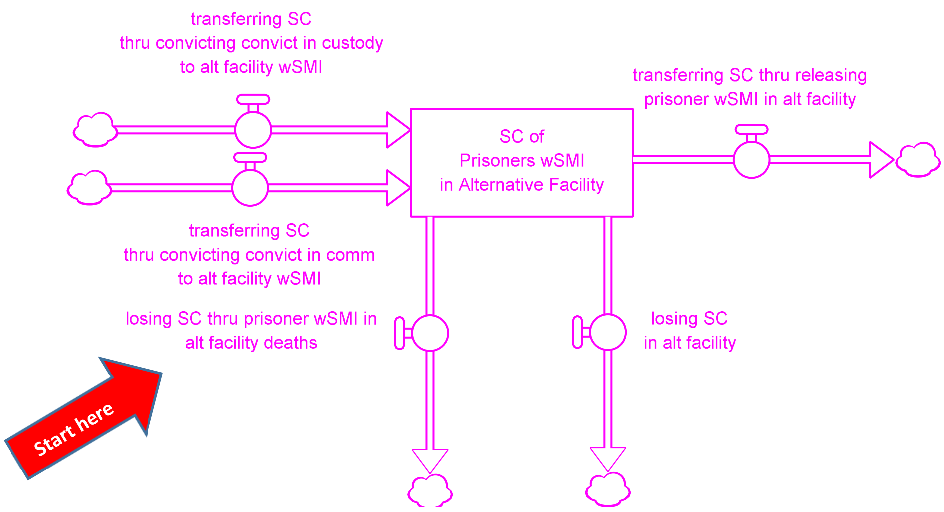


Figure 229 Simplified Stock-and-Flow Structure for the Social Capital Coflow for Prisoners with Severe Mental Illness in Alternative Facility

The two inflows to the SC of Prisoners wSMI in Alternative Facility stock are the transfers of SC of prisoners wSMI in custody and in the community when they are admitted to the alternative facility (Figure 229). Assuming that the distribution of SC is the same for prisoners wSMI and prisoners wMMI, the average SC that prisoners wSMI bring to the altnerative facility is same as the average SC prisoners wMMI bring to the prison. The average SC per prisoner wSMI in custody diverted equals the average SC per pre-sentencing convict in custody; the average SC per prisoner wSMI in the community diverted equals to the average SC per pre-sentencing convict in community.

The three outflows from the stocks are release, deaths, and loss of SC. The release and deaths outflows are similar to those outflows from the SC of Prisoners wMI stock. When prisoners wSMI are released, the average SC per prisoner wSMI is transferred to the SC Hi Risk Prison ExConv wMI stock. However, the "losing SC in alt facility" *differs* from that of the SC of Prisoners wMI stock. As one of the objectives of the alternative facility is to rehabilitate prisoners wSMI to facilitate their reentry, the rehabilitative programs in the alternative facility also help prisoners wSMI to regain some social networks. Hence, their SC loss is less than those in prison. Therefore, the annual SC loss per prisoner wSMI in alternative is set to 1.5 scores per person per year instead of two scores per person per year in the prison. Each year, the total SC loss, which is a product of the number of prisoners wSMI and average SC per prisoner wSMI, flows out from the stock.

To summarize, Section 6.1 presents the recommended policy structure to divert prisoners wSMI to an alternative facility with the goals to hold and rehabilitate these prisoners. These policy structures includes the fundamental stock and the coflows to track the attributes of prisoners wSMI.

6.2 Policy Element 2 - Correctional Fund to Community Services with a Feedback Structure

Community services are essential in facilitating the reentry of parolees. At the county level, local governments and the California Department of Corrections and Rehabilitation (CDCR) do not share information about the soon-to-be released prisoners. Consequently, the county governments lack the information required to undertake community service planning. Additionally, community services have long been underfunded. Without proper funds, information, and a capacity planning approach, it is difficult for the county governments to assess the needs for community services. The traditional fund adjustment approach is based on projected county population growth. Every year, the correctional fund for community services is growing at the rate similar to the county population growth. In this policy, we recommend adding a feedback structure to determine the needs and resources for community services. As the recommended structure for parolees wMI is similar with parolees wo MI, only the policy structure for parolees wMI will be illustrated.

First, we explain the policy structure for community service capacity planning. Then, we explain the policy structure for the budget adjustment process.

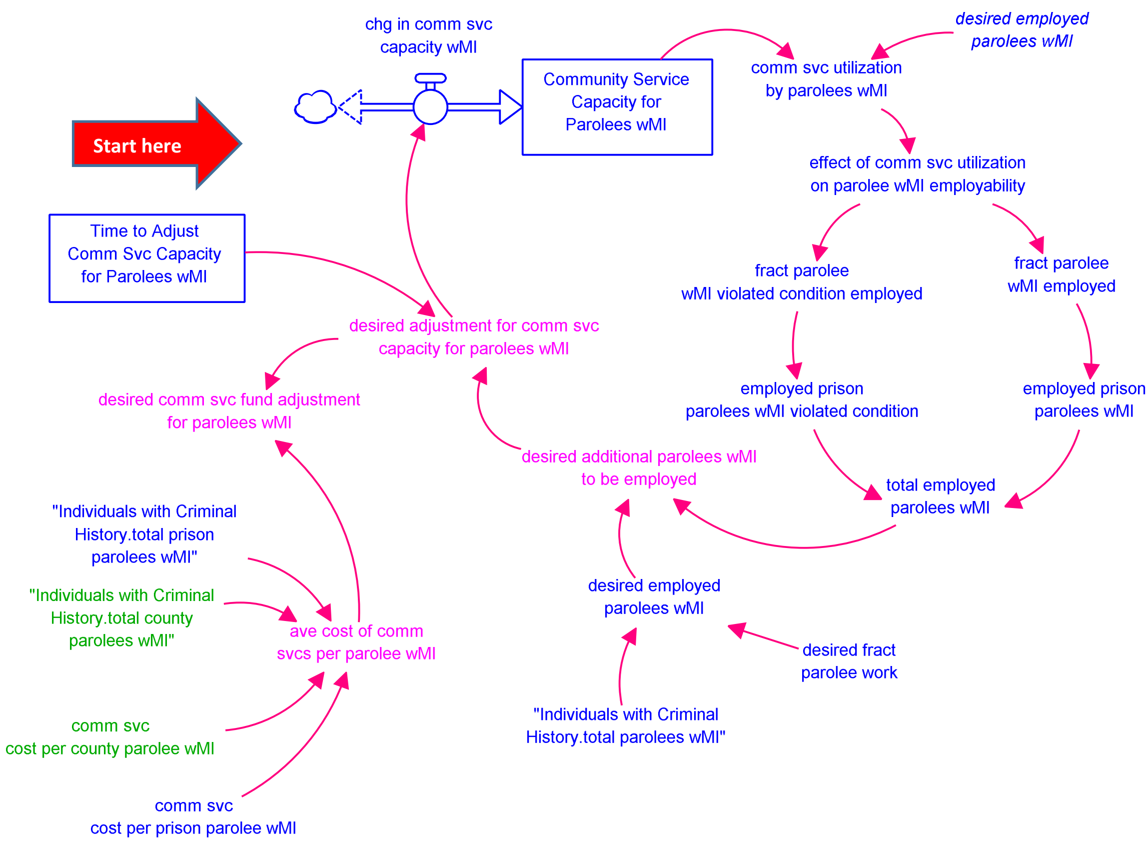


Figure 230 Policy Structure for Community Service Capacity for Parolees with Mental Illness

Note: Structures in blue represents the pre-Realignment structure. Some pre-Realignment structure has been simplified. Pink represents the policy structure while green denotes the structure associated with the Realignment policy.

The Community Service Capacity for Parolees wMI stock and flow structure has a bi-flow (Figure 230). Capacity increases or decreases by way of the bi-flow. Community service utilization is a ratio of the actual community service capacity to the desired number of employed parolees wMI. The goal of the actual community service capacity is provide sufficient services to ensure that the parolees are being employed. “desired additional parolees wMI to be employed” represents the additional number of parolees wMI needed to be employed in order to reach the desired employment level among parolees wMI (“desired fract parolee work”), which is 0.6. The additional number of parolees wMI to be employed is the difference between the desired number of parolees wMI being employed (“desired employed parolees wMI”) and number of parolees wMI who are currently employed (“total employed parolees wMI”). The desired number of parolees being employed is 60% of the all the parolees wMI. Community service utilization affects the employability of parolees positively, whether they have violated condition or not. Then, the “desired adjustment for comm svc capacity for parolees wMI” over the capacity adjustment time (Figure 230) becomes one of the inputs to the bi-flow of “chg in comm svc capacity wMI” to adjust the Community Service Capacity for Parolees wMI stock. Another input to the bi-flow will be explained in the next section.

At the same time, “adjustment for comm svc capacity for parolees wMI” also serves as one of the inputs to determine the desired fund adjustment for community service capacity for parolees wMI (Figure 230). Factoring in the average cost of community services per parolee wMI, “desired comm svc fund adjustment for parolees wMI” emerges. “desired comm svc fund adjustment for parolees wMI” represents the adjustment to the Correctional Fund for Community Services stock. The average cost of community services per parolee wMI is the average of community service costs for prison parolees wMI and county parolees wMI. The desired community service fund adjustment for parolees wMI and the desired community service fund adjustment for parolees wo MI form “total desired correctional comm svc fund adjustment”, which is the input to the bi-flow that changes the correctional fund allocated to community services (Figure 231).

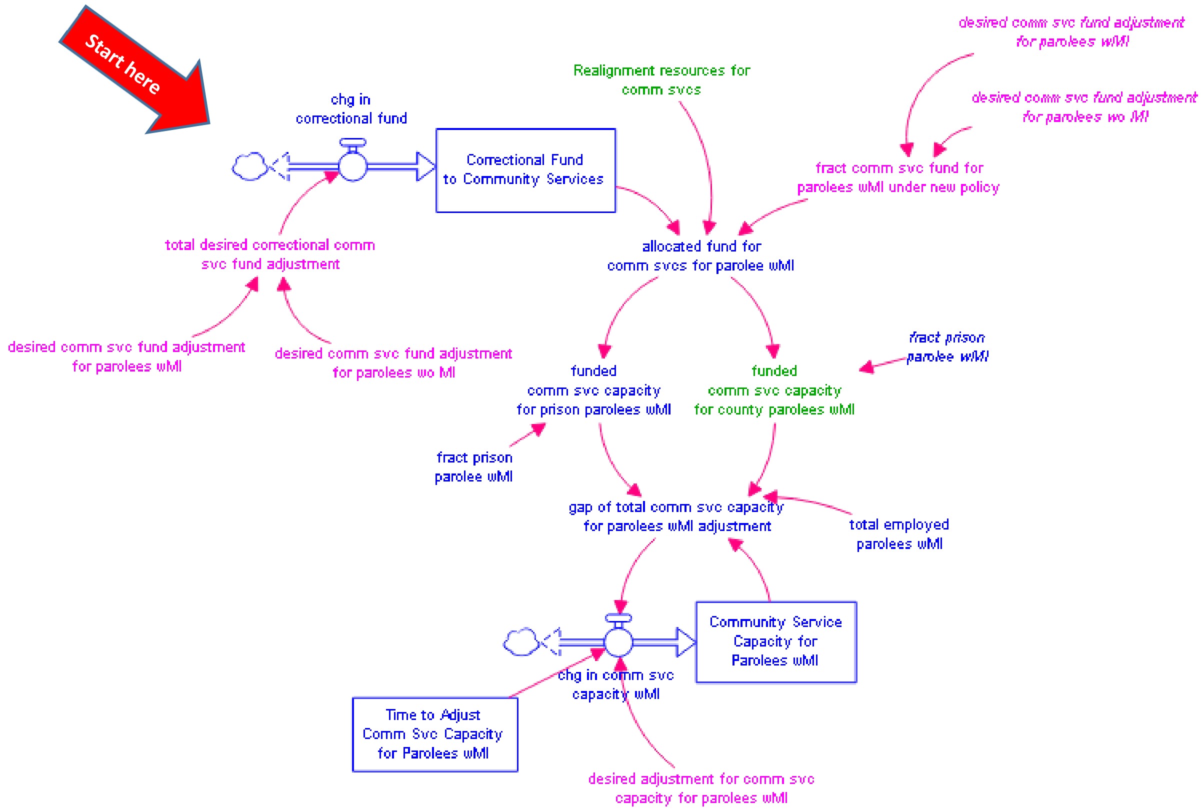


Figure 231 Policy Structure for Community Service Budget and Resource Allocation for Parolees with Mental Illness

Note: Structures in blue represents the pre-Realignment structure. Some pre-Realignment structure has been simplified. Pink represents the policy structure while green denotes the structure associated with the Realignment policy.

Together with the special annual “Realignment resources for comm svc”, the adjusted fund is allocated to support or change community service capacity for parolees wMI and parolees wo MI respectively (Figure 231). Under our recommended policy, the fractions of funds spent between community services for parolees wMI and parolees wo MI, respectively, is contingent upon the fraction of fund adjustment each type of community services requested. “fract comm svc fund for parolees wMI under new policy” is the ratio of the desired community service fund adjustment requested specifically for parolees wMI to the total desired correctional community service fund adjustment (i.e. the sum of the desired community service fund adjustment for parolees wMI and the desired community service fund adjustment for parolees wo MI). The new allocated fund for community services for parolees wMI is then split between services for prison parolees wMI and county parolees wMI. The split of resources between the prison and county parolees wMI is based on the fraction of prison parolees and county parolees, respectively. “funded comm svc capacity for prison parolees wMI” is the total capacity available to achieve a 60% employment ratio among prison parolees wMI. However, the “funded comm svc capacity for county parolees wMI” depends on the remaining resources available after funding the capacity for prison parolees wMI. If a further itemized budget for community services for prison and county parolees wMI is not prepared prior to the fund adjustment, the funded community services for county parolees wMI may be somewhat underfunded.

To summarize, when comparing the funded capacities for prison and county parolees wMI with the existing community service capacity for parolees wMI, a gap in community service capacity is identified. The gap is corrected over the capacity adjustment time.

The "chg in comm capacity wMI" takes the minimum value between "desired adjustment for comm svc capacity for parolees wMI" (Figure 230) or "gap of total comm svc capacity for parolees wMI adjustment" (Figure 231). The gap of total comm svc capacity for parolees wMI adjustment" takes the minimum the two values, i.e. (1) the discrepancy between the total funded community service capacity for parolees wMI (the sum of funded community service capacity for prison parolees wMI and funded community service capacity for county parolees wMI) and the existing community service capacity for parolees wMI, or the (2) discrepancy between the total number of employed parolees wMI and the existing community service capacity for parolees wMI. When the correction fund for community services for parolees wMI is restricted by the State or county governments, the community service capacity reduces even if the desired adjustment for community service capacity increases. Such formulation for "gap of total comm svc capacity for parolees wMI adjustment" expresses that if the desired adjustment for community service capacity for parolees wMI exceeds the total number of funded capacity, only the gap between total number of funded community service capacity for parolees wMI and the existing capacity will be adjusted. If the number of parolees wMI employed equals or exceeds the community service capacity for parolees wMI, then the "gap of total comm svc capacity for parolees wMI adjustment" may be zero or a negative value. With a negative "gap of total comm svc capacity for parolees wMI adjustment", the Community Service Capacity for Parolees wMI stock will reduce and eventually meet the "total employed parolees wMI", which equals to the "desired employed parolees wMI" at this stage (Figure 230).

The capacity adjustment time, named "Time to Adjustment Comm Svc Capacity for Parolees wMI", is modeled as a stock so as to simulate a gradual reduction over time (Figure 232). It is recommended that the time to adjust community service capacity be reduced through a better data collection and sharing process, a more realistic observation period, and a faster reporting rate. It is known that the community service capacity lags significantly behind the actual needs. Thus, the initial community service adjustment time is set to 20 years. Under the new policy, the desired capacity adjustment time is set to three years. This enables the community service capacity to be more responsive in meeting the needs of the parolees wMI. Nevertheless, a shorter adjustment time is associated with a higher possibility to produce a more oscillatory capacity in the beginning. This is because that a shorter adjustment time may lead to a large correction in response to a certain capacity gap. Therefore, the stock may be over- or under-adjusted. Eventually, the capacity settles at an appropriate and stable level. As it takes time to collect data and verify data, to share infrastructure, and to change reporting practice, the adjustment delay for Time to Adjust Community Capacity for Parolees wMI is set to ten years.

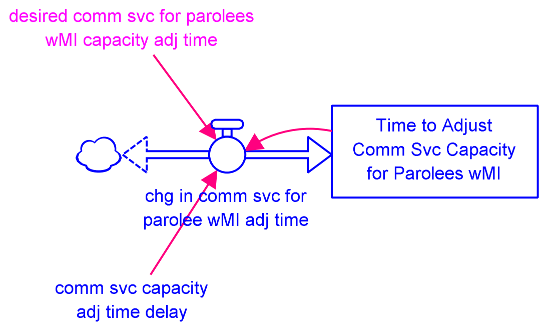


Figure 232 Modeling Time to Adjust Community Service Capacity for Parolees with Mental Illness as a Stock under New Policy

We advocate a better resource and capacity planning approach rather than extending the special annual Realignment fund to counties to increase community service capacity. We do so for two reasons. First, the amount of the annual Realignment fund allocation has been determined with different projection approaches. Historically, a variety of projection approaches have been applied to determine Realignment fund allocated to the county goverments to facilitate the Realignment policy. This causes significant uncertainty in the budgeting process. The county governments may have difficulty to foresee the relevant data needed for the next budget adjustment or to expect the fund they will be able to get in the next fiscal year. This may affect the annual resources available for county governments and make capacity planning difficult. Second, the county governments decide on the fraction of county Realignment fund set aside for the local law enforcement or community service activities. Without a clear goal set to determine the fraction of Realignment fund spent on these two groups of activity, the fund allocation for these two groups of activity is unpredictable. The unstable resources allocation process, resulting from an ambiguity in the goal-setting, renders a more volatile community service provision. Despite a lengthy adjustment and adaptation to the new policy, an explicit goal formulation and a built-in feedback structure that make up the new policy constitute the foundation for a self-correcting and sustainable community service resource allocation and capacity planning system.

6.3 Policy Element 3 and 4 - Include Expected Depreciation Rates in Prison and Jail Capacity Planning

This policy suggests the addition of the expected depreciation rates of prison and jail facilities to avoid steady state errors. Depreciation refers to *the natural wear and tear of the facilities*. A steady state error is *a gap that appears when the value of the stock persistently falls short of the desired value even though the system has sufficient time to settle into a steady state and other variables stop changing* (Sterman, 2000).

In planning for prison and jail capacity, the authority bases the desired capacity on the expected prisoner or jail population growth. Without including the expected depreciation of prison and jail facilities, the new capacities constantly fall below the desired capacities. The inclusion of the expected depreciation rate is crucial in prison and jail capacity planning given that capacity utilization has consequential effects on the mental illness development in prisons and the length of jail time. In an over-utilized prison capacity, the likelihood of prisoners developing MI will increase. When, on the other hand, the jail capacity is over-utilized, jail time is shortened so as to make room for incoming jail offenders or arrestees. Therefore, we propose a modification to the decision-making process of capacity adjustment. As jail capacity has a similar structure as the prison capacity, only the policy structure for prison capacity is shown and explained.

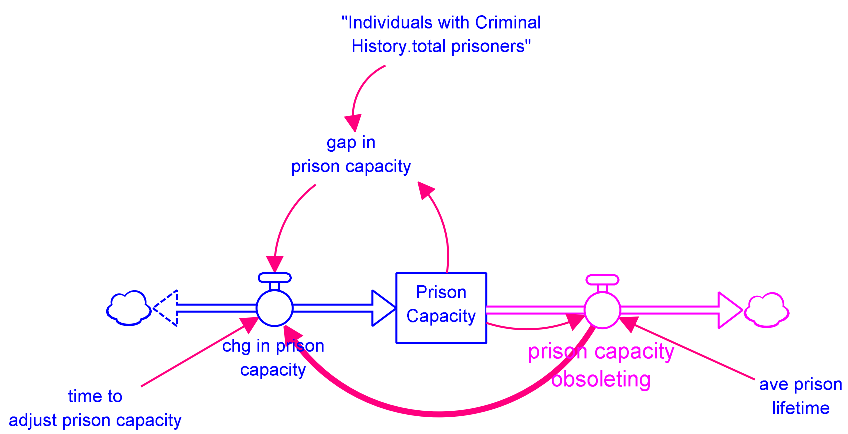


Figure 233 Policy Structure for the Inclusion of Expected Depreciation Rate in Prison Capacity Adjustment

Figure 233 outlines the prison capacity structure with one-stock, two flows, and a negative feedback loop to adjust prison capacity. The inflow, "chg in prison capacity" adds prison capacity through correcting the gap in that capacity over the capacity adjustment time. The outflow, "prison capacity obsoleting", represents the natural depreciation of the prison facilities. The average prison lifetime is set to 60 years (O'Connor, 2004). Every year,the prison capacity depreciates at the rate of 1/60. The thicker link in pink from "prison capacity obsoleting" outflow to the "chg in prison capacity" inflow symbolizes the policy structure, i.e. the inclusion of the expected loss rate in determining the change in prison capacity as a compensation for the loss. Hence, “chg in prison capacity” is governed by the following equation.

(gap_in_prison_capacity / time_to_adjust_prison_capacity) +

SMTH1 (prison_capacity_obsoleting, 1, 0) (6-1)

The first half of the equation 6-1 denotes the capacity adjustment based on the gap between the existing and desired capacity. The second half of the equation represents the expected depreciation rate for the next year. As it takes time to observe and report prison facilities’ wear and tear, a first-order built-in SMOOTH function is used to model the information delay associated with updating the perception of prison capacity depreciation. With the inclusion of the expected depreciation rate, the authority does not only expand or reduce prison capacity based on needs, but also considers the natural loss of the prison facilities.

6.4 Validation

The preceding sections illustrate the proposed policy structure. In this section, validation tests will be conducted to assess the impact of the added policy structure and the robustness of the policy. Then, we analyze the potential impact of the new policies on the system.

The model has passed the dimensional consistency test. Equations have been inspected directly with extreme values assigned. Then, the following extreme condition tests have been conducted.

Test 1 - Increase fraction of innocent population being arrested 500%

Test 2 - Decrease fraction of innocent population being arrested to zero

Test 3 - Zero fraction of convicts with prison conviction

Test 4 - Increase mental functions per new arrestee

Test 5 - Decrease mental functions per new arrestee

Test 6 - Increase Time Served in alternative facility

The results of the extreme condition tests are presented in Appendix N. We summarize the extreme condition tests in the following text.

<u>Assigning extreme values to the fraction of innocent population being arrested</u>

When the inflow to the criminal justice system increases drastically (Test 1), i.e. when there is a steep increase in the fraction of individuals in the innocent population being arrested, the number of prisoners wSMI in the alternative facility and prisoners wMI increase. There are more prisoners developing MI in prison. Due to the influx of prisoners wo MI under this test, MI prevalence in prison drops drastically after the test is initiated. However, after ten years, MI prevalence among prisoners rises and seems to level off at a higher level than the policy scenario. MHC capacity fund and correctional fund for community services also increase. As the adjustment time for prison MHC has been reduced, the MHC capacity adequacy overshoots the demand, i.e. the needs for MHC. When MHC capacity adequacy overshots, MHC fund drops below zero in order to correct the excessive MHC capacity until the MHC capacity meets the demand. At the end of the simulation, the MHC capacity is about 137,000 persons higher than in the policy scenario. The correctional fund to community services is also higher than in the policy scenario because of the increase in the parolee population. Community service utilization level for parolees wMI and parolees wo MI hike as the community service capacities adjust to match the increase in demand. When the community service capacities finally catch up with the demand, the community service utilization levels approach one eventually.

On the contrary, when the inflow of first-time arrestees to the criminal justice system is set to zero (Test 2), i.e. only the recidivists are recycling in and out of the system, the prisoners wSMI, total prisoners, total parolees, total probationers, and total jail populations decline and taper off to a level close to zero after about 20 years. Capacity stocks, such as all kinds of treatment capacity in the prisons and Community Services for Parolees wMI, deplete to zero as well, as could be expected.

<u>Reducing fraction of convicts receiving prison sentence to zero</u>

When the prison inflows reduce to zeros (Test 3), the convicts are directed to jail and probation sentences. Therefore, the jail and probationer population are higher than the policy scenario. The populations of prisoners and parolees eventually approach zero, as may be expected.

<u>Assigning extreme values to the average mental functions of arrestees</u>

When the average mental functions of new arrestees is close to its maximum level (Test 4), the number of prisoners wMI and prisoners wSMI in alternative facility reduce drastically. MI prevalence in prison drops considerably and levels off at a lower level. There are also fewer prisoners developing MI in prison. Prison MHC capacity consequently drops to near zero. The fraction of unrecovered population wMI and criminal history reduces significantly too. The community service capacity for parolees wMI is lower than in the policy scenario because the average previous incarceration time served by recidivists is lower. Hence, the needs for community services is lower.

In contrast, when the average mental functions per new arrestee drops to 30 (Test 5), i.e. the level of mental function impairment that indicates the need for hospitalization, the populations of prisoners wMI and prisoners wSMI in the alternative facility increase significantly. Hence, more prisoners develop MI. Prison MHC fund and correctional fund to community service, as may be expected, increase significantly as well.

<u>Lengthening the time prisoners wSMI serve</u>

Finally, when the time served in alternative facility doubles (Test 6), the prisoners wSMI population surges. The total incarceration time per prisoner wSMI increases and the mental functions per prisoner wSMI grows higher than in the policy scenario. When prisoners wSMI are released to the High Risk Prison Ex-Convicts wMI stock, the average mental functions of high-risk prison ex-convicts wMI also grows higher than in the policy scenario. Longer incarceration time leads, as expected, to a more significant social capital erosion.

6.5 Policy Scenario Analysis

This section is a documentation of the analysis regarding the impact of our recommended policy on the model behavior. First, we test the entire policy that includes the four policy elements. Then, we test the policy elements one at a time. The purpose of these two exercises is to understand the interaction between the effects of the four elements.

In order to run the entire policy, the following parameters are enabled from 2018 onwards in addition to the settings modified in Section 4.2.2. To run one of the four elements of the policy, the switch value of the intended element is set to one while the switch values of the other elements are set to a neutral value, i.e. zero.

"Policy alternative facility for prisoners wSMI" is a switch to enable the first element of the policy. "Policy comm svc fund distribution" and "policy reduce comm svc capacity adj time" are the switches for the second element. "Policy prison capacity steady state error" and "policy jail capacity steady state error" are the switches for the third and fourth elements respectively.

Policy Scenario			
Parameter	Module	Input Type	Value
policy alternative facility for prisoners wSMI	Individuals with Criminal History	Constant	STEP(1, 2018) * 1
policy comm svc fund distribution	Individuals with Criminal History	Constant	STEP(1, 2018) * 1
policy reduce comm svc capacity adj time	Individuals with Criminal History	Constant	STEP(1, 2018) * 1
policy prison capacity steady state error	Individuals with Criminal History	Constant	STEP(1, 2018) * 1
policy jail capacity steady state error	Individuals with Criminal History	Constant	STEP(1, 2018) * 1

The policy scenario covers three periods from 1987 to 2050:

6.5.1 Comparison of Our Recommended Policy to the Post-Realignment Model in the Equilibrium State

In this section, the impact on the population and institutional levels, and attributes of the population under the policy scenario are compared to the **post-Realignment** model in the equilibrium state. The purpose of initializing the model in the equilibrium state is to conduct a controlled experiment (Sterman, 2000). Equilibrium refers to *a state where all the stocks in the system are constant by equating the inflows to the outflows*. Initializing the model in equilibrium prior to further policy testing enable us to introduce perturbation to the system and trace the rippling effect of the changes imposed on the system. In a disequilibrium condition, the effects arise from the perturbation may be confounded by the interactions of other parameters or feedback loops. This policy scenario testing runs from **1987** to **2050**.

6.5.1.1 Impacts on Population

In Chapter 2, we explained our conceptual framework. We see the increasing and persistently high mental illness (MI) prevalence in prison is not only a criminal justice problem, but also a public health issue. Thus, when we analyze the impact of our policy, we take a top-down approach by looking into the impact on the population level. By population, we mean the entire California (CA) population. California population is an exogeneous input to the model, but the composition of the California population by criminal status, such as the innocent population (i.e. those without criminal history), unrecovered population with criminal history (i.e. those who are serving their sentences or those who have served sentences but with the probability of reoffence), and recovered population (i.e. those who have served sentences but permanently ceased engaging in criminal activities) are endogenized (Figure 234).

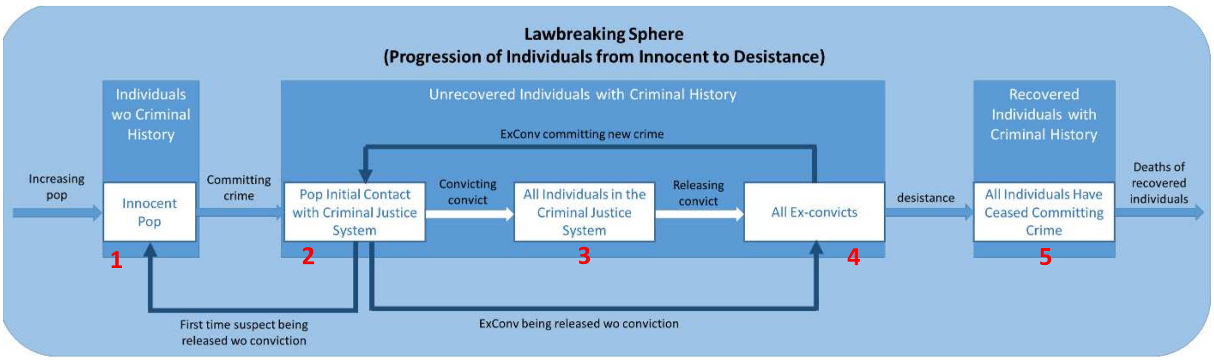


Figure 234 Progression of Individuals from Innocent to Desistance (partial Figure 3 in Chapter 2)

In Figure 235, we presents the relationships of the sub-populations we define and used in our analysis. These sub-populations are: the unrecovered population with criminal history, the unrecovered population with mental illness and criminal history, and the recovered population. The fraction of unrecovered population with criminal history represents ratio of the sum of the second, third, and fourth boxes in Figure 234 to the entire CA population. In this policy test, the CA population (the sum of Box 1 to Box 5 in Figure 234) is set as a constant. The fraction of unrecovered population with mental illness and criminal history is a subset of the fraction of unrecovered population with criminal history (Figure 235). In other words, the number of individuals with mental illness and criminal history is a sub-group within the Unrecovered Individuals with Criminal History population.

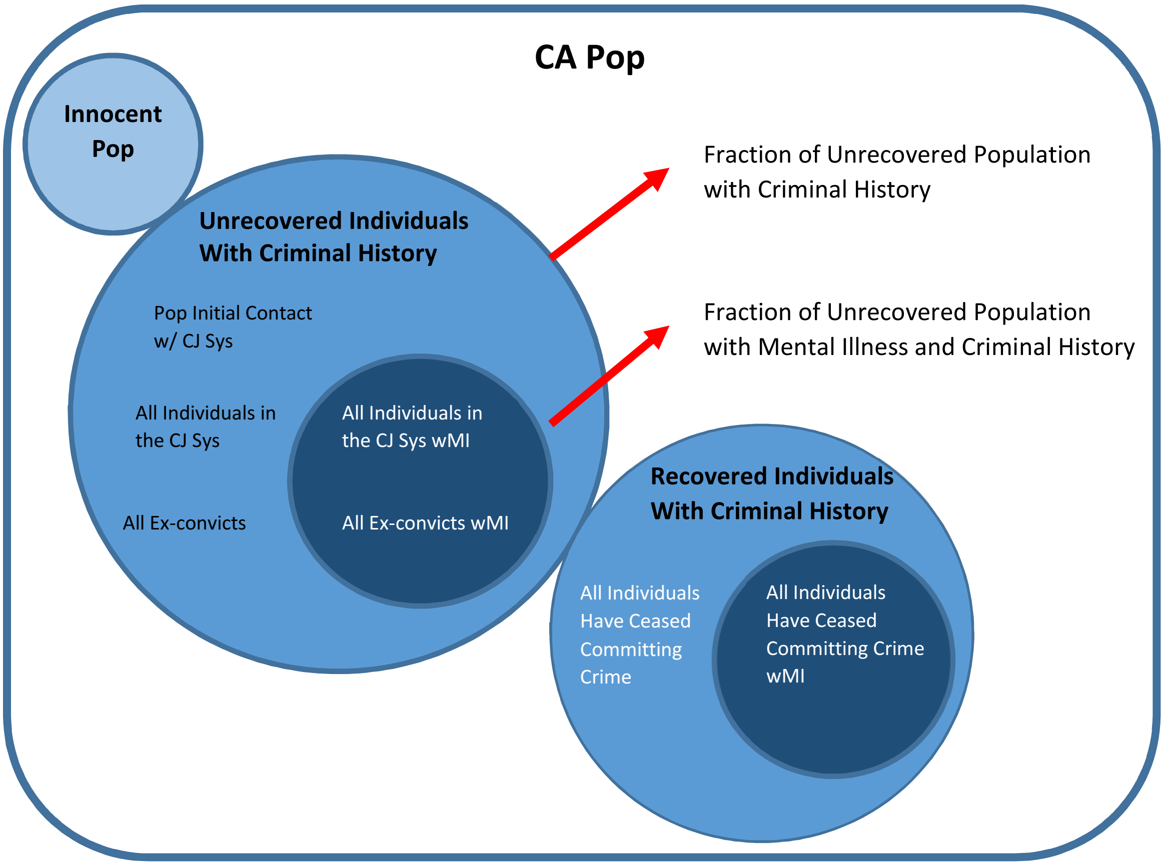
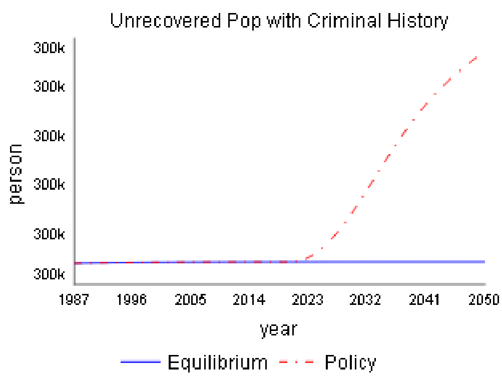


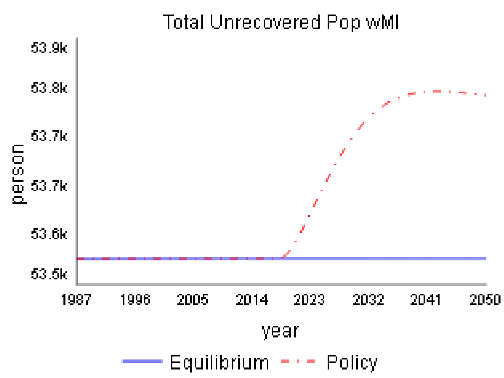
Figure 235 The Relationship between the Fraction of Unrecovered Population with Criminal History and Fraction of Unrecovered Population with Mental Illness and Criminal History to the Entire California Population

Figure 235 shows the relationship of the subsets of populations with the California population and the definition of the fraction of unrecovered population with criminal history and fraction of unrecovered population with mental illness and criminal history. The entire California population encompases all the stocks in Figure 234, i.e. boxes 1 – 5. The fraction of unrecovered population with criminal history is the sum of box 2 – 5 over the entire CA population. Finally, the fraction of unrecovered of population with mental illness and criminal history is the sum of sub-populations with mental illness of box 3 – 5 over the entire CA population.

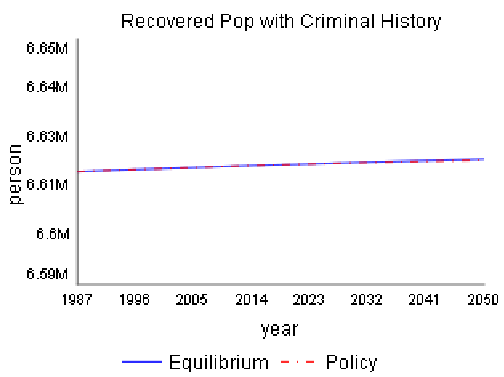
By looking at Figure 236 (a)-(c), it may seem that our recommended policy has led to a worse scenario because the numbers of unrecovered population with criminal history and the unrecovered population with mental illness and criminal history increase while the number of recovered population decreases (not visible in Figure 236c). But the increase in the unrecovered populations and decrease in the recovered population are fairly insignificant. Note that the total population remains constant in this test. The unreceovered population with criminal history increases by 290 persons while the unrecovered population with wMI and criminal history increases by 264 persons. The population with initial contact with the criminal justice system also sees a slight increase of 30 persons. The recovered population reduces by 300 persons. However, if we look at the impact on institutions, the number of prisoners wMI (Figure 238b) reduce. In this policy testing, the prisoners wMI are actually prisoners wMMI after the policy is implemented from 2018 onwards because they only consist of prisoners with mild and moderate MI. The prisoners with severe mental illness (prisoners wSMI) are confined in the alternative facility after the policy is implemented. Since the prisoners wSMI are confined for longer time compared to the prisoners wMMI (Figure 238k), more unrecovered individuals with criminal history (as well as unrecovered individuals wMI and criminal history) stay in the Unrecovered Population with Criminal History stock.



(a)



(b)



(c)

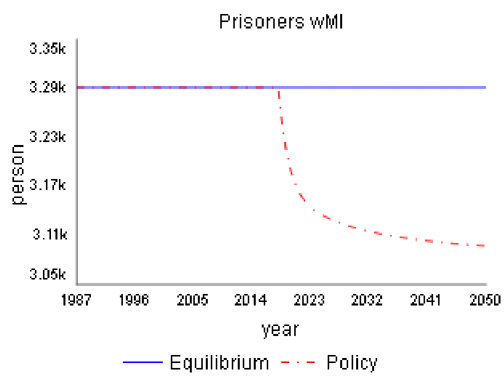


Figure 238 (b) from Section 6.5.1.3

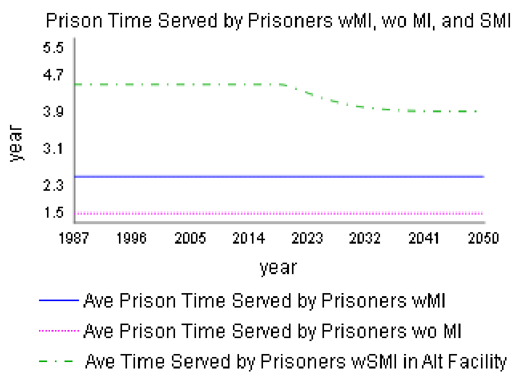


Figure 238 (k) from Section 6.5.1.3

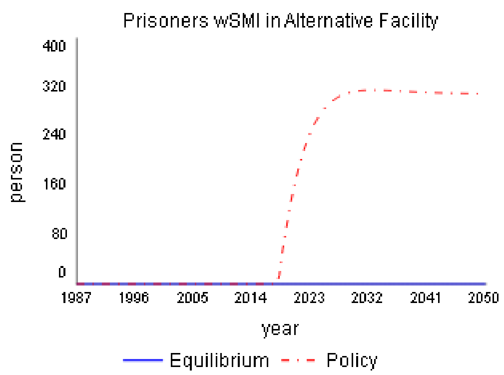
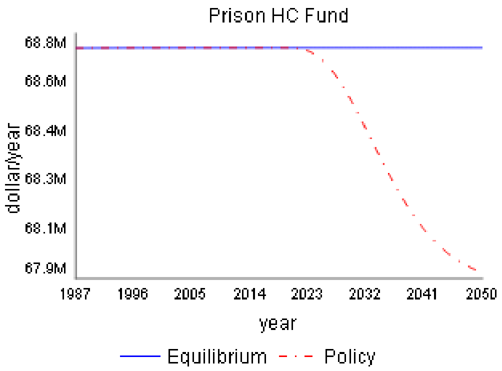


Figure 287 (f) from Section 6.5.1.3

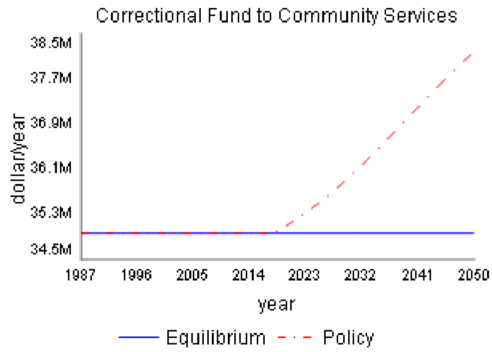
Figure 236 Impacts on Population under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

(a)- Unrecovered Population with Criminal History; (b) Unrecovered Population with Mental Illness and Criminal History; (c) – Recovered Population with Criminal History; (c) Recovered Population with Criminal History

6.5.1.2 Impacts on Public Finance



(a)



(b)

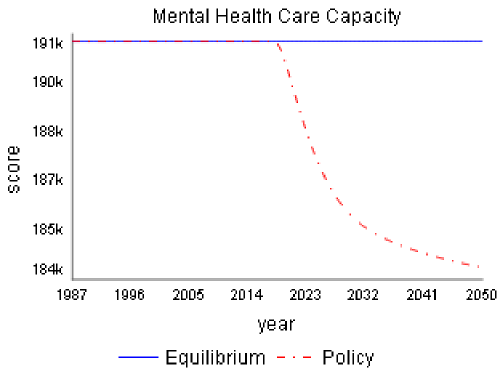


Figure 239 (d) from Section 6.5.1.4

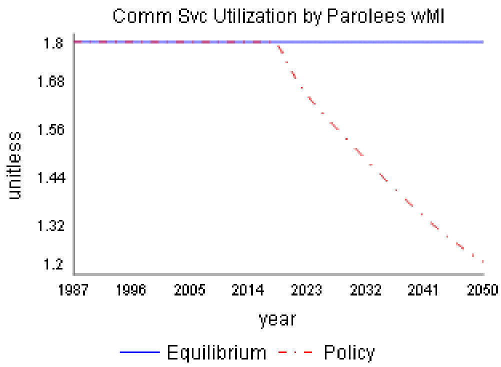


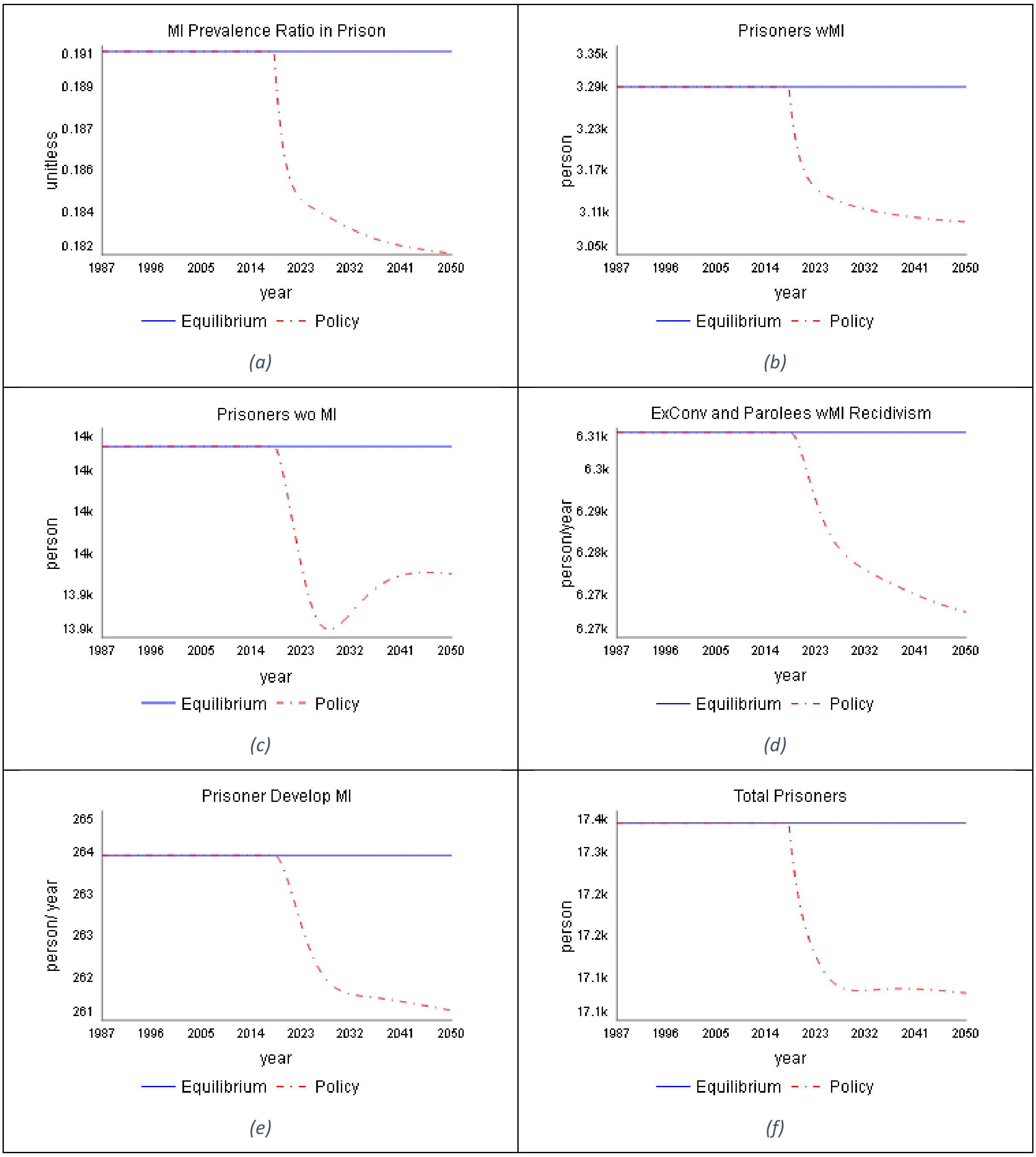
Figure 240 (a) from Section 6.5.1.5

Figure 237 Impacts on Public Finance under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

(a)-Prison Health Care Fund; (b) Correctional Fund to Community Services

The policy leads to a reduction in prison HC fund (Figure 237a) because prisoners wSMI are diverted to the alternative facility. The prisoners wMI remain in the prisons are those with mild and moderate MI (prisoners wMMI). Therefore, the health care capacity required to care for prisoners wMMI is relatively lower (Figure 239d). As community service planning improves under our recommended policy, community service capacity for parolees wMI increases considerably. Therefore, community service utilization among parolees wMI reduces and the utilization level is approaching one (Figure 240a). Consequently, the correctional fund required to provide sufficient services to parolees increases under our recommended policy (Figure 237b).

6.5.1.3 Impacts on Institutions



(a) (b) (c) (d) (e) (f)

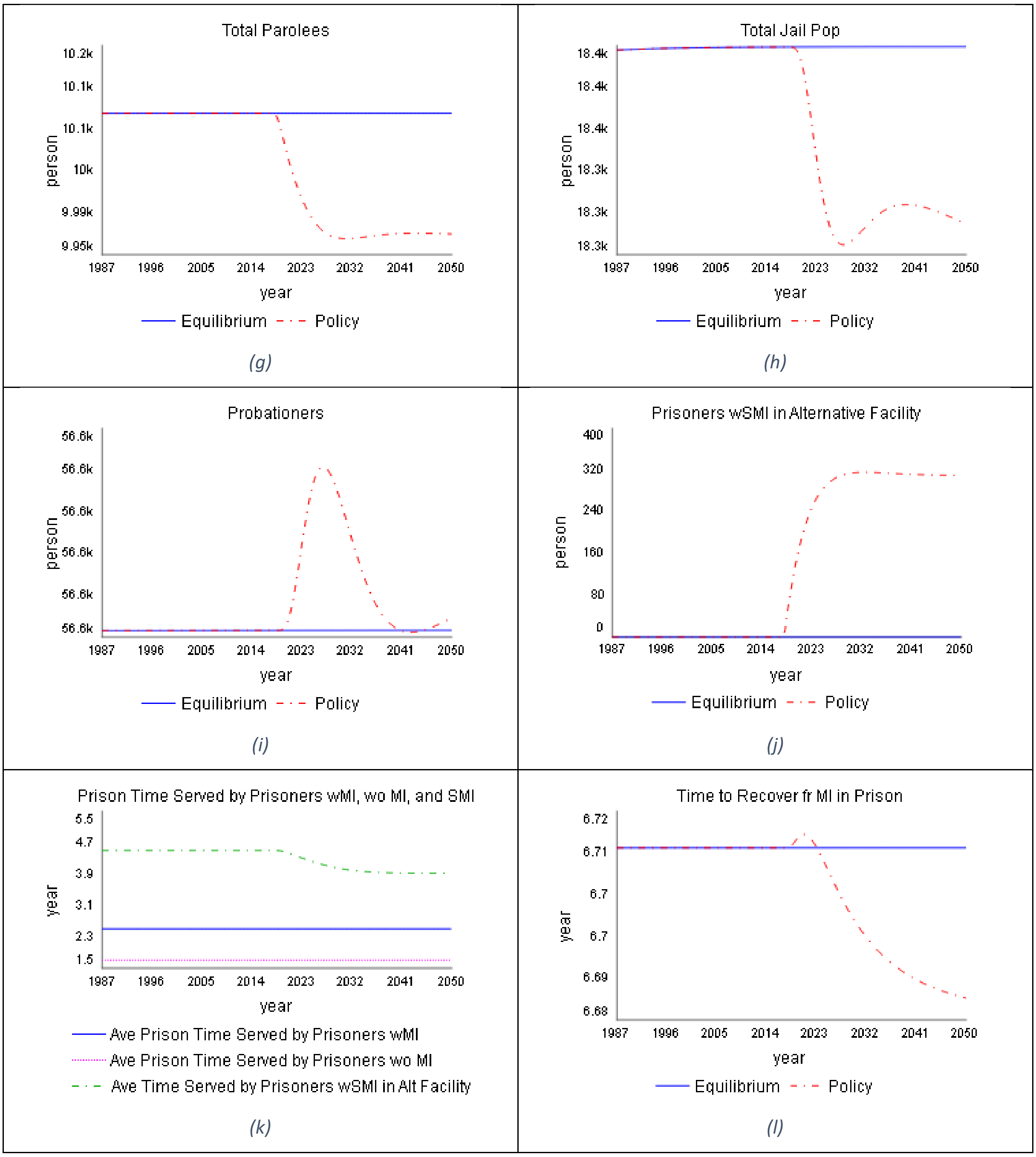


Figure 238 Impacts on Institutions under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

(a)-Mental Illness Prevalence in Prison; (b) Prisoners with Mental Illness; (c) Prisoners without Mental Illness; (d) Ex-convicts and Parolees with Mental Illness Recidivism Rate; (e) Prisoners Develop Mental Illness; (f) Total Prisoners; (g) Total Parolees; (h) Total Jail Population; (i) Probationers; (j) Prisoners with Severe Mental Illness in Alternative Facility; (k) Prison Time Sereved by Prisoners with Mental Illness in Prisons, without Mental Illness, and Prisoners with Severe Mental Illness in the Alternative Facilty; (l) Time to Recover from Mental Illness in Prison

Under our recommended policy scenario, the MI prevalence in prison decreases (Figure 238a). The populations of prisoners wMI, prisoners wo MI, and jail offenders also reduce (Figure 238,c,f, h). This is because that the the recidivism rate among parolees and ex-convicts reduces (Figure 238d). The overall recidivism among all parolees and ex-convicts also reduces (not shown in Figure 238). Consequently, there are also fewer parolees (Figure 238g). There are also fewer prisoners develop MI (Figure 238e). The population of offenders serving probation increases insignificantly, i.e. by less than five persons in 2025. This may be caused by the fact that when the prisoners wSMI are released to the High Risk Ex-Convicts wMI stock, they will more likely commit less serious crimes and receive probation sentence should they recidivate.

6.5.1.4 Impacts on Prison Health Care Needs

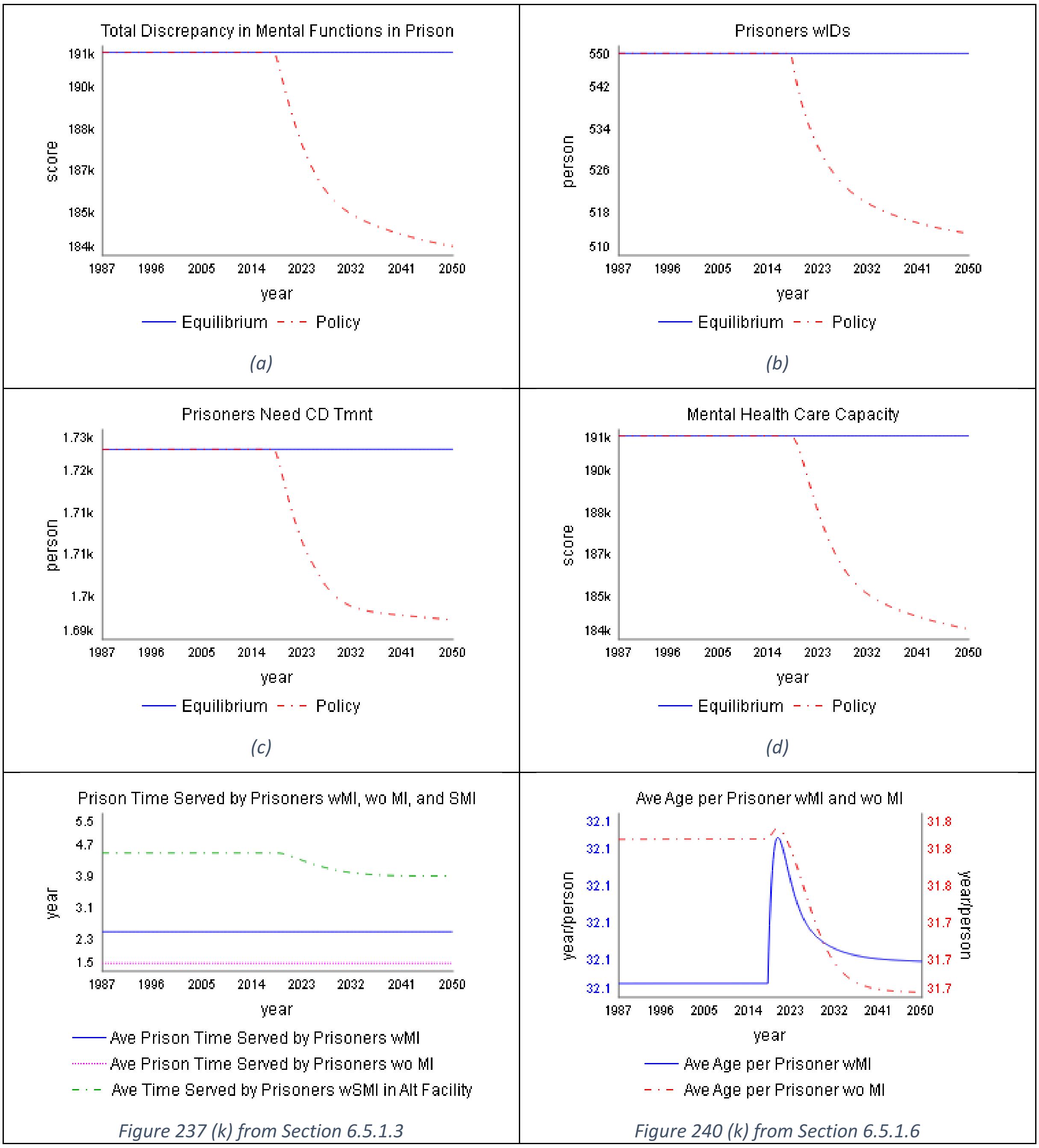
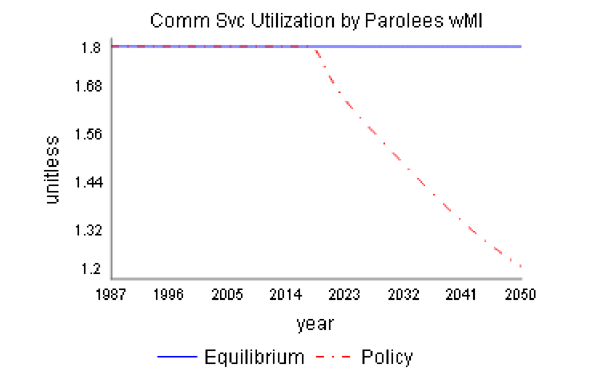


Figure 239 Impacts on Prison Health Care Needs under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

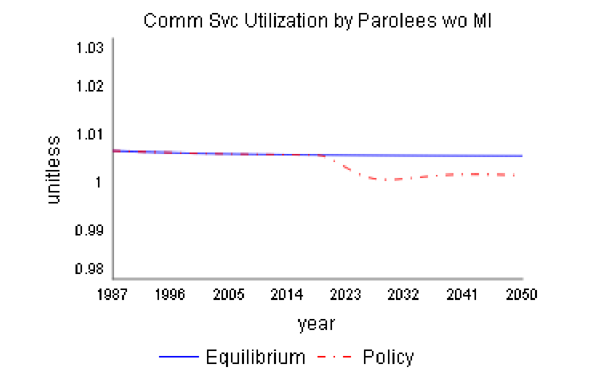
(a)-Total Discrepancy in Mental Functions in Prison; (b) Prisoners with Infectious Diseases; (c) Prisoners Need Chronic Disease Treatment; (d) Mental Health Care Capacity

With our recommended policy, fewer prisoners wMI lead to lower discrepancy in mental functions (Figure 238a) because those with lower mental functions are diverted away. As the population of prisoners wo MI reduces, there are fewer prisoners developing MI (Figure 238e). Hence, MHC capacity is lower than it would have otherwise been (Figure 239d). The diversion of prisoners also results in lower needs for infectious disease treatment (Figure 239b). As prisoners wSMI who are likely to have longer incarceration time are diverted away, the incarceration time served by the remaining prisoners wMMIdecreases while the incarceration time served by prisoners wo MI is constant (Figure 238k). The average age of prisoners wMI ad wo MI decrease slightly because those who remain in the prison are more likely to be habitual offenders (Figure 241k). As those who are not habitual offenders but are only recidividating due to the strict conditions set forth by the Three Strikes Law are able to leave the system. Consequently, the need for chronic disease treatment decreases (Figure 239c).

6.5.1.5 Impacts on Community Services



(a)



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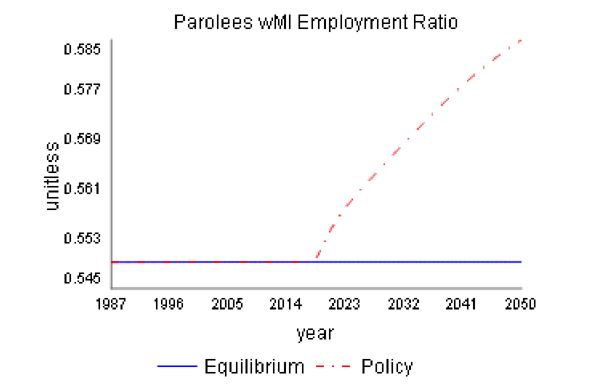

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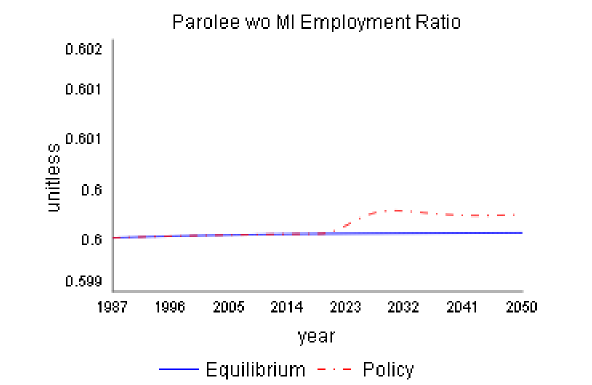

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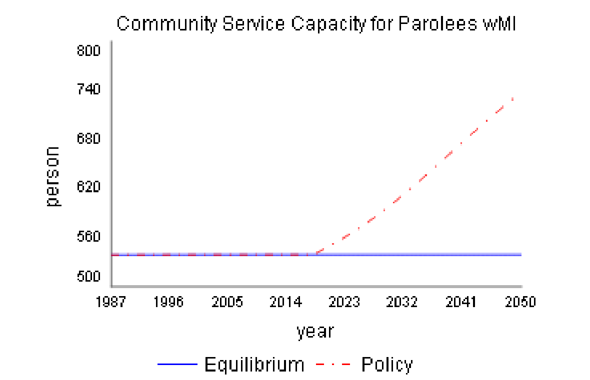

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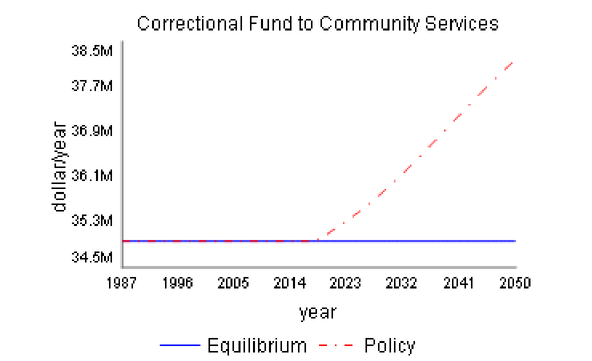


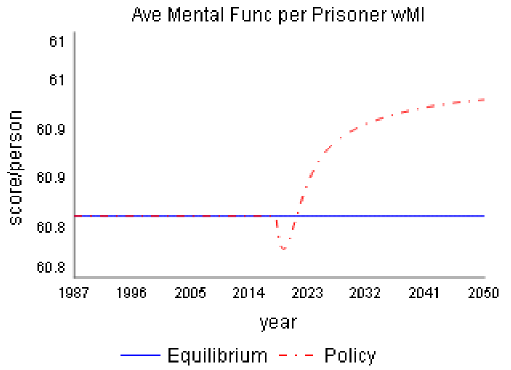
Figure 235 (b) from Section 6.5.1.2

Figure 240 Impacts on Community Services under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

(a)-Community Service Utilization by Parolees with Mental Illness; (b) Community Service Utilization by Parolees without Mental Illness; (c) Parolees with Mental Illness Employment Ratio; (d) Parolees without Mental Illness Employment Ratio; (e) Community Service Capacity for Parolees with Mental Illness

Figure 240a and 240b show that our recommended policy lead to lower community service utilization by both parolees wMI and parolees wo MI. Community service utilization decreases due to more adequate funding (Figure 237b). Adequate funding contributes to the increase in the community service capacity for parolees wMI (Figure 240e). Community service utilization has an inverse relationship with employment ratio. When the utilization level decreases, the employment level among parolees increases. Hence, employment level of parolees show increasing trends (Figure 240c and d).

6.5.1.6 Impacts on Population Attributes



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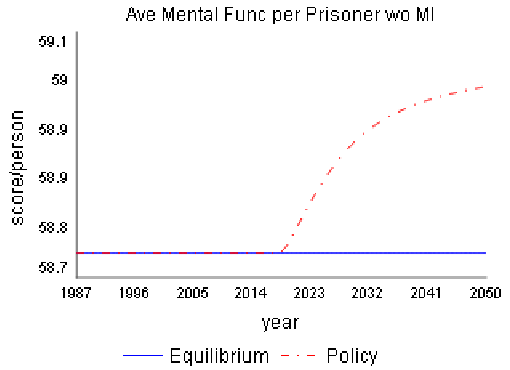

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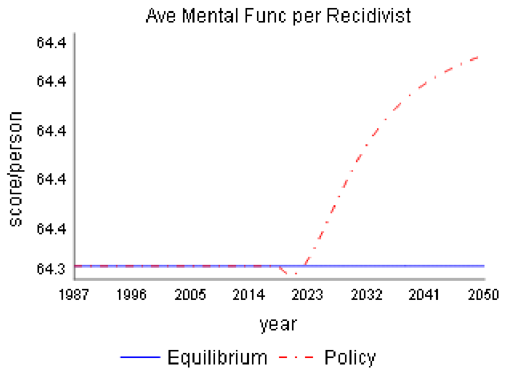

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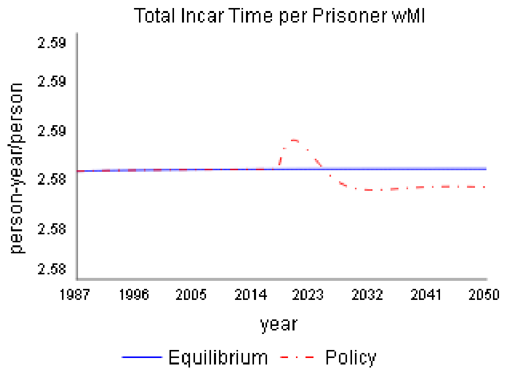

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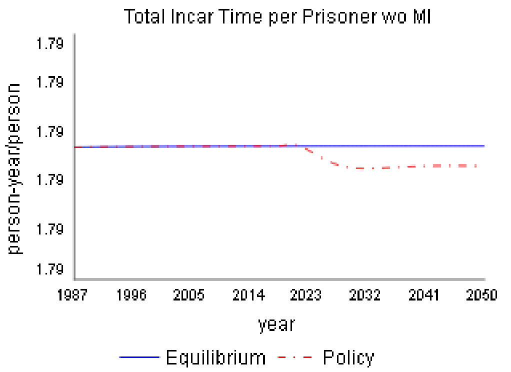

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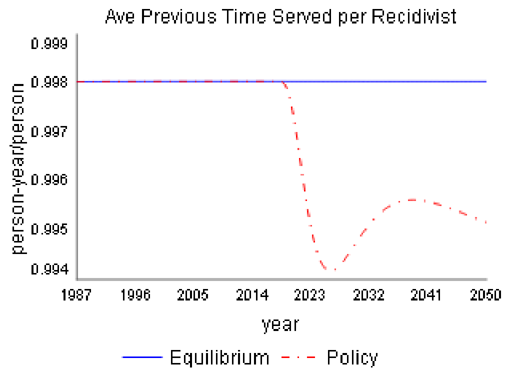

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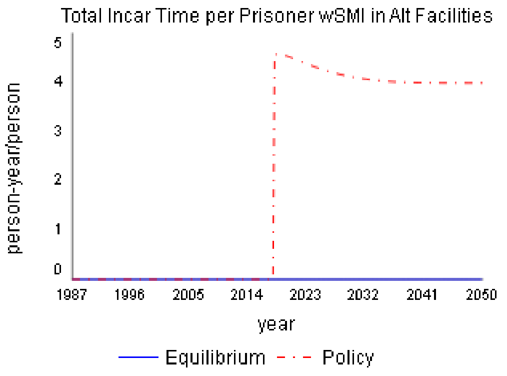

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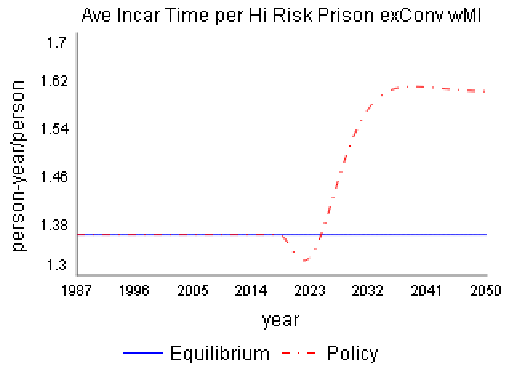

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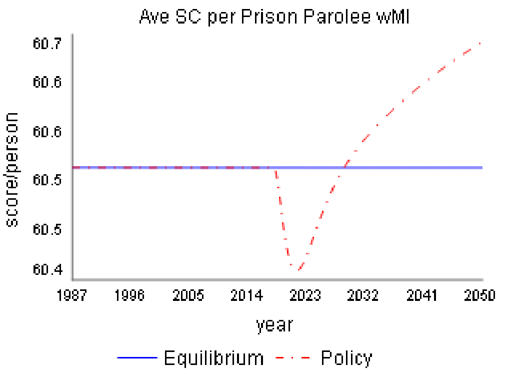

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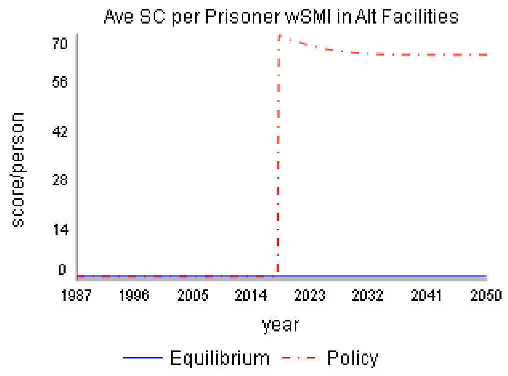

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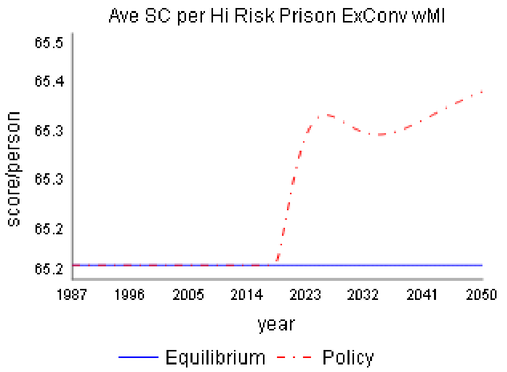

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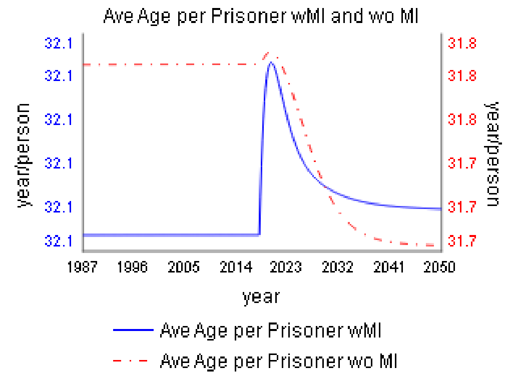

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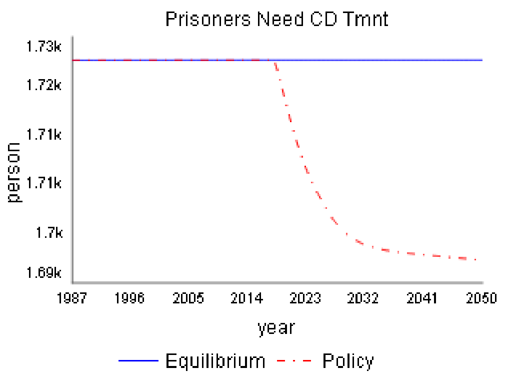


Figure 239 (c) from Section 6.5.1.4

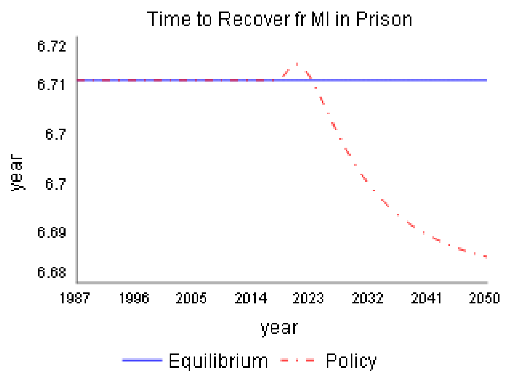


Figure 238 (l) from Section 6.5.1.3

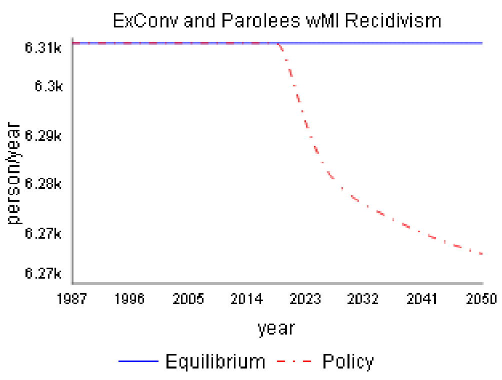


Figure 238 (d) from Section 6.5.1.3

Figure 241 Impacts on Population Attributes under the Comparison of Policy Scenario to the Post-Realignment Model in Equilibrium State

(a)-Average Mental Functions per Prisoners with Mental Illness; (b) Average Mental Functions per Prisoners without Mental Illness; (c) Average Mental Functions per Prisoners per Recidivist; (d) Total Incarceration Time per Prisoner with Mental Illness; (e) Total Incarceration Time per Prisoner without Mental Illness; (f) Average Previous Time Served per Recidivist; (g) Total Incarceration Time per Prisoner with Severe Mental Illness in the Alternative Facility; (h) Average Incarceration Time per High-risk Prison Ex-convict with Mental Illness; (i) Average Social Capital per Prison Parolee with Mental Illness; (j) Average Social Capital per Prisoner with Severe Mental Illness in the Alternative Facility; (k) Average Social Capital per High Risk Prison Ex-convict with Mental Illness; (l) Average Age per Prisoner with Mental Illness

The average mental functions of prisoners wMI (Figure 241a) are higher because more MHC resources are freed up to treat prisoners wMI (in fact, only the prisoners with mild and moderate mental illness remain in the prisons). Shortly after the introduction of our recommended policy, the average mental functions of prisoners wMI drop because those with severe MI who are already serving the prison sentences will remain in the prison until they are released. Hence, the diversion of incoming prisoners wSMI does not increase the average mental functions of prisoners wMI immediately. After the the prisoners wSMI are diverted away and higher MHC resources available to diagnosed prisoners who develop MI, more mentally ill prisoners (i.e. the prisoners wMMI) are diagnosed and treated. The recovery time from MI decreases (Figure 238l). Thus, the average mental functions of prisoners wMI (at this time, the prisoners wMMI and wSMI are still blended in the stock of Prisoners wMI) drop for a brief period and then rebounds and levels off at a higher level. As more prisoners wMMI and wSMI (who are already serving the prison sentence when our recommended policy is introduced) leave the prison, the fraction of prisoners wMMI continues to rise. From that time onwards, the average mental functions of prisoners wMI (or mostly made up of prisoners wMMI) continues rising. The shorter recovery time also contributes to the increase in average mental functions among prisoners wo MI (Figure 241b). This results in a higher average mental functions among all the recidivists (Figure 241c). When these recidivists return to prison, the average mental functions in prison rises.

The total incarceration time for prisoners wMI (Figure 241d) rises shortly after the introduction of our recommended policy with the similar reason that contributes to the development of the average mental functions among prisoners wMI. The decline in the total incarceration time served by prisoners wMI and prisoners wo MI (Figure 241d and e) is caused by the decrease in recidivism among parolees and ex-convicts (238d). Those who stay in the prisons are more likely to be habitual offenders rather than those who are being recycled in and out between prisons and community due to the strict criteria under the Three-strikes Law. Eventually, more individuals stay on the progress towards desistance rather than recidivate. Thus, the total incarceration time of prisoners decline. This results in lower previous incarceration time served among the recidivists (Figure 241f). When the recidivists return to prison, the total incarceration time will be lower upon their release. However, the average incarceration time per high risk prison ex-convict wMI (Figure 241h) is higher because prisoners wSMI, who serve longer time in the alternative facility, are release to this stock.

The average SC per prison parolees wMI (Figure 241i) drops and increases for the similar reason that causes the drop and rise in the mental functions among prisoners wMI. The increase in SC among prison parolees wMI are due to two reasons: higher SC among the prisoners wMI when they are released (because of shorter incarceration time served), and higher employment level. Lower incarceration served among the prison parolees limits the damage to their SC. When the prisoners are released, adequate community services facilitate their reentry. As more of them are employed, their SC grow. The SC of high risk prison ex-convicts wMI (Figure 240j) is also higher because of the release of of prison parolees with higher SC as well as the released prisoners wSMI who have higher average SC (Figure 241j) to this stock.

Finally, lower incarceration time among the prisoners lead to the slight decrease in average age among prisoners wMI and wo MI. This contributes to the decrease in the needs for age-related chronic disease treatment (239c).

6.5.2 Comparison of Policy to the Base Case

In the following sections, the impact on the population and institutional levels, and attributes of the population under the policy scenario are compared to the **base case**. Although the simulation still runs from 1987 to 2050, the time horizon on the graphs in this section is changed to **2018** to **2050** to demonstrate the detailed changes in the behavior of relevant parameters.

6.5.2.1 Impacts on Population

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
Fract of Unrecovered Pop wMI with Criminal History	0.006114	0.006159	0.000045	0.74%
Unrecovered Pop with Criminal History	1,419,859	1,421,919	2,060	0.15%
Recovered Pop with Criminal History	12,366,638	12,364,932	-1,706	-0.01%

Table 12 Impacts on Population under the Policy and Base Case Scenario

At the population level, the Recovered Pop with Criminal History has 1,700 fewer persons or 0.01% lower while the Unrecovered Pop with Criminal History increases 2,000 more persons or 0.15% higher (Table 12). As there are more individuals staying in the unrecovered population, there are fewer individuals becoming desisting ex-convicts. The fraction of unrecovered population with wMI and criminal history increases about 0.74%. This translates into about 2,000 additional individuals. The increase in the unrecovered population is due to the increase in the time served by prisoners wSMI in the alternative facility. Compared to other prisoners, the prisoners wSMI population serve longer sentence.

6.5.2.2 Impacts on Public Finance

Comparing the prison health care fund and correctional fund to community services under base case and policy scenarios demonstrates cumulative savings. For the prison health care fund, a cumulative of $1,023 trillion is saved if when the recommended policy is compared to the base case (Figure 242). Of this saving, about $37 million is saved in mental health care (Figure 242). The correctional fund to community services incur an cumulative saving of $234 million (Figure 243).

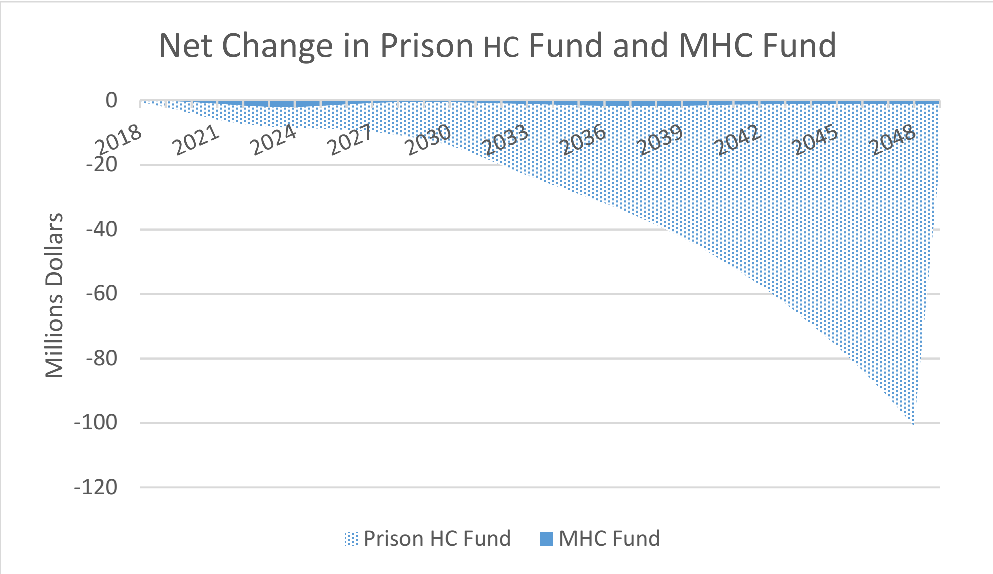


Figure 242 Comparison of Prison Health Care Fund between Base Case and Policy Sceanario and Cumulative Net Savings (2018 - 2050)

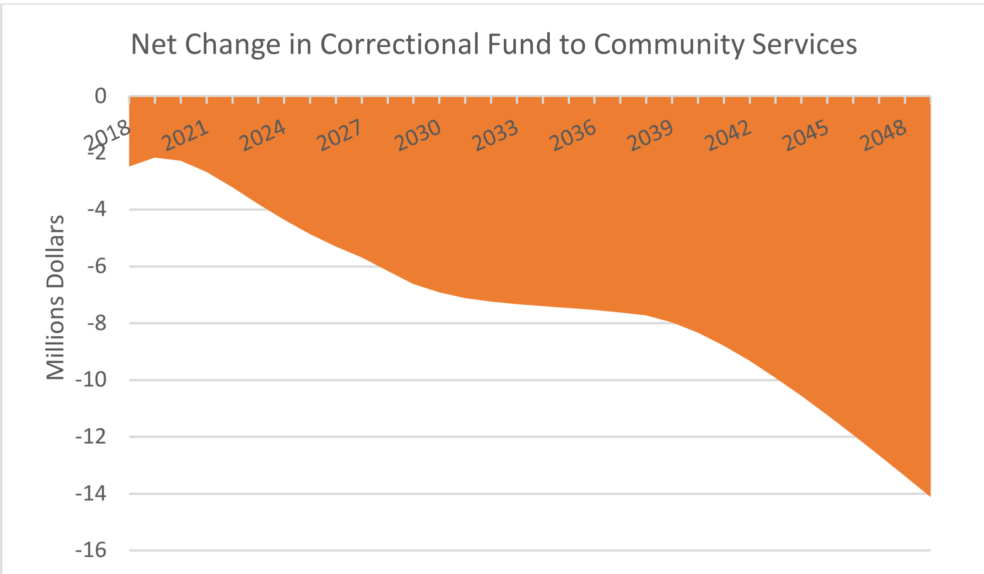


Figure 243 Comparison of Correctional Fund to Community Services between Base Case and Policy Sceanario and Cumulative Net Savings (2018 - 2050)

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
Prison HC Fund	782,992,761	764,734,533	-18,258,228	-2.3%
MHC Capacity Fund	8,482,094	7,266,217	-1,215,872	-14.3%
Correctional Fund to Community Services	251,497,596	237,369,228	-14,128,368	-5.6%

Table 13 Impacts on Prison Health Care Fund and Correctional Fund to Community Services in Base Case and Policy Scenario

In 2050, the prison HC fund is $18 million or 2% lower than in the base case while correctional fund to support community services is $14 million or 6% lower (Table 13). The fund for mental health care capacity is $1.2 million or 14% lower. Thus, the other savings go to infectious disease and chronic disease treatment capacities.

6.5.2.3 Impacts on Institutions

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
MI Prevalence in Prison	0.292	0.280	-0.012	-4.1%
Prisoners wMI	24,322	22,859	-1,463	-6.0%
Total Prisoners	83,580	81,872	-1,708	-2.0%
Total Parolees	40,766	40,028	-738	-1.8%
Prisoners wSMI in Alternative Facility	0	2,176	2,176	-
Prison Capacity Utilization	1.2	1	-0.2	-16.7%

Table 14 Impacts on Institutions in Base Case and Policy Scenario

Overall, the policy leads to more significant improvement at the institutional level (Table 14). MI prevalence in prison is 4% lower. There are 1,500 or 6% fewer prisoners wMI because about 2,200 prisoners wSMI are diverted to an alternative facility. The total prisoners and total paroles are both 2% lower than in the base case. With better prison capacity planning, prison capacity utilization is 17% lower.

6.5.2.4 Impacts on Prison Health Care Needs

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
Total Discrepancy in Mental Functions in Prison	903,593	865,498	-38,095	-4.2%
Prisoners wIDs	2,646	2,456	-190	-7.2%
Prisoners Need CD Tmnt	131,59	12,884	-275	-2.1%

Table 15 Impacts on Prison Health Care Needs in Base Case and Policy Scenario

The diversion of prisoners wSMI, a better prison capacity planning approach, and lower recidivism rate lead to lower needs for the three kinds of treatments in prisons (Table 15). The needs for MHC is 4%

lower. Prisoners who need ID and CD treatment are 7% and 2% lower than in the base case respectively.

6.5.2.5 Impacts on Community Services

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
Community Service Utilization by Parolees wMI	1.17	1.03	-0.14	-12.0%
Community Service Utilization by Parolees wo MI	0.49	1.0	0.51	104.0%
Community Service Capacity for Parolees wMI	5,205	5,526	321	6.2%
Community Service Capacity for Parolees wo MI	37,087	18,108	-18,979	-51.2%

Table 16 Impacts on Community Services in the Base Case and Policy Scenario

Community service utilization by parolees wMI decreases from 1.17 to 1.03 (Table 16). This is resulted from a change in the correctional fund adjustment approach. In the base case, correctional fund adjustment is based on county population projection approach. Every year, the correctional fund is adjusted with the expected growth rate of county population. This approach does not take the reduction of parolees into consideration (the population of parolees reduced drastically after the introduction of the Realignment policy). Hence, the correctional fund is projected to be higher in the base case, which may result in redundant community service capacity for the parolees wMI and parolees wo MI. Our recommended policy suggests that the correctional fund and community service capacity to be adjusted based on goals, such as the desired number of parolees work. The discrepancy between the desired number of parolees work and the existing commuty service capacity forms the correction for the correctional fund and community service capacity. In the policy scenario, the community service utilization level for parolees wMI and parolees wo MI approach and equal to one. This means that excessive capacities are prevented with our recommended policy. The community service capacities for parolees wMI is 6% higher than in the base case and the community service capacities for parolees wo MI is 52% lower than in the base case.

6.5.2.6 Impacts on Population Attributes

Stock/Parameter Name	Value in **Base Case** at 2050	Value in **Policy** Scenario at 2050	Difference in Number	% Change
Ave Mental Func per Prisoner wMI	61.3	61.4	0.1	0.16%
Ave Mental Func per Prisoner wo MI	58.75	58.9	0.4	0.7%
Ave Mental Func per Hi Risk Prison ExConv wMI	64.1	63.4	-0.7	-1.1%
Ave Mental Func per Hi Risk Jail ExConv wMI	64.7	64.8	0.1	0.15%
Ave Previous Incar Time Served per Prisoner wMI	0.0879	0.0878	-0.0001	-0.1%
Ave Previous Incar Time Served per Prisoner wo MI	0.0908	0.0906	-0.0002	-0.23%
Ave Incar Time Served per Hi Risk Prison ExConv wMI	1.55	1.76	0.21	13.6%
Ave SC per Prison Parolee wMI	60.9	60.8	-0.1	-0.16%
Ave SC of All Parolees wMI	64	63.9	-0.1	-0.16%

Table 17 Impacts on Population Attributes in the Base Case and Policy Scenario

Overall, the average mental functions of prisoners wMI and prisoners wo MI are higher than in the base case (Table 17). But the mental functions of high-risk prison ex-convicts wMI is 1% lower. This is because that prisoners wSMI are released to the stock of Hi-Risk Prison Ex-Convicts wMI directly. Given the definition of MI recovery is contingent upon the ability to lead normal lives in the community, the ex-convicts from alternative facility may likely have lower mental functions. The previous incarceration time served by prisoners wMI and wo MI appear to be lower, except for the high-risk prison ex-convicts wMI. Again, the prisoners wSMI from the alternative facility are released to be high-risk prison ex-convicts wMI. Despite the longer confinement imposed on the prisoners wSMI, they possess higher SC upon release as cultivating social capital during confinement is one of functions of the alternative facility. The SC of prison parolees wMI and all parolees wMI are slightly lower because those who remain in the correctional system are mainly the habitual offenders instead of those who are retained due to the strict requirements of the Three-strikes Law.

Table 18 compares the profiles of prisoners wMMI and prisoners wSMI at 2050 under our recommended policy. The prisoners wSMI population is less than 10% of the prisoners wMMI population. Since the prisoners wSMI are not subject to the Three-strikes law, their previous incarceration time is shorter than prisoners wMMI. However, their sentence length is longer. As prisoners wSMI stay in the alternative facility longer, their average age is higher than prisoners wMMI. Fostering ties with the community during confinement is one of the rehabilitative activities offered to the prisoners wSMI in the alternative facility. Thus, the average SC of prisoners wSMI is higher than that of prisoners wMMI under our recommended policy.

Stock/Parameter Name	**Prisoners wMMI**	**Prisoners wSMI**
Number of Prisoners	22,859	2,177
Ave Age per Prisoner	32.2	33.7
Ave Mental Func per Prisoner	61.4	57.3
Ave SC per Prisoner	60.8	64.3
Ave Previous Incar Time per Prisoner	0.088	0.083
Total Incar Time per Prisoner	3.00	4.00

Table 18 Comparison of Selected Variables Related to Prisoners with Mild and Moderate Mental Illness and Prisoners with Severe Mental Illness in the Policy Scenario and Base Case

6.5.3 Comparison of Policy Elements Enabled Separately

This section presents the simulated behaviors of policy elements being tested separately. The simulated behaviors of each policy elements are compared against the policy scenario. The analysis will be presented from six different perspectives:

1. Impacts on Population
2. Impacts on Public Finance
3. Impacts on Institutions
4. Impacts on Prison Health Care
5. Impacts on Community Services
6. Impacts of Population Attributes

To show the detailed differences between scenarios, the figures in this section are presented from year **2018**, which is the year our recommended policy is implemented in the model, to **2050**.

6.5.3.1 Impacts on Population

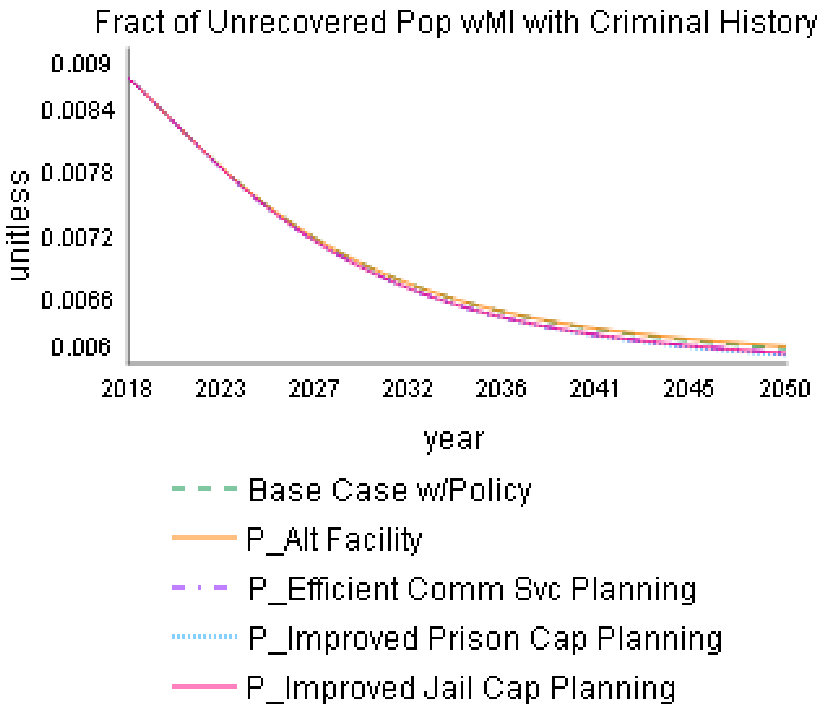


Figure 244 Fraction of Unrecovered Population with Mental Illness with Criminal History under Four Individual Policy Elements Scenarios (2018-2050)

The impact on population level from running the policy elements separately is negligible. However, the fraction of unrecovered population wMI and criminal history (Figure 244) is lower than in the policy scenario when each of the elements are tested separately, except for the first element, i.e. the alternative facility element, being tested in isolation. When only the alternative facility element is simulated, more unrecovered individuals wMI and criminal history are retained in correctional system because it also takes longer time for these prisoners with severe mental illness to be released.

When the community service planning improved, more parolees receive the assistance needed to progress towards desistance. Therefore, recidivism reduces. This leads to lower fraction of unrecovered population wMI and criminal history.

The same goes for improved prison capacity planning. As fewer prisoners develop MI when prison capacity is not over-utilized. Mentally ill prisoners are more likely to adhere to prison rules and subsequently lead to longer incarceration time compared to the mentally fit prisoners. Thus, when prisoners' behavior are less likely to be inteferred by their mental illness, more of them progress to desistance. Consequently, the fraction of unrecovered population wMI and criminal history is lower.

The improved jail capacity planning scenario leads to a lower fraction of prisoners wMI and criminal history because the community service utilization by parolees wMI and parolees wo MI are redundant. So the utilization level of community services are low. More parolees are employed and the recidivism among parolees are lower. Therefore, more of them proceed toward desistance.

6.5.3.2 Impacts on Public Finance

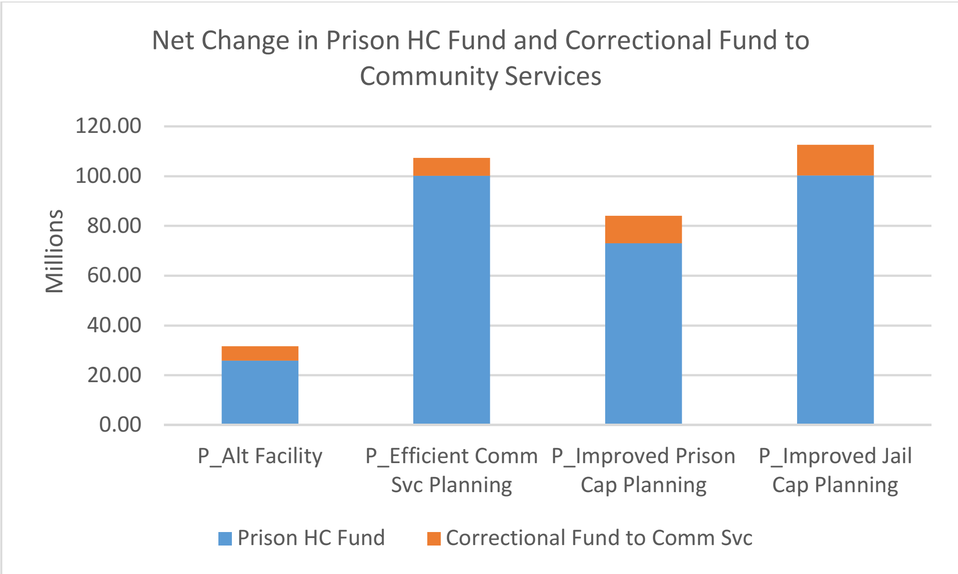
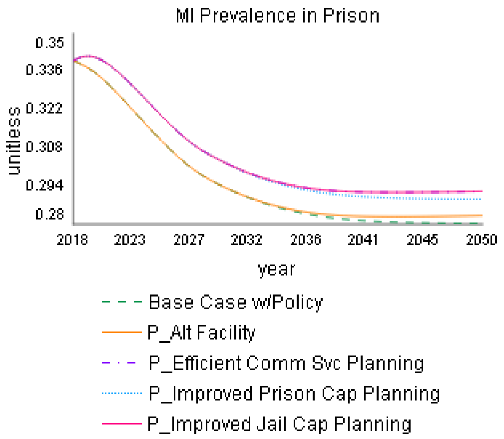


Figure 245 Comparison of Net Savings under Each Individual Policy Element Scenario in 2050

Figure 245 shows the additional spending compared to the base case resulted from implementing each policy element separately. Implementing the first element alone leads to the least additional spending. When the alternative facility element is implemented, a total of $26 million and $6 million additional spendings are incurred in prison health care fund and correctional fund to the community services respectively. The improved prison capacity planning leads to the second least additional spending, which amounts to $73 million and $12 million in prison health care fund and correctional fund to the community services. The efficient community service palnning and improved jail planning scenarios would incur an $101 million additional spending in prison health care fund (in both scenarios) and $11 million and $12 million extra spending in the correctional fund to community services.

6.5.3.3 Impacts on Institutions



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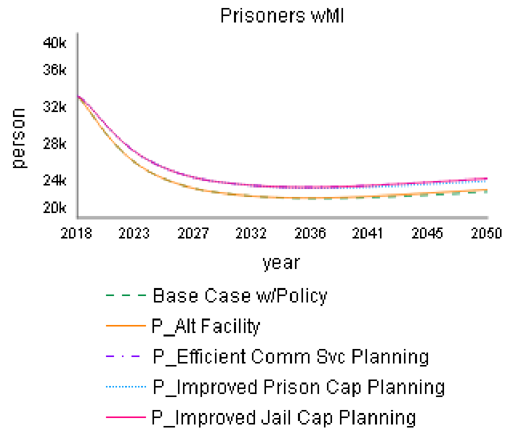

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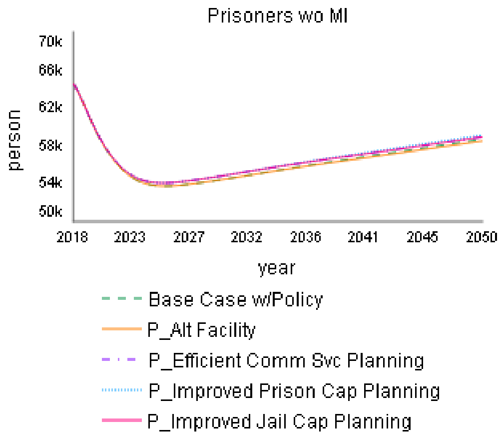

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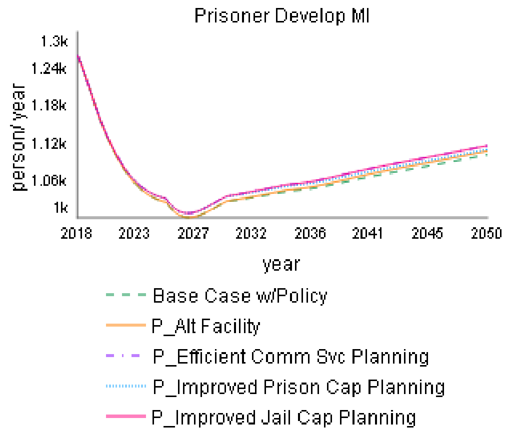

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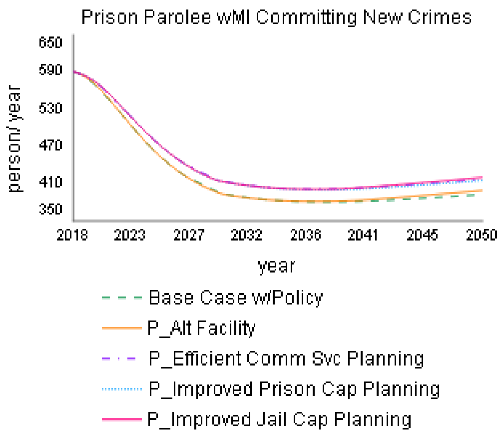

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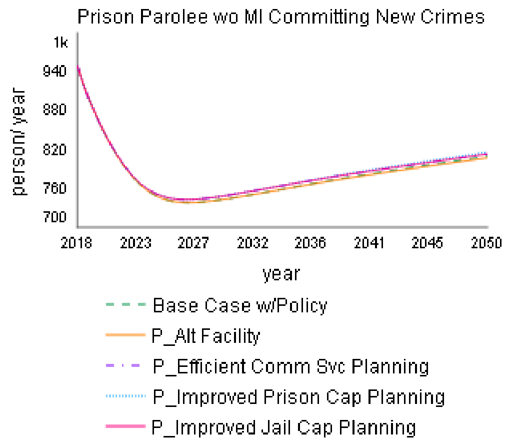
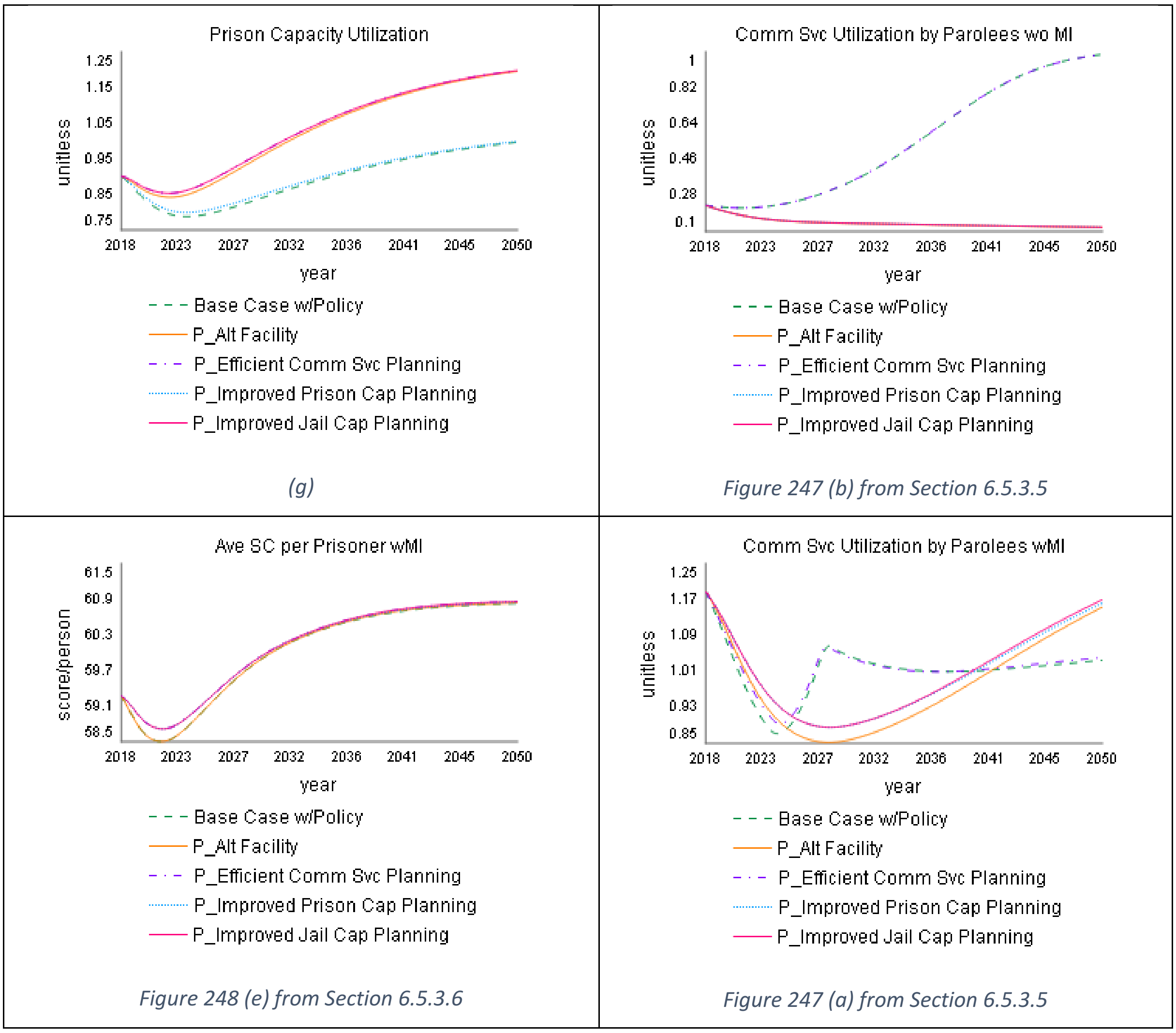


(f)



(g)

Figure 247 (b) from Section 6.5.3.5

Figure 248 (e) from Section 6.5.3.6

Figure 247 (a) from Section 6.5.3.5

Figure 246 Impacts on Institutions under Four Individual Policy Elements Scenarios (2018-2050)

(a)-Mental Illness Prevalence in Prison; (b) - Prisoners with Mental Illness; (c) – Prisoners without Mental Illness; (d) – Prisoner Develop Mental Illness; (e) - Prison Parolee with Mental Illness Committing New Crimes; (f) – Prison Parolee without Mental Illness Committing New Crimes; (g) Prison Capacity Utilization

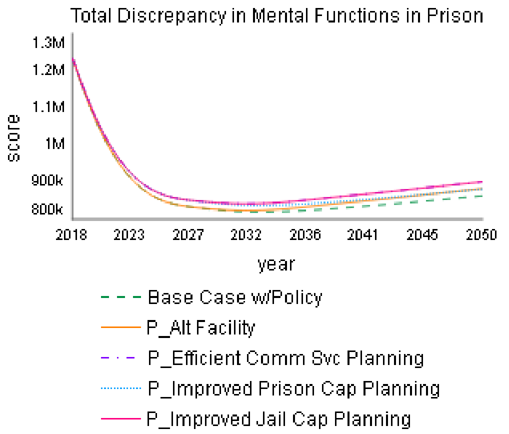
Under the first policy element scenario, i.e. the diversion of prisoners wSMI, the MI prevalence in prison is higher than that in the policy scenario (Figure 246a). This is due to more prisoners wMMI being diagnosed of MI at the reception centers when they are newly admitted (Figures 247e) because the medical screening time adequacy exceeds one between 2018 and 2030. After 2030, the medical screening time adequacy falls to around 0.9. Despite the higher prison capacity utilization (Figure 246g), there are fewer prisoners develop MI (Figure 246d) because the number of prisoners wo MI is lower (Figure 246c). The low community service utilization level by parolees wo MI (Figure 248b) contributes to the lower recidivism among prisoners wo MI (Figure 246f). However, in this scenario, the recidivism rate for prisoners wMI (Figure 246e) is higher because those who are remaining in the prisons are the habitual offenders. So the average SC capital of prisoners wMI is lower than in the base case (Figure 249e).

Under the efficient community service planning policy element scenario, MI prevalence appears to be higher than in the policy scenario (Figure 246a) as there are more prisoners develop MI (Figure 246d). This is due to higher prison capacity utilization (Figure 246g) and higher recidivism rate among prisoners wMI and prisoners wo MI (Figure 246e and f). Focusing on the effort on improving community service reduces excess in community service utilization for prison parolees wMI and prison paroles wo MI (Figures 248 a and b). Excessive capacity implies under-utilization, which is costly, as resources may be used in other priority areas. On the other hand, over-utilization of community services leads to lower employment level among the parolees and subsequently contributes to higher recidivism.

Under the improved prison capacity planning policy element scenario, higher MI prevalence (Figure 246a) resulted from higher recidivism among prison parolees wMI and prison parolees wo MI(Figure 246e and f). Although the purpose of a more efficient prison capacity planning approach is to reduce prison capacity utilization in order to reduce the onset of MI development among prisoners (Figure 246d), the gain from lower number of prisoners develop MI is compensated by higher recidivism among the prison parolees wo MI (Figure 246f). Eventually, prison capacity utilization (Figure 246g) rises because more prisoners wo MI return to the prisons. Consequently, the number of prisoners wo MI develop MI in the prisons still increases.

Finally, under the improved jail capacity planning policy element scenario, MI prevalence is higher (Figure 246a) as there are more prisoners wMI (Figure 246b). The number of prisoners develop MI is higher (Figure 246d) due to the larger number of prisoners wo MI (Figure 246c). The recidivism among prisoners wMI and wo MI are higher (Figure 246e and f). Therefore, prison utilization level remains higher than in the policy scenario (Figure 246g).

6.5.3.4 Impacts on Prison Health Care



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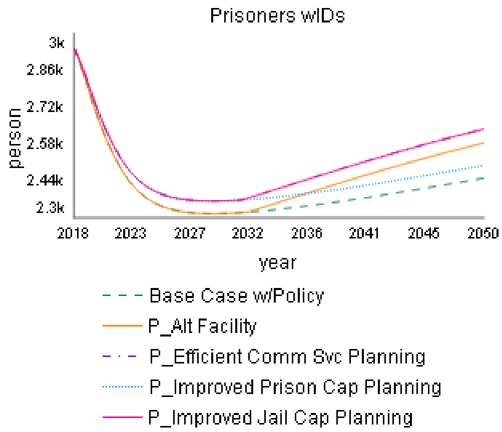

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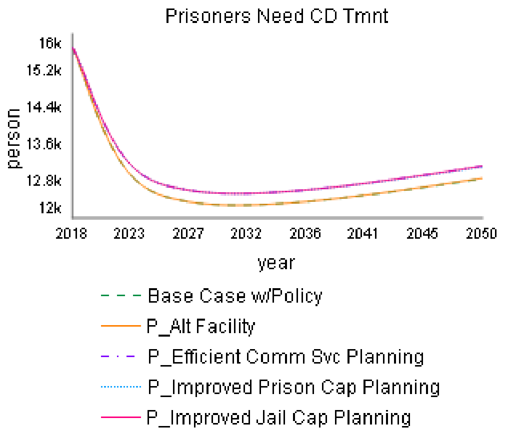

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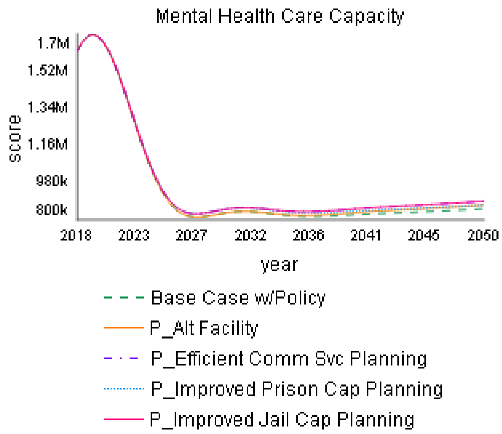

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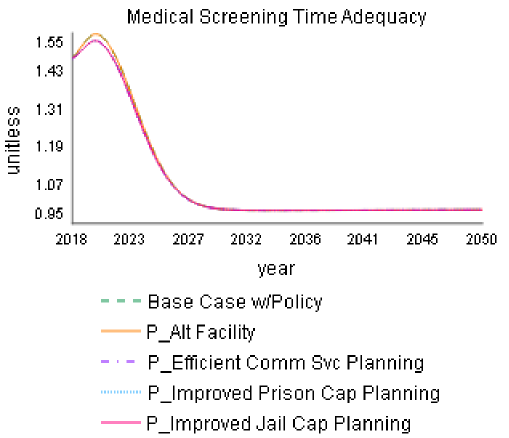


(e)

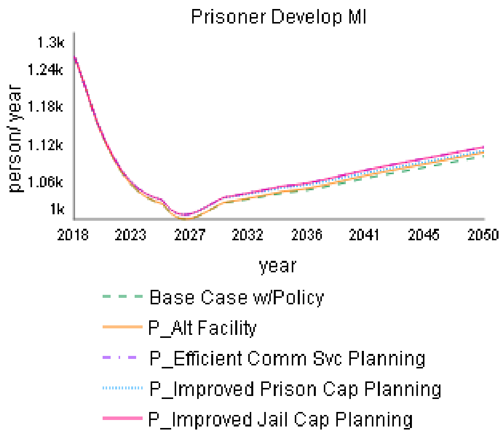


Figure 246 (d) from Section 6.5.3.3

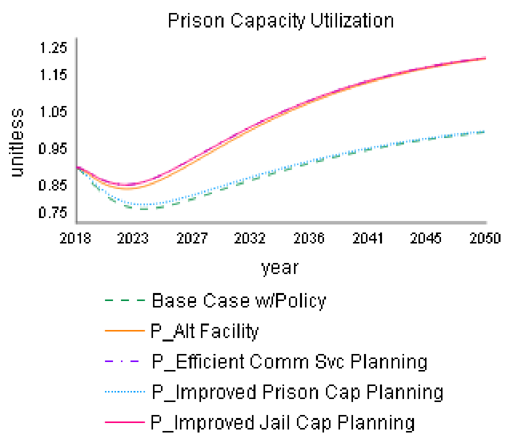


Figure 246 (g) from Section 6.5.3.3

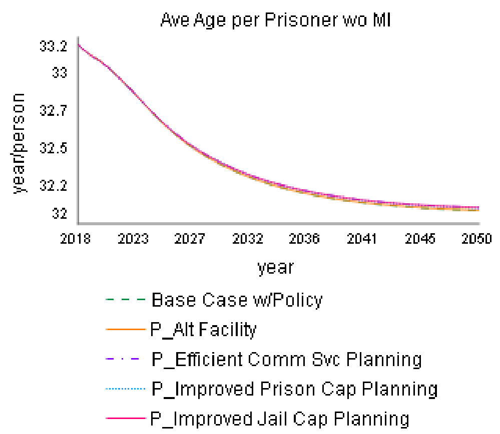


Figure 249 (k) from Section 6.5.3.6

Figure 247 Impacts on Prison Health Care under Four Individual Policy Elements Scenarios (2018-2050)

(a)-Total Discrepancy in Mental Functions in Prison; (b) - Prisoners with Infectious Diseases; (c) – Prisoners Need Chronic Disease Treatment; (d) – Mental Health Care Capacity; (e)-Medical Screening Time Adequacy

Diverting prisoners wSMI away does not affect the MI prevalence in prison significantly because the number of prisoners wSMI being diverted is small compared to the entire prison population. In fact, the total discrepancy of mental funtions in prisons, which portrays the needs for MHC, is higher under all scenarios with individual policy elements simulated separately (Figure 246a) because the number of prisoners develop MI is higher in these scenarios (Figure 246d). The need for infectious disease treatment (Figure 247b) is higher because of higher prison utilization level (Figure 246g). So, infectious diseases infection rate may be higher. The need for chronic disease treatment is also higher in the individual policy element scenarios because the average previous incarceration time served by prisoners wMI and prisoners wo MI are higher in these scenarios. The average age of the prisoners wMI do not differ significantly in all the scenarios, but the average age of prisoners wo MI increases more significantly under these scenarios (Figure 249k).

The analysis from the prison health care perspective suggests that when policy elements is implemented in isolation, i.e. one at a time, health care needs in the prisons will be higher than when all entire policy is implemented together (i.e. all four policy elements are implemented together).

6.5.3.5 Impacts on Community Services

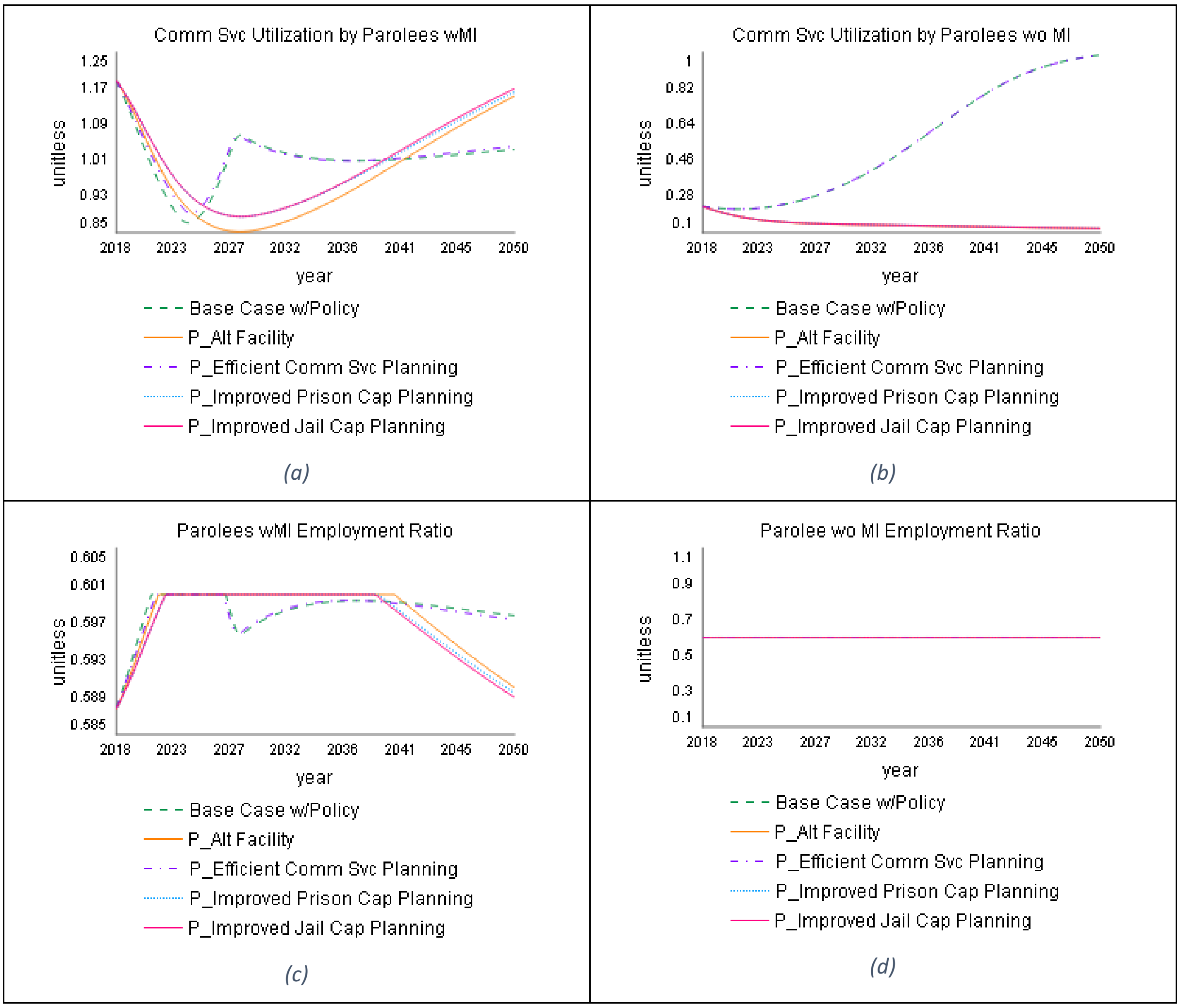
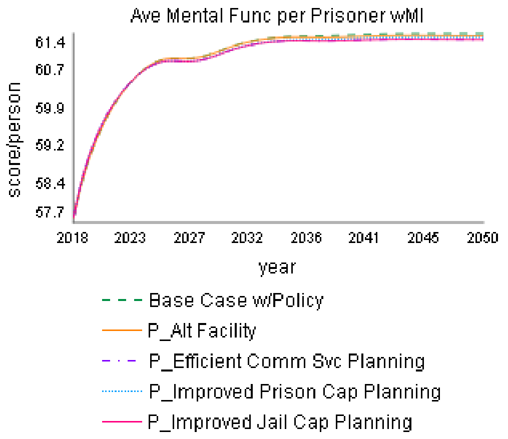


Figure 248 Impacts on Community Services under Four Individual Policy Elements Scenarios (2018-2050)

(a) – Community Service Utilization by Parolees with Mental Illness; (b) - Community Service Utilization by Parolees without Mental Illness; (c) – Parolees with Mental Illness Employment Ratio; (d) – Parolees without Mental Illness Employment Ratio

Under the alternative facility, improved prison capacity planning, and improved jail capacity policy element scenarios, community services utilization level for parolees wMI emerge to be higher than in the policy scenario (Figure 248a and b). Therefore, the employment level of parolees wMI in these three policy element scenarios is lower than in the policy scenario (Figure 248c). The community service utilization level for parolees wo MI in these three policy element scenarios is approaching zero. This implies under-utilization. Under-utilization of community services for parolees wo MI does not yield marginal increase in the employment level of parolees wo MI (Figure 248d). Therefore, such excess community service capacity is costly because the increase in correctional fund fails to yield marginal return.

6.5.3.6 Impacts on Population Attributes



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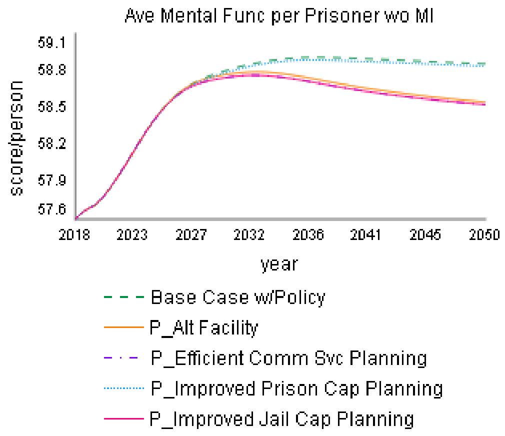

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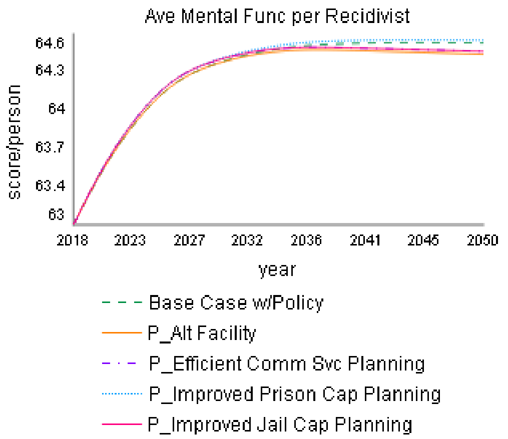

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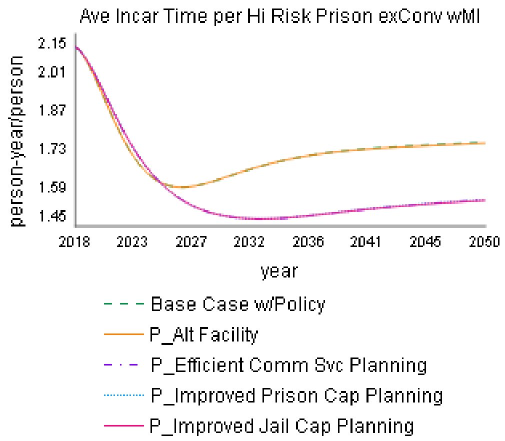

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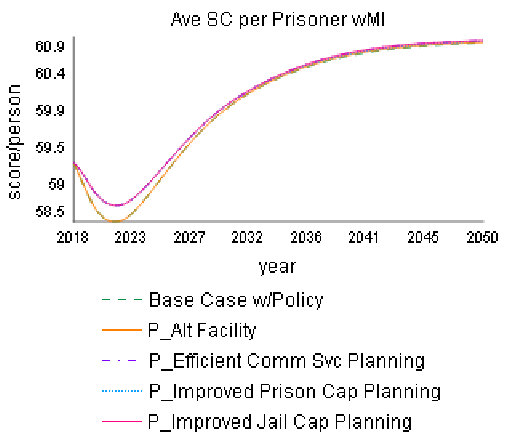

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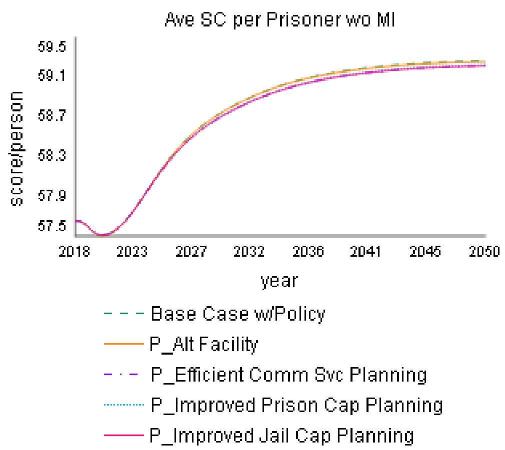

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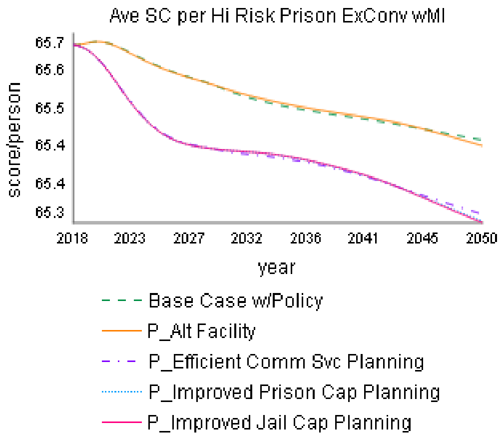

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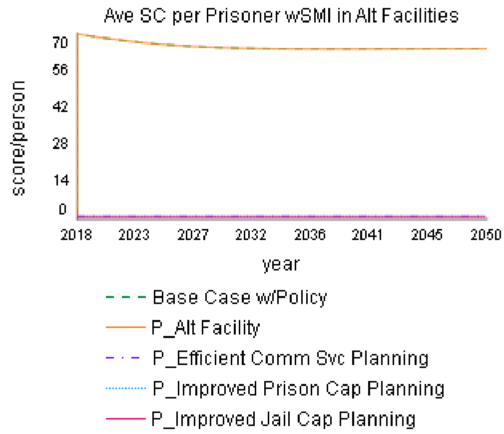
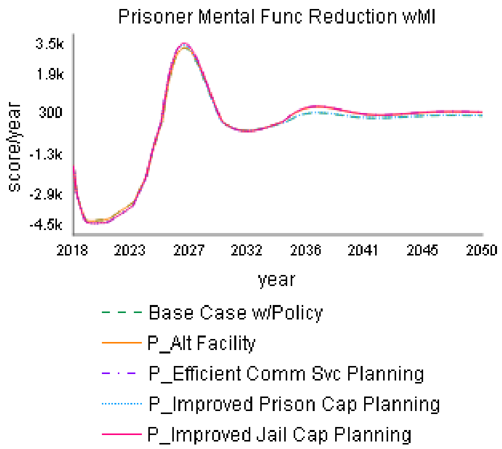
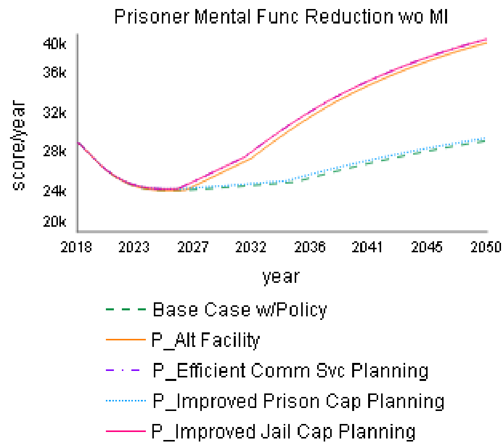


(h)



(i)



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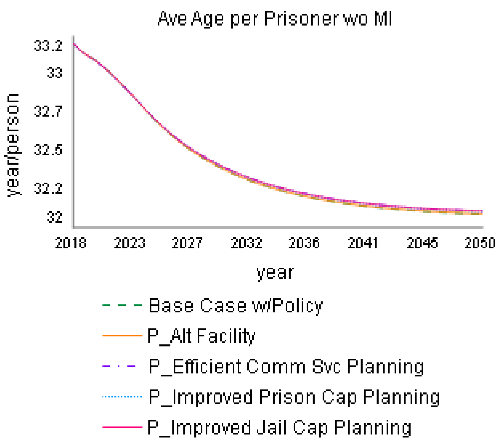


(k)

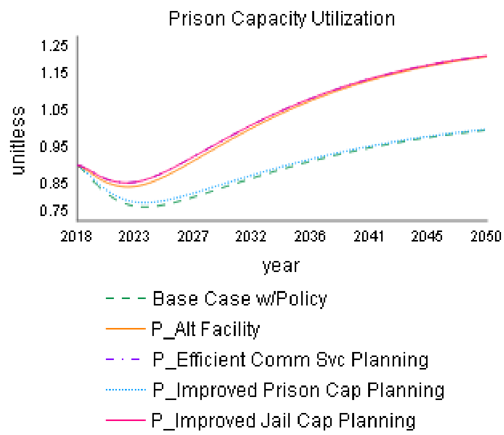


Figure 246 (g) from Section 6.5.3.3

Figure 249 Impacts on Population Attributes under Four Individual Policy Elements Scenarios (2018-2050)

(a) – Average Mental Functions per Prisoner with Mental Illness; (b) - Average Mental Functions per Prisoner without Mental Illness; (c) – Average Mental Functions per Recidivist; (d) – Average Incarceration Time Served by High Risk Prison Ex-convict with Mental Illness; (e) – Average Social Capital per Prisoner with Mental Illness; (f) – Average Social Capital per Prison Parolees with Mental Illness; (g) – Average Social Capita per High-risk Prison Ex-convicts with Mental Illness; (h) – Average Social Capital per Prisoner with Severe Mental Illness; (i) Prisoners wMIs' Average Mental Function Reduction ; (j) Prisoners wo MIs' Average Mental Function Reduction; (k) Average Age per Prisoner without Mental Illness

Under all the policy element scenarios, the average mental functions of prisoners wMI and parolees wo MI are lower than in the policy scenario (Figure 249a ad b). However, the lower average mental functions of prisoners is due to higher prison utilization level (Figure 246g). Higher prison utilization level attributes to the larger deterioration in mental functions among prisoners (Figure 249i and j). The mental functions of prisoners wMI do not deteriorate as much as the prisoners wo MI because the adequacy of mental health care capacity prevents mental functions deterioration among prisoners wMI. In fact, in the first eight years after the policy and policy elements are simulated, the mental functions reduction among prisoners wMI show negative values. This means that the mental functions of prisoners wMI increases (Figure 249i).

The average SC per prisoner wMI (Figure 249e) is lower than the policy scenario because of the lower onset of MI and lower population of prisoners wMI. As there are fewer prisoners wo MI, who possess higher SC, develop mental illness and become prisoners wMI, the prisoners wMI mostly consist of recidivists wMI who have longer average previous incarceration time served. Therefore, prisoners wMI have lower average SC. Consequently, prisoners wMI are released with lower SC. The high-risk prison ex-convicts possess higher SC (Figure 249g) because the prisoners wSMI who possess higher SC are released to this stock (Figure 2489). Prisoners wSMI are offered rehabilitative programs that promote social ties when they are imprisoned in the alternative facility.

However, with improved prison capacity planning, the mental functions of prisoners wo MI improves (Figure 249b). When prison utilization level (Figure 246g) is lower, mental functions of prisoners wo MI are less adversely affected.

The individual policy element scenario test demonstrates the differences between single policy element being implemented and the synergy of all the policy elements being implemented together. The synergy produced from having all the policy elements working together produces the result that is unattainable by any of the element being implemented alone. The result of the interactions of these policy elements is greater than the sum of their individual effects.

6.6 Sensitivity Analysis

This section presents the results of sensitivity analysis conducted under the policy scenario. The objectives of the sensitivity analysis are:

- Testing alternative parameter values within an assumed reasonable range of values to evaluate the impact of the changes on model conclusion;
- Building confidence by assessing whether the behavior generated by the model is realistic compared to the real world;
- Assessing the sensitivity of the model to perturbations

To achieve the above-mentioned objectives, we alter some constants and table functions. The constants and table functions we test are as the following.

Constants

1. Ref Fract Incoming Prisoners wSMI Diverted
2. Ref Fract Prisoners devMI
3. Mental Func Gain in alternative facility
4. Annual Prisoner SC Loss per Prisoner in Alt Facility

Table Functions

1. Effect of Mental Func of preSentencing Convict in Custody on Fract Incoming prisoners wSMI diverted
2. Effect of Mental Func per Prisoner wSMI in alt facility on time served
3. Effect of Mental Func per preSentencing Convict in Custody on Mental Func per Prisoner wSMI
4. Effect of Mental Func per preSentencing Convict in Custody on Ave Mental Func per Prisoner wMMI

Sensitivity analysis results are presented in Appendix N. After conducting the sensitivity analysis tests, the model is found to be insensitive to parameter changes. Between constants and table function variations, the model is more sensitive to constant changes. The variation of fraction of prisoners wSMI being diverted and fraction of prisoners develop MI in prison yield larger changes on model behaviors. When the fraction of incoming prisoners wSMI being diverted is tested at 50%, 150 %, and 500% of the constant, which is 0.05, "MI prevalence in prison" is 1.8%, -1.4%, and -14.0% of the value under the policy scenario (Table 19). The fraction of unrecovered population wMI and criminal history is 0.8% higher or 0.3% lower when 50% less and 50% more prisoners wSMI being diverted. Total prisoners is 0.7% lower when 50% fewer prisoners wSMI are diverted and 1.2% and 8.3% higher when

150% and 500% more prisoners wSMI are diverted. Total recidivism by ex-convicts and parolees is 0.1%, -0.1%, and -1.1% when the fraction of incoming prisoners wSMI being diverted is tested at 50%, 150%, and 500% of the constant.

Parameter Tested: Ref Fract Incoming Prisoners wSMI Diverted				
Parameter	Policy Scenario	50% of Initial value	150% of Initial value	500% of Initial value
MI Prevalence in Prison	0.280	0.285 (1.8%)	0.276 (-1.4%)	0.240 (-14.0%)
Fract of Unrecovered Pop wMI with Criminal History	0.00616	0.00611 (-0.8%)	0.00618 (0.3%)	0.00640 (3.9%)
Total Prisoners	81,872	82,481 (0.7%)	80,858 (-1.2%)	75,110 (-8.3%)
Total ExConv and Parolee Recidivism	88,710	88,825 (0.1%)	88,594 (-0.1%)	87,770 (-1.1%)
Parameter Tested: Ref Fract Prisoners DevMI				
Prisoners wSMI in Alternative Facility	1,383	2,171 (-0.2%)	2,170 (-0.3%)	2,168 (-0.4%)
MI Prevalence in Prison	0.272	0.267 (-4.6%)	0.293 (4.6%)	0.367 (31%)
Fract of Unrecovered Pop wMI with Criminal History	0.00594	0.00605 (-1.8%)	0.00624 (1.3%)	0.00683 (10.9%)

Table 19 Comparison of Sensitivity Analysis Results by Varying the Reference Fraction of Incoming Prisoners with Severe Mental Illness Diverted and Reference Fraction of Prisoners Develop Mental Illness

When the fraction of prisoners develop MI varies at 50%, 150% and 500% of the constant, which is 0.02, the Prisoners wSMI in Alternative Facility stock 0.2%, 0.3 % and 0.4% lower than in the policy scenario. When 50% fewer prisoners develop MI, MI prevalence decreases 4.6%; when 150% and 500% more prisoners develop MI, MI prevalence is a 4.6% and 31% higher. “Fract of Unrecovered Pop wMI with Criminal History” is also sensitive to the variation in the fraction of prisoners develop MI. When 50% fewer prisoners develop MI, “Fract of Unrecovered Pop wMI with Criminal History” is 1.8% lower; if 150% and 500% more prisoners develop MI, “Fract of Unrecovered Pop wMI with Criminal History” is 1.3% and 11% higher.

In sum, the patterns of model behaviors do not change in sensitivity testing. However, the values of MI prevalence, fraction of unrecovered population wMI and criminal history, and recidivism show more obvious variations when the two constants, the fraction of incoming prisoners wSMI and fraction of prisoners develop MI, vary.

6.7 Chapter Summary

The insights from the analyses in Chapter 4 and 5 shows that the Realignment policy reduces the prison population and unrecovered population with criminal history significantly. However, the Realignment policy has disproportionate effects on prisoners with mental illness (wMI) and prisoners without mental illness (wo MI). The unrecovered populations wMI and criminal history changes much less under the Realignment policy. We recommend a policy with four elements to lower mental illness (MI) prevalence in prison and reduce the unrecovered population wMI and criminal history further.

The policy structure is built upon the full model. Then, validation, analysis, and sensitivity analysis are conducted. Under the policy scenario, the prisoners wMI population reduces while the unrecovered population wMI and criminal history and the unrecovered population with criminal history increase. Subsequently, the recovered population with criminal history decreases. This is because of the diversion of prisoners with severe mental illness (wSMI) to an alternative faciiltiy. As the alternative facility is responsible to let prisoners to serve their sentences while providing mental health care and targeted rehabilitative programs to facilitate prisoners wSMIs' reentry upon release, prisoners wSMI serve longer time. Hence, more prisoners with mental illness remain in the correctional system, which is part of the unrecovered population wMI and criminal history and part of unrecovered population with criminal history. With our recommended policy, community service capacities for parolees wMI and parolees wo MI adjust according to the demand. Hence, utilization levels are brought to the appropriate levels, which is around one. In that case, excessive capacity or over-utilization is prevented. Consequently, more parolees are employed and recidivism is lowered. At the same time, the correctional fund to community services is lower because excessive capacity is avoided.

Even with our policies aiming to enlarge the outflow from the criminal justice system by assisting individuals wMI and criminal history move through the system and become desisting ex-convicts, the simulation shows that the unrecovered population wMI and criminal history still increase insignificantly. With more prisoners wSMI remain in the correctional system and the linearly increase in the inflow of first-time offenders (due to the constant fraction of innocent individuals being arrested and a growing population), our recommended policy does not result in a larger outflow from the unrecovered population with criminal history to the recovered population with criminal history. Unless the time to move through the criminal justice system to desistance is shortened further until the outflow from the unrecovered population with criminal history exceeds the inflow of the first-time offenders. But this will require a long adjustment time and process. In order to reduce the inflow, effective crime prevention programs, which falls outside the scope of this study, will be needed. To increase the outflow, further assistance may be needed to reach the high-risk jail and prison ex-convicts to speed up the process to desistance.

Nevertheless, our recommended policy still contributes to improving the system marginally. The average mental functions of prisoners and ex-convicts improve slightly. The average previous incarceration times served by prisoners and ex-convicts also reduce insignificantly. The improvement in mental functions and reduction in previous incarceration time served contribute to savings in prison mental health care spending and correctional fund for community services.

The multi-perspective policy impact analysis shows that if we only analyze the policy impact from a single perspective, such as the population-level perspective, it may seem that our recommended policy leads to more unrecovered population with mental illness and criminal history. However, albeit slight improvements in other aspects of the system, the marginally improvements in other aspects, such as the attributes of individuals in the criminal justice system, contribute to considerable cumulative savings in public monies. More importantly, our model-based policy impact analysis enables use to trace the causal effects of our recommended policy on the system.

7 Scenario Analysis

This chapter presents six scenario analyses. The purpose of these analyses is to test the generalizability of the model. If the model demonstrates different modes of behavior under different circumstances with explainable behavior, the model is considered to have passed the generalizability test. To conduct the tests, the full policy model is used.

In the first scenario, the Realignment policy and recommended policy are being introduced at the start of the simulation rather than in 2012 and 2018 respectively. In the following three scenarios, historical policies are removed one by one to formulate different contexts with the absence of these historical policies. The elimination of structural elements mimics new systems with different initial conditions. The first scenario compares to the Policy scenario, i.e. our recommended policy scenario; Scenario 2 to 4 compare to the preceeding scenarios. Such progressive comparison aims at demonstrating the effect of removing one structural element at a time. The last scenario compares to the Policy scenario. The system in the last scenario is the same as in Scenario 1, only with a step increase in arrest rate from 2018 – 2023. This scenario analysis aims at investigating the model behavior under the circumstance that the "war on drugs" policy is re-launched after the entire population in the criminal justice system has decreased.

A summary of the scenario testing is presented in the next section (Table 20) followed by detailed scenario analysis in the subsequent sections. Selected simulation results will be presented in graphs along with text description.

7.1 Overview of the Five Scenarios

Scenario 1	• Purpose: *To assess the change in model behavior if the Realignment Policy and our recommended policy are introduced at the beginning of the simulation* • Modification: Introduce the Realignment Policy and our recommended policy in 1987 instead of 2012 and 2018. • Value: Explore the impact on mental illness (MI) prevalence in prison and the fraction of unrecovered population with MI and criminal history in a rehabilitative system that aims at reducing recidivism, increase social support, and specifically treat prisoners with serious MI with a hike in arrest rate in the beginning resulted from the historical "war on drugs" policy.
Scenario 2	• Purpose: *To assess the change in model behavior if the Realignment Policy and our recommended policy are introduced at the beginning of the simulation without the presence of Three-strikes Law* • Modification: Introduce the Realignment Policy and our recommended policy in 1987 instead of 2012 and 2018; disable the Three-strike Law effect from 1987. • Value: Explore the impact on MI prevalence in prison and the fraction of unrecovered population with MI and criminal history in a rehabilitative system without Three-strikes Law that aims at reducing recidivism, increase social support, and specifically treat prisoners with serious MI with a hike in arrest rate in the beginning resulted from the historical "war on drugs" policy.
Scenario 3	• Purpose: *To assess the change in model behavior if the Realignment Policy and our recommended policy are introduced at the beginning of the simulation without the presence of Three-strikes Law and influence of the deinstitutionalization movement in the 1970s.* • Modification: Introduce the Realignment Policy and our recommended policy in 1987 instead of 2012 and 2018; Disable the Three-strike Law effect from 1987; Reduce the initial value of Prisoners wMI to only 0.1% of the stated value.

	• Value: Explore the impact on MI prevalence in prison and the fraction of unrecovered population with MI and criminal history in a rehabilitative system without Three-strikes Law that aims at reducing recidivism, increase social support, and specifically treat prisoners with serious MI with a hike in arrest rate in the beginning, assuming that the initial prisoners wMI is low; test the explanatory power of the theory that attributes the cause of high MI prevalence in prison to the deinstitutionalization movement in 1970s.
Scenario 4	• Purpose: *To assess the change in model behavior if the Realignment Policy and our recommended policy are introduced at the beginning of the simulation without the presence of Three-strikes Law, influence of the deinstitutionalization movement in the 1970s, and the "war on drugs" policy in the 1980s*. • Modification: Introduce the Realignment Policy and our recommended policy in 1987 instead of 2012 and 2018; disable the Three-strike Law effect from 1987; reduce the initial value of Prisoners wMI to only 0.1% of the stated value; reduce the fraction of innocent population arrested to a lower constant value from 1987. • Value: explore the impact on MI prevalence in prison and the fraction of unrecovered population with MI and criminal history in a rehabilitative system without Three-strikes Law that aims at reducing recidivism, increase social support, and specifically treat prisoners with serious MI, assuming that the initial prisoners wMI is low and without the hike in arrest rate in the beginning.
Scenario 5	• Purpose: *To assess the change in model behavior if the first-time crime commitment increases gradually from 2018*. • Modification: fraction of population arrested increases 0.5% annually from 2018 to 2023. • Value: Explore the impact on MI prevalence in prison and the fraction of unrecovered population with MI and criminal history with a hike in arrest rate again in 2018 against a backdrop of decreasing population in the criminal justice system.

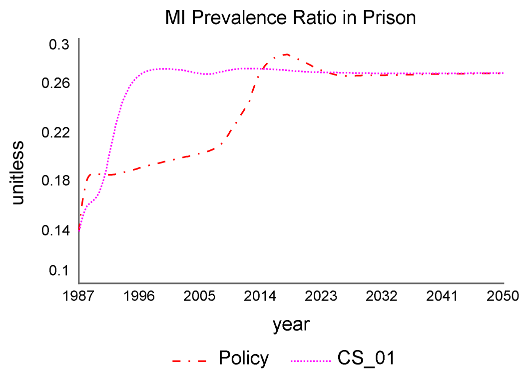
Table 20 Descriptions of Case Studies

7.2 Scenario 1

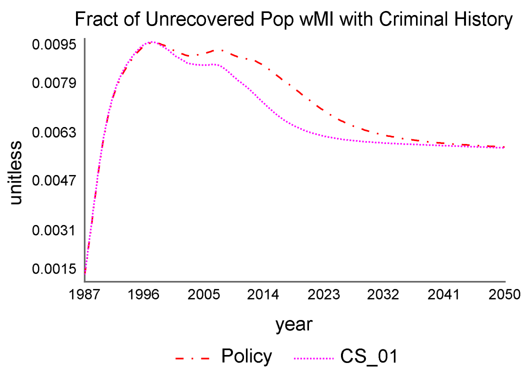
The Realignment Policy and our recommended policy are both introduced in 1987. The purpose is to assess the change in model behavior resulting from the introduction of the Realignment Policy and our recommended policy at the start of the simulation.

This scenario shows that with a combination of reduced prison population, adequate prison MHC resources, and sufficient community services early in the simulation, the prison population and the population of prisoners wMI remain lower throughout the simulation. Although the MI prevalence appears to be higher between 2015 and 2025, the fraction of the unrecovered population wMI and criminal history is lower. The mental functions of prisoners are higher in general. Most importantly, prison truly functions as it is intended to do, i.e. punishing the offenders and habitual offenders. The community lives up to the public's expectation to rehabilitate ex-convicts.

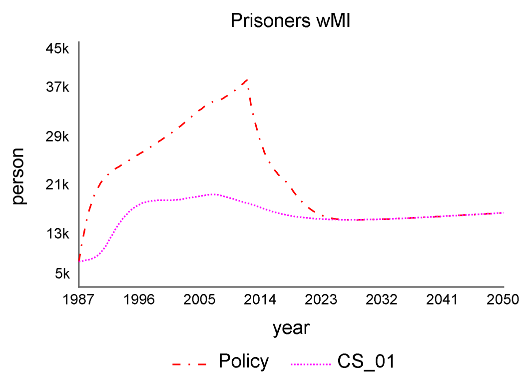
Selected Results from Scenario 1



(a)



(b)



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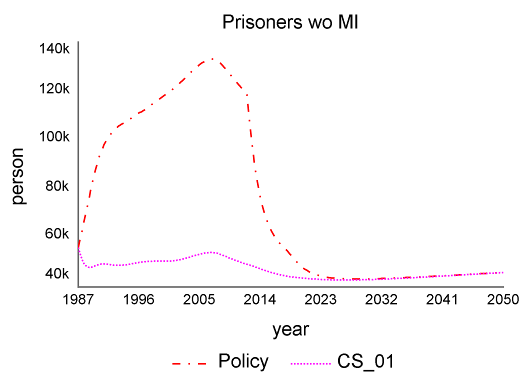


(d)

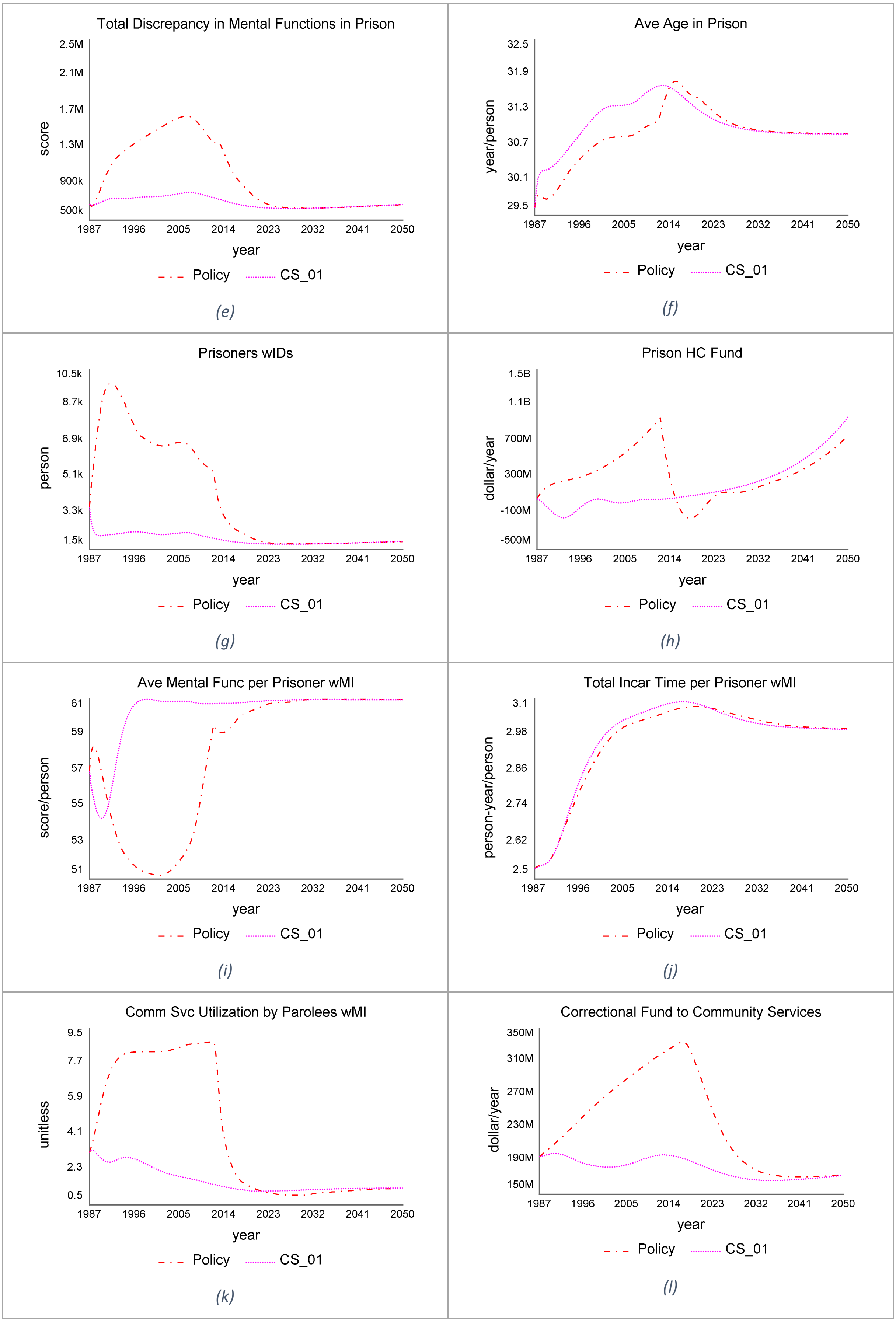


Figure 250 Comparison of Simulated Results in Policy Scenario and Scenario 1

(a)-MI Prevalence in Prison; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) – Prisoners with Mental Illness; (d) – Prisoners without Mental Illness; (e) – Total Discrepancy in Mental Functions in Prison; (f) – Average Age in Prison; (g) – Prisoners with Infectious Diseases; (h) – Prison Health Care Fund; (i) Average Mental Function per Prisoner with Mental Illness; (j) – Total Incarceration Time per Prisoner with Mental Illness; (k) – Community Service Utilization by Parolees with Mentall Illness; (l) Correctional Fund to Community Services

In Scenario 1, the Realignment Policy and our recommended policy are being introduced at the start of the simulation. Hence, some parolees are being diverted to county parole supervision early in the simulation. Some incoming prisoners wSM are also diverted to alternative facility. The prison population is being drastically reduced (Figure 250c and d). Therefore, the prisoners wMI stock is lower (Figure 250c). The MI prevalence in prison is higher in the first half of the simulation because the magnitude of the reduction in prisoners wo MI exceeds the magnitude of reduction in prisoners wMI (Figure 250a). Also, the increasing effectiveness of screening incoming prisoners contributes to a larger inflow of prisoners wMI. Eventually, the MI prevalence in prison matches that observed in the Policy scenario later in the simulation. Nevertheless, the fraction of the unrecovered population wMI and a criminal history is lower than that in the Policy scenario (Figure 250b) because more individuals with criminal history progress towards desistance.

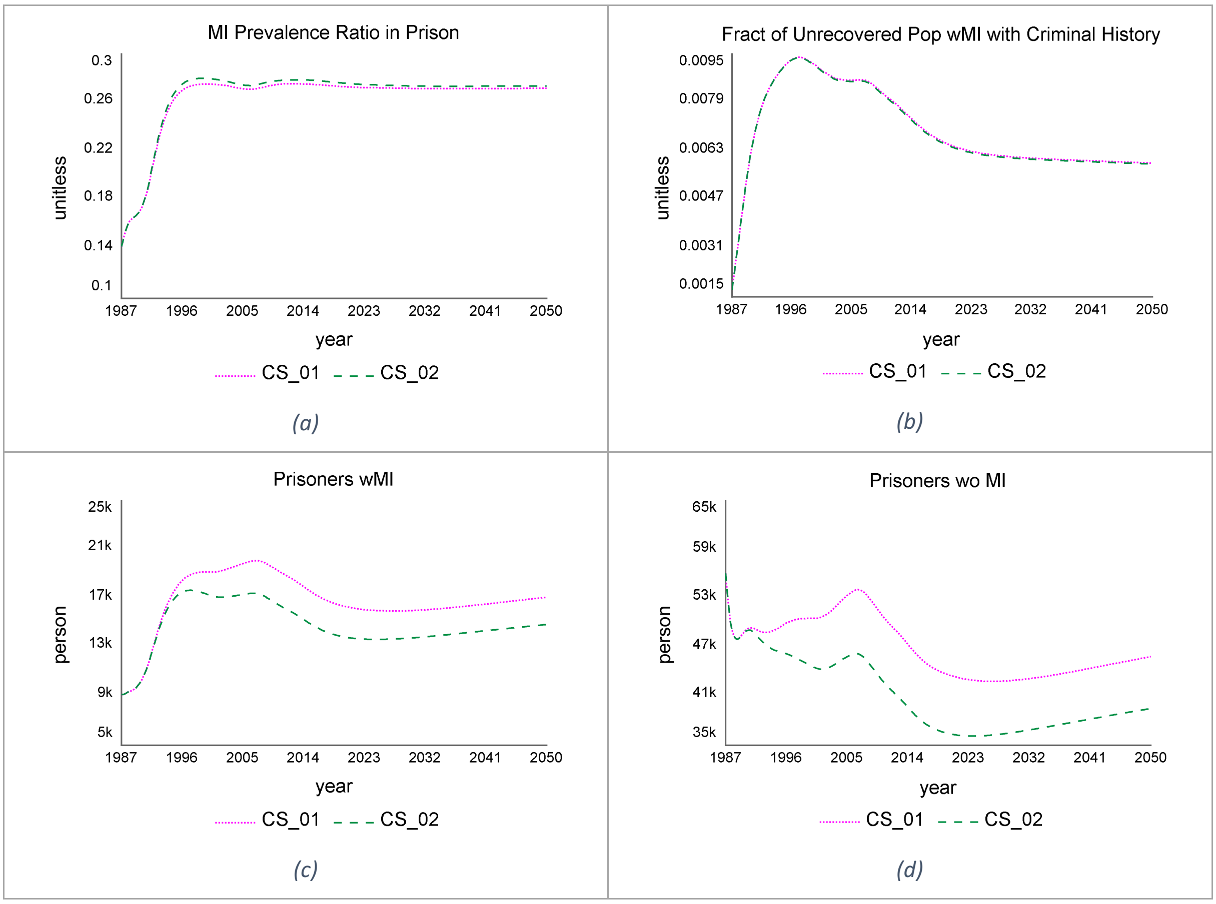
Since more prisoners are rehabilitated due to a larger amount of HC resources in prison and sufficient community services, the remaining prisoners are habitual offenders with increasing age (Figure 250f). Thus, the needs for chronic disease (CD) treatment is higher in Scenario 1. However, the needs for MHC (Figure 250e) and infectious disease (ID) treatment (Figure 250g) are lower due to fewer prisoners wMI and lower total prison population. This leads to lower HC fund in the first half of the simulation (Figure 250h). In the second half of the simulation, the HC fund in Scenario 1 exceeds that observed in the Policy scenario because of a larger older prison population that needs more intensive and costly CD treatment. The increase in the average age in prison is attributable to the increase in habitual offenders serving longer sentences. The average mental functions of prisoners wMI is higher (Figure 250i) even though they are more likely to be habitual offenders with longer incarceration time served (Figure 250j) due to adequate MHC.

A lower prison population and more adequate prison MHC, combined with sufficient community services, result in more parolees wMI progressing towards desistance instead of recidivism. As more prisoners wMI are being treated, the needs for community services for parolees wMI also reduce. Hence, community service utilization by parolees wMI is characterized by a lower trend than what we observe in the Policy scenario (Figure 250k). Due to a lower needs for community services for parolees wMI and better budget planning, the correctional fund for community services has been lower in Scenario 1 (Figure 250l).

7.3 Scenario 2

This scenario is an extension of Scenario 1 with one additional change: The Three-strikes Law structure has been removed from the beginning of the simulation. Thus, the time prisoners spend in prison (the "current prison time served" parameter) is constant rather than variable. Removing this reinforcing loop between the previous incarceration time served and current sentence length also leads to the removal of several other reinforcing relationship, namely the effect on prison sentence conviction, prisoners' SC loss, fraction of prison parolees return to prison, and fraction of county parolees return to jail. The purpose is to assess the change in model behavior provided the Realignment Policy and our recommended policy both are being introduced at the beginning of the simulation in the absence of the Three-strikes Law.

Selected Results from Scenario 2



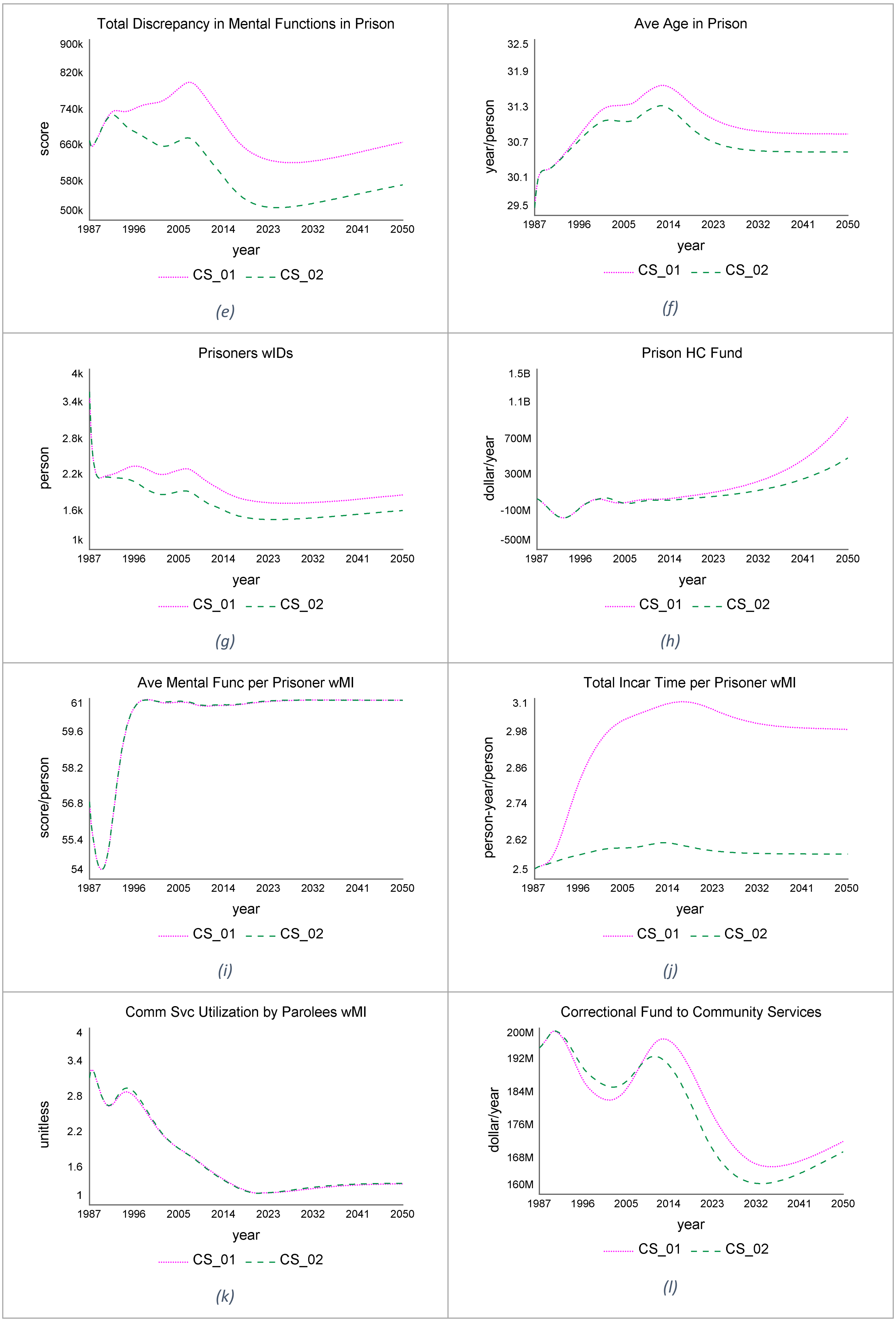


Figure 251 Comparison of Simulated Results in Policy Scenario and Scenario 2

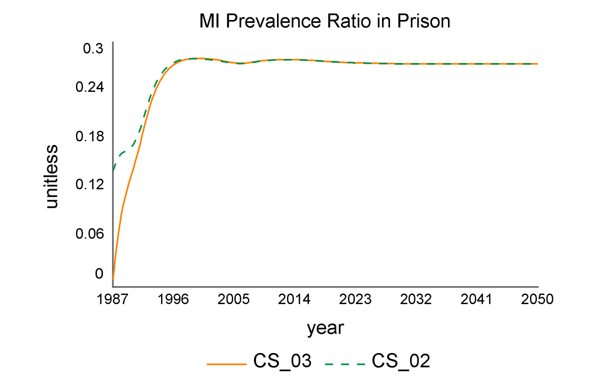
(a)-MI Prevalence in Prison; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) – Prisoners with Mental Illness; (d) – Prisoners without Mental Illness; (e) – Total Discrepancy in Mental Functions in Prison; (f) – Average Age in Prison; (g) – Prisoners with Infectious Diseases; (h) – Prison Health Care Fund; (i) Average Mental Function per Prisoner with Mental Illness; (j) – Total Incarceration Time per Prisoner with Mental Illness; (k) – Community Service Utilization by Parolees with Mentall Illness; (l) Correctional Fund to Community Services

Comparing Scenario 2 to Scenario 1 reveals that without the influence of Three-strikes Law, the MI prevalence in prison reduces slightly (Figure 251a). This is because the reduction in prisoners wo MI is relatively larger than the reduction in prisoners wMI (Figure 251c and d). Due to the overall reduction in prison population, the needs for MHC, CD treatment, and ID treatment are lower in this scenario (Figure 251e-g). Consequently, prison HC fund is lower (Figure 251h) in the second half of the simulation. The lower HF fund is attributable to the lower cost in the treatment for older prisoners. The total incarceration time per prisoner wMI is significantly shorter as the change is only contributed by the frequency of recidivism, i.e. how many times there recidivists recommit crimes, whereas with the presence of the Three-strikes Law, the increase in previous incarceration time served is attributed to the frequency of recidivism and the increase in average prison time due to recidivism (Figure 251j). This also implies fewer habitual offenders. Due to fewer parolees wMI and parolees wo MI, the correctional fund to community services appears to be lower than in Scenario 1 (Figure 251l). Compared to Scenario 1, Scenario 2 leads to more significant savings in prison HC and in correctional fund for community services.

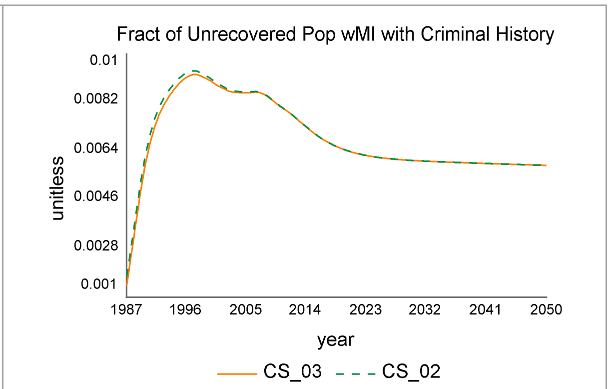
7.4 Scenario 3

This scenario is an extension of Scenario 2 with one additional change: The effect of deinstitutionalization is annulled by reducing the initial value of the Prisoners wMI stock to 0.1% of the original initial value. This change is intended to represent a small number of prisoners wMI at the start of the simulation. The purpose of this scenario is to test the explanatory power of the theory that states that the high MI prevalence in prison is caused by the large-scale shutdown of mental hospitals in the 1970s. The advocates of this theory further suggest that the displaced mentally ill individuals are stigmatized and criminalized.

Selected Results from Scenario 3



(a)



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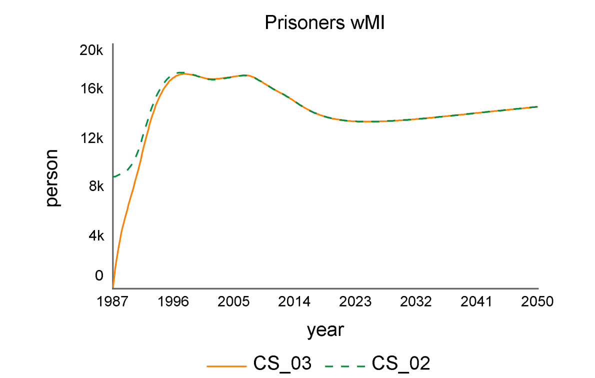

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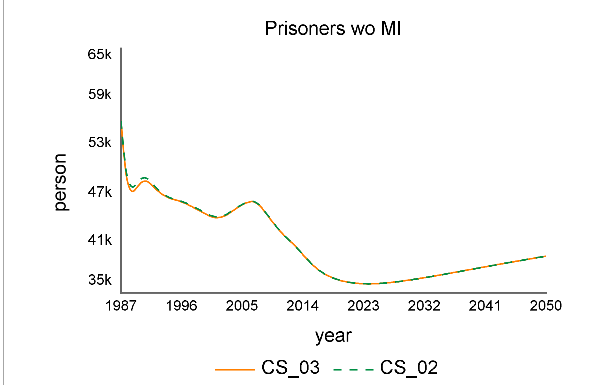

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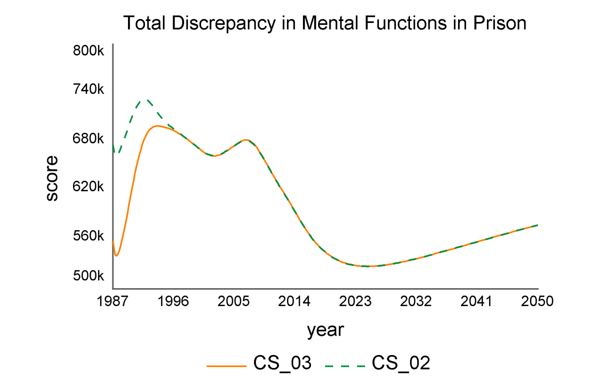
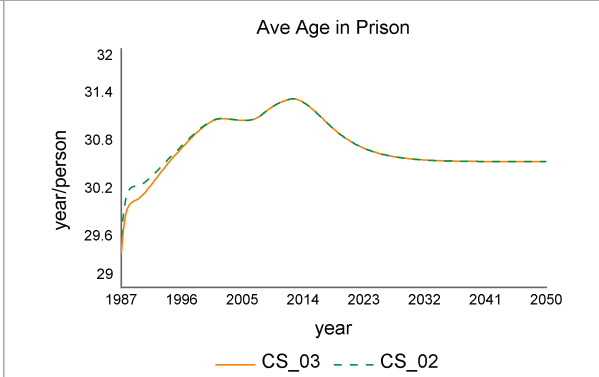


(e)



(f)

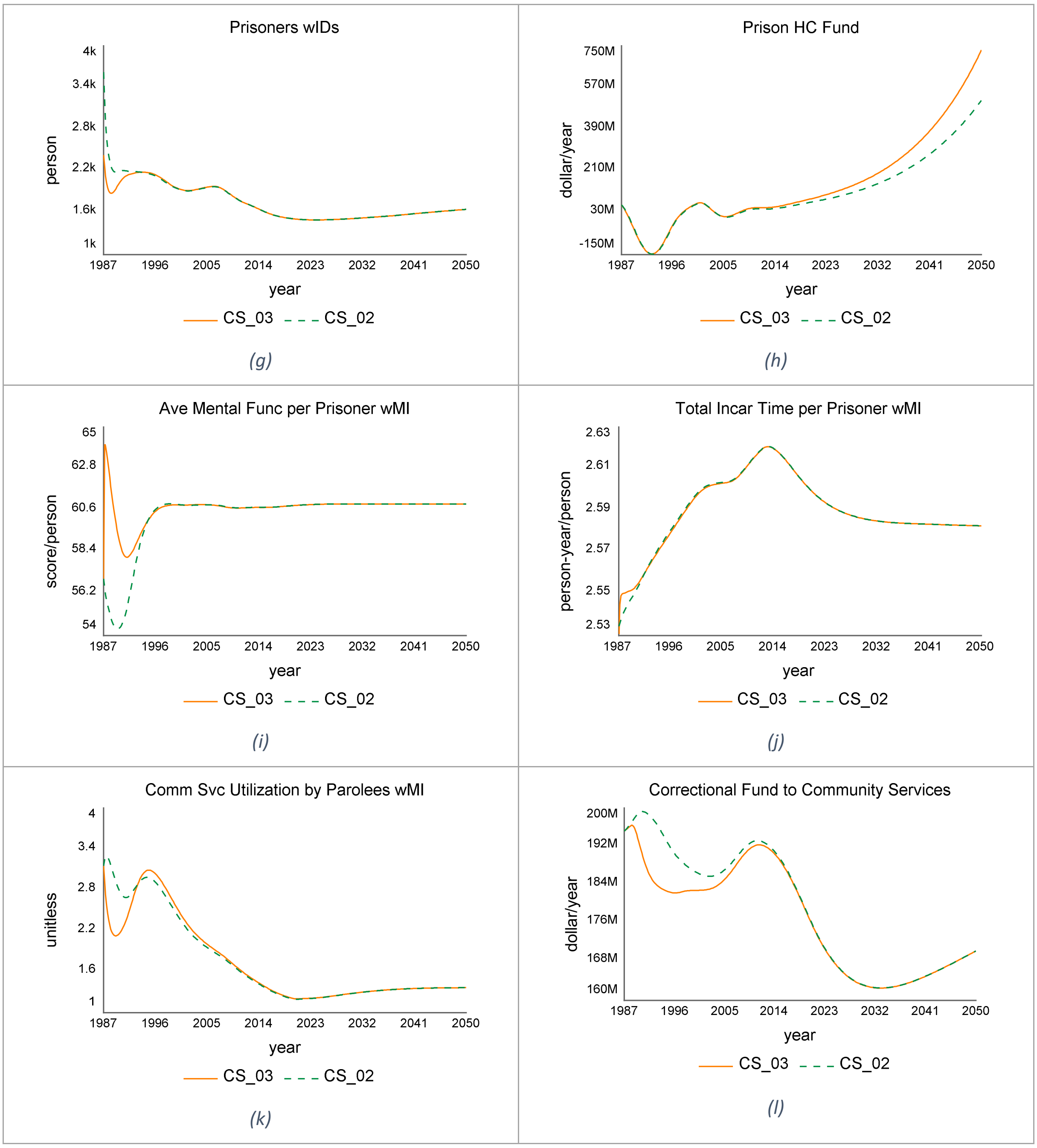


Figure 252 Comparison of Simulated Results in Policy Scenario and Scenario 3

(a)-MI Prevalence in Prison; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) – Prisoners with Mental Illness; (d) – Prisoners without Mental Illness; (e) – Total Discrepancy in Mental Functions in Prison; (f) – Average Age in Prison; (g) – Prisoners with Infectious Diseases; (h) – Prison Health Care Fund; (i) Average Mental Function per Prisoner with Mental Illness; (j) – Total Incarceration Time per Prisoner with Mental Illness; (k) – Community Service Utilization by Parolees with Mentall Illness; (l) Correctional Fund to Community Services

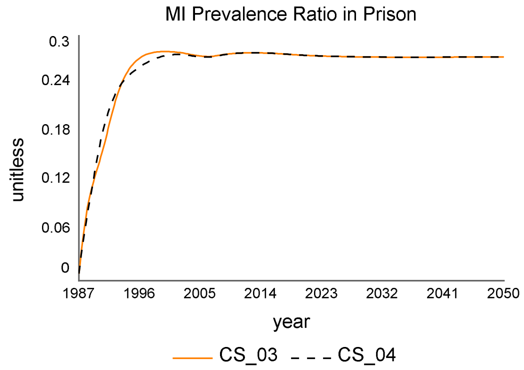
This scenario shows that minimizing the initial value of the stock of Prisoners wMI to diminish the effect of deinstitutionalization, i.e. assuming that the displaced individuals wMI are not criminalized and do not end up in prison, has little impact on the overall model behavior. The MI prevalence in prison is lower in the beginning of the simulation (Figure 252a). As such, the total discrepancy in mental functions among prisoners is lower in the beginning (Figure 252e). As the prisoners wMI increases due to recidivism, the average age in prison also increases (Figure 252f) in the beginning. When recidivists wMI return to prison and age accordingly during their repeated episodes of recidivism, the needs for CD treatment increases later in the simulation. Consequently, prison HC fund is higher than in Scenario 2 (Figure 252h). At the same time, correctional fund to community services is lower in the beginning of the simulation (Figure 252l) because there are fewer prison parolees wMI who need community services. Thus, the community service utilization by parolees wMI is lower than in Scenario 2 (Figure 252k).

This simulation results show that the increase in MI prevalence in prison is caused by the internal structure of the system rather than the perturbation from the deinstitutionalization movement. If the deinstitutionalization is the main cause of the increase in prisoners wMI, the prison wMI population will remain persistently lower after the first few years of the simulation because population of the prisoners wMI should return to a lower level after these ex-convicts progress towards desistance.

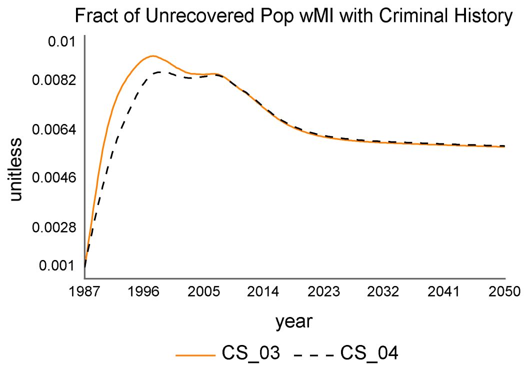
7.5 Scenario 4

This scenario is an extension of Scenario 3 with one additional change: The effect "war on drugs" policy has been removed from the model. Hence, the fraction of the innocent population arrested from 1987 to 1994 remains at the 1995 level. The effect of the "war on drugs" policy on fractions of parolees wMI and parolees wo MI returning to prison due to parole violation has also been removed. This scenario aims at representing a case as if "war on drugs" policy had not been introduced.

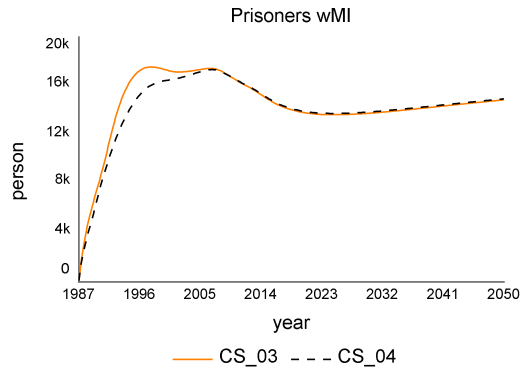
Selected Results from Scenario 4



(a)



(b)



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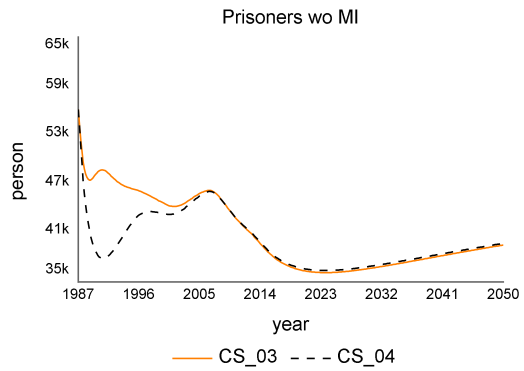
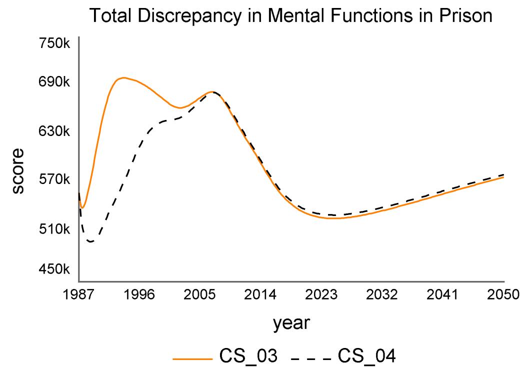


(d)



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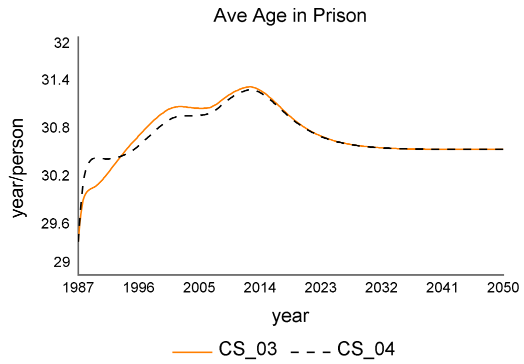

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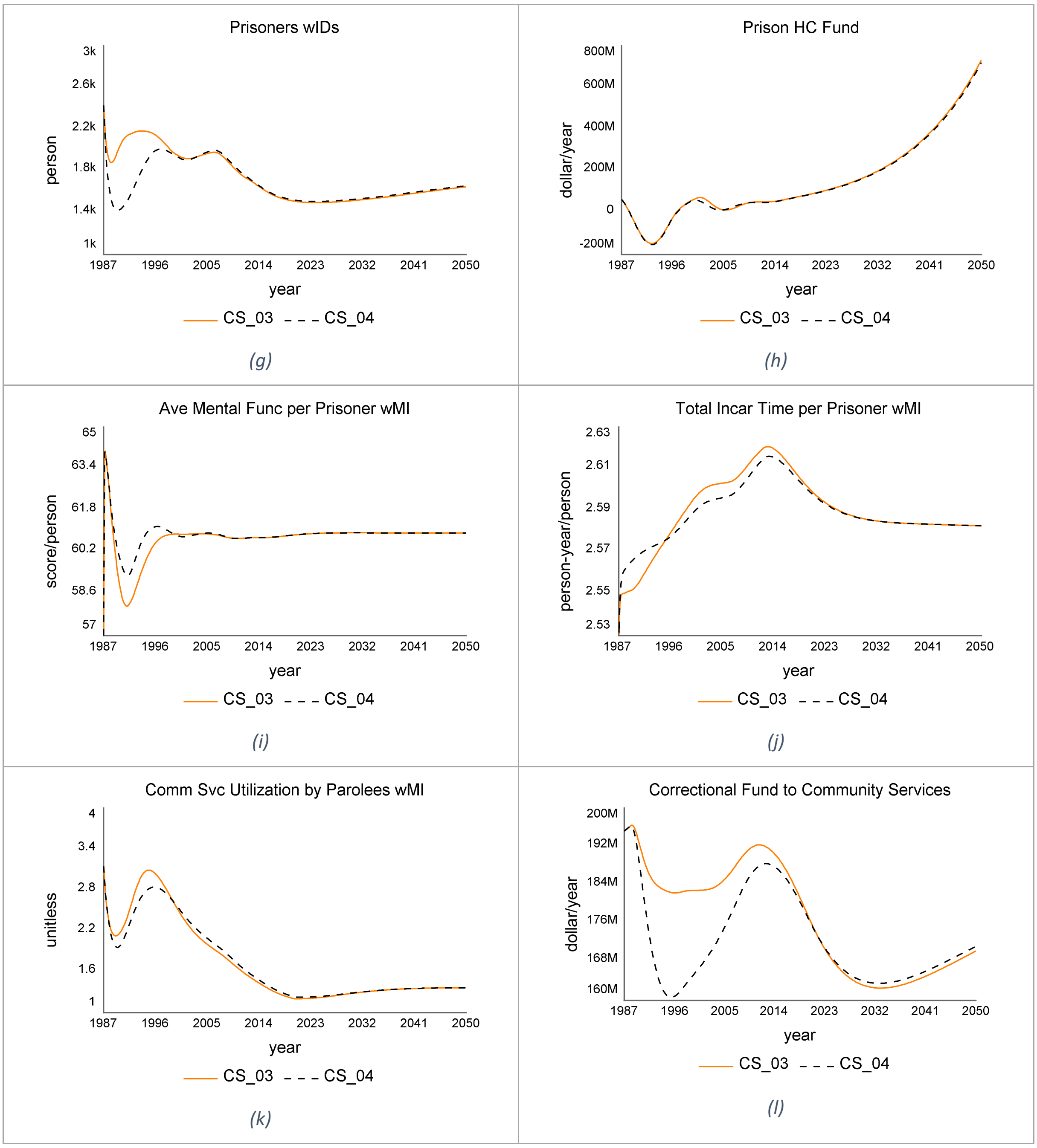


Figure 253 Comparison of Simulated Results in Policy Scenario and Scenario 4

(a) - MI Prevalence in Prison; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) – Prisoners with Mental Illness; (d) – Prisoners without Mental Illness; (e) – Total Discrepancy in Mental Functions in Prison; (f) – Average Age in Prison; (g) – Prisoners with Infectious Diseases; (h) – Prison Health Care Fund; (i) Average Mental Function per Prisoner with Mental Illness; (j) – Total Incarceration Time per Prisoner with Mental Illness; (k) – Community Service Utilization by Parolees with Mentall Illness; (l) Correctional Fund to Community Services

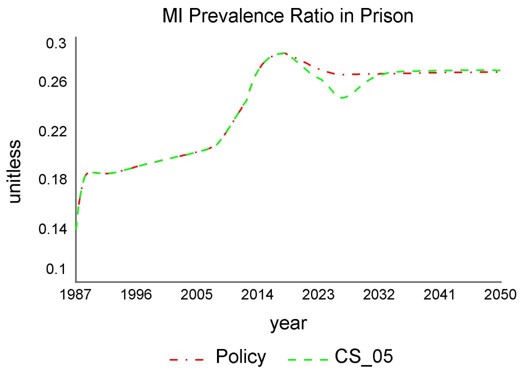
Due to fewer individuals in the innocent population being arrested at the start of the simulation, the fraction of the population wMI and a criminal history is lower (Figure 253b). Figure 253c and d show that the reduction in prisoners wo MI and the reduction in prisoners wMI are almost proportionately the same. Therefore, MI prevalence in prison changes little (Figure 253a). As there are fewer prisoners wMI and a lower prison population in the beginning of the simulation, the needs for MHC (Figure 253e) and ID treatment (Figure 253g) are lower. The savings accrued from lower MHC and ID treatment capacities are reflected in a slightly lower prison HC fund (Figure 253h). Fewer prisoners lead to fewer parolees. Hence, the correctional fund to community services is lower in the beginning of the simulation (Figure 253l).

This scenario demonstrates that the "war on drugs" policy indeed affects the behavior of the model in the beginning of the simulation.

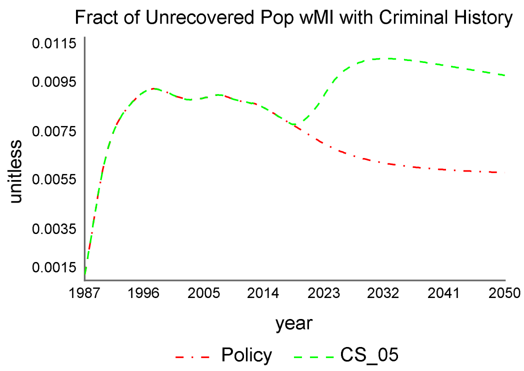
7.6 Scenario 5

This scenario is an extension of the Policy scenario. From 2018 to 2023, the fraction of innocent population arrested increases 5% annually. The purpose of this scenario is to simulate a case in which the "war on drugs" policy is reignited as the consequence of the new interest of the Trump administration in tightening the law against drug-related offences.

Selected Results from Scenario 5



(a)



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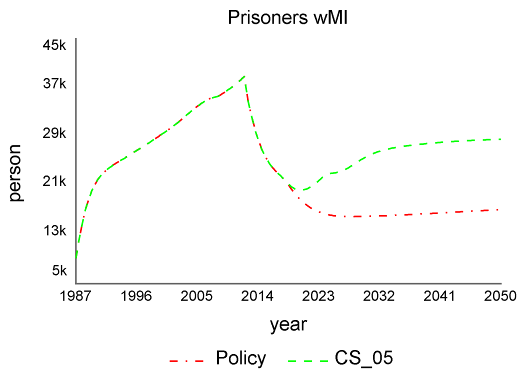

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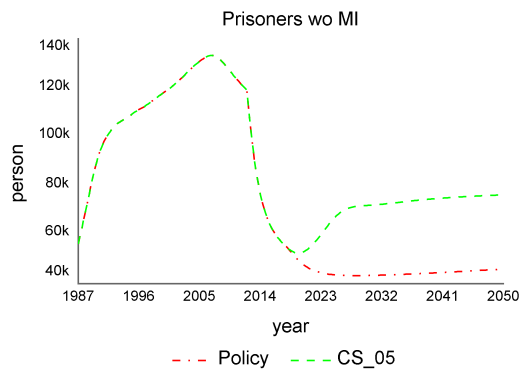

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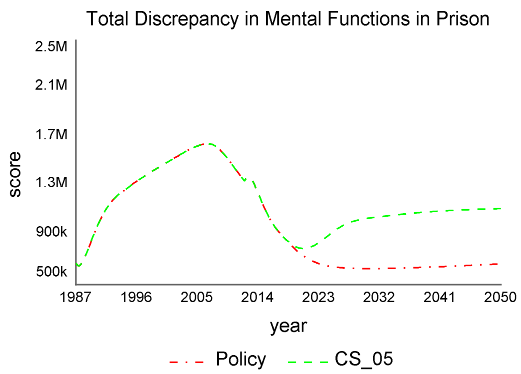

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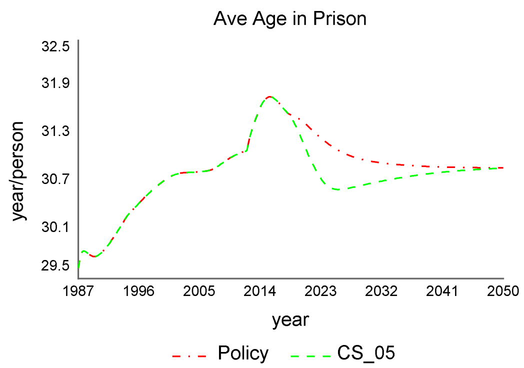


(f)

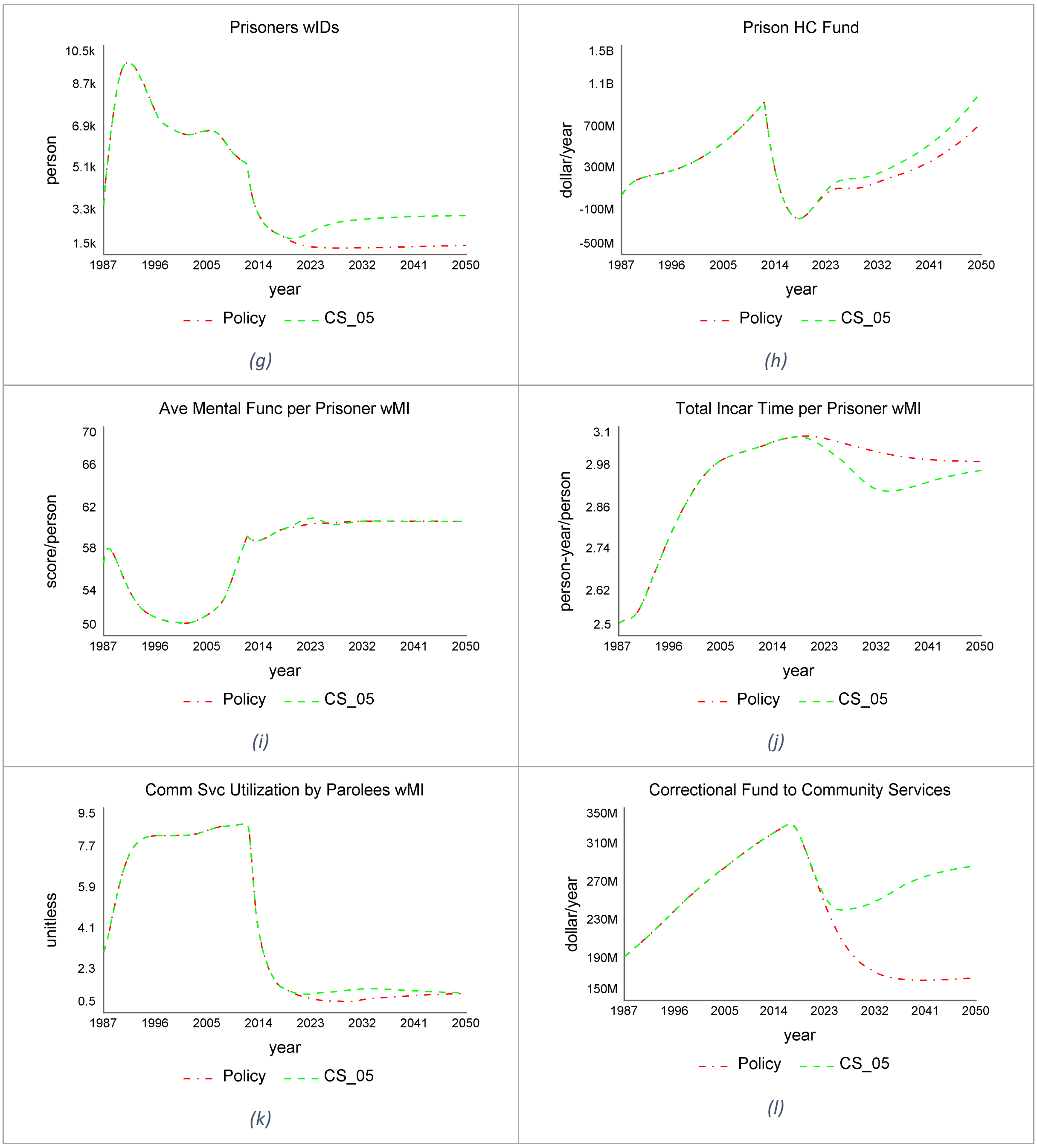


Figure 254 Comparison of Simulated Results in Policy Scenario and Scenario 5

(a)-MI Prevalence in Prison; (b) Fraction of Unrecovered Population with Mental Illness and Criminal History; (c) – Prisoners with Mental Illness; (d) – Prisoners without Mental Illness; (e) – Total Discrepancy in Mental Functions in Prison; (f) – Average Age in Prison; (g) – Prisoners with Infectious Diseases; (h) – Prison Health Care Fund; (i) Average Mental Function per Prisoner with Mental Illness; (j) – Total Incarceration Time per Prisoner with Mental Illness; (k) – Community Service Utilization by Parolees with Mentall Illness; (l) Correctional Fund to Community Services

This scenario demonstrates that if the fraction of innocent population arrested increases gradually between 2018 and 2023, the MI prevalence in prison decreases shortly after the test has been initialized in 2018 (Figure 254a). This is because the increment in prisoners wo MI is relatively larger than the increment in prisoners wMI (Figure 254c and d). The fraction of the unrecovered population wMI and a criminal history also increases significantly from 2018 (Figure 254b). The average age in prison reduces temporarily after 2018 because of the large inflow of younger first-time offenders (Figure 254f). However, the average age in prison continues to increase and becomes higher than in the Policy Scenario. Together with the higher needs for MHC (Figure 254e) and ID treatment (Figure 254g), prison HC fund is higher from 2018 onwards (Figure 254h).

The average mental functions of prisoners wMI is not affected significantly due to adequate MHC provision in the prison (Figure 254i). The total incarceration time per prisoner wMI drops temporarily after 2018 because of the influx of first-time prisoners with no prior incarceration time served (Figure 254i). Given that community service resource and capacity planning are equipped with a feedback structure between the California Department of Corrections and Rehabilitation (CDCR) and the local governments, the county governments are able to adjust resources and capacity in advance. Correctional fund for community services are adjusted accordingly and timely (Figure 254l). Therefore, the community service utilization by parolees wMI only rises slightly above the Policy Scenario (254k).

7.7 Chapter Summary

This chapter shows that under various circumstances, the model produces behavior modes corresponding to our expectation. We have provided explanation for the casual relationships that give rise to these different modes of behavior. As such, these tests increase the generalizability of the model. More specifically, the model may be calibrated and customized to other settings to study similar problems. These scenario analyses also shed some light on leverage points for effective intervention. However, additional policy design based on these leverage points under different scenarios is beyond the scope of the current study.

8 Conceptual Model

This chapter presents a conceptual model that contains the major feedback loops presented in Chapter 3. A conceptual model is defined as *the representation of a system at a highly aggregate level*. A conceptual model may refer to the model formed after the conceptualization or after the full model development stage. The conceptualization stage establishes the purpose of the study through a critical decision made on the level of aggregation, boundary, time horizon, and method of description for the modeling effort. Considering the inherent complexity in which social problems arise and in which public policies are made, Ghaffarzadegan et al. (2011) advocate the use of small models as part of the public policy making process. By small models, the authors mean models formulated with less than ten major feedback loops and limited number of important stocks. A small model with major feedback loops facilitates policymakers' learning of the problems from an endogenous perspective. At an aggregate level with only a few of the important stocks, policymakers are able to focus on the major feedbacks and endogenous sources of the problematic behavior. Policymakers can also improve their understanding of the problem behavior by using the model as a learning environment. Experimentation from a small simulation model enables policymakers to study various policy scenarios without incurring irreversible negative social and economic costs. Since the structure and causal links in a small model are obvious and clear, exhaustive experimentation through parameter changes helps policymakers understand the problem from a holistic perspective and decide on the leverage points to tackle next.

The conceptual model presented in this chapter is built through the abstraction of the major structures exist in the real system that give rise to the increasing and persistently high mental illness (MI) prevalence in California's prisons. In our study, the full model builds upon the first conceptual model developed after the conceptualization stage. For the sake of simplicity, the conceptual model developed during or after the conceptualization stage is named as "conceptual model 1.0". The conceptual model presented here is formulated after the ***full model development*** processes. Hence, the second conceptual model is termed as "conceptual model 2.0".

During the conceptualization stage, numerous versions of conceptual models were developed. After formulating the acceptable conceptual model that was able to produce a plausible explanation, the full model was developed gradually based on conceptual model 1.0. Compared to conceptual model 1.0, conceptual model 2.0 is more refined because it is formed after gaining insights from the full model.

The potential functions of conceptual model 2.0 include:

- Providing an overview of the model that only focuses on major feedback loops

- Providing a general alternative explanation for the increasing and persistently high mental illness prevalence among prisoners in California
- Demonstrating the sensitive leverage points

Conceptual model 2.0 consists of 17 stocks and less than 100 equations. This model has the size of about 5% of the full model. With such a reduction, much dynamics from the full model is omitted in conceptual model 2.0. As such, conceptual model 2.0 has the following major limitations:

- Lacking the capability to assess the impact of policy at the population-level;
- Lacking the capability to track attributes, such as age, mental functions, incarceration year served, and social capital for individuals;
- Lacking the capability to evaluate the relative impact on individuals categorized by their sentence type, criminal history, and mental health status;
- Due to the lack of attributes-tracking capability, conceptual model 2.0 is unsuitable to assess the interactional effects of these attributes that give rise to the problem. Hence, when assessing the impact of policy, these attributes is assumed to be constant.
- Lacking the dynamics between factors that influence mental illness severity, such as prison mental health care provision, the availability of community services, and prison capacity utilization;
- Lacking the visualization of the causal relationship between community services, social capital, and recidivism;
- Lacking the details to produce a behavior that closely fit the historical behavior (or reference mode). Therefore, reproducing ***behavior pattern*** is the main objective of validating conceptual model 2.0 instead of examining the fitness of model-generated behavior and reference mode.

Hence, users of this conceptual model should be cautious with model conclusion due to the elimination of much dynamics from the full model. Despite the limitations, conceptual model 2.0 is useful in the initial or introductory presentation to the stakeholders. The concept model can also be used to conduct strategic experiments before deciding the sector in which more effort should be invested in order to produce desirable outcomes.

In the next section, the structure of conceptual model 2.0 will be explained in the form of stock-and-flow diagrams, followed by the analysis of the simulated behavior. The major feedback loops in conceptual model 2.0 is similar to the feedback structure in the full model presented in Chapter 30.

8.1 Stock-and-Flow Structure

Since conceptual model 2.0 is an abstraction of the full model, most of the stock-and-flow structure presented here is the aggregation of individual modules in the full model. Modules that are not part of the ***major*** feedback loops, such as the Age, Prison Health Care Needs, Jail Capacity, and Mental Profiles are omitted. Constants or exogenous input are used to replace the feedback from these omitted modules. The feedback loop symbols are presented next to the parameters that connect the sub-structures to indicate the corresponding feedback loops in Figure 255. Also, note that some of the parametric values have been modified to operationalize concept model 2.0. Refer to Appendix P for the full documentation of conceptual model 2.0. The emphasis of this section is on the formulation; therefore, the documentation of data sources for parametric values are omitted.

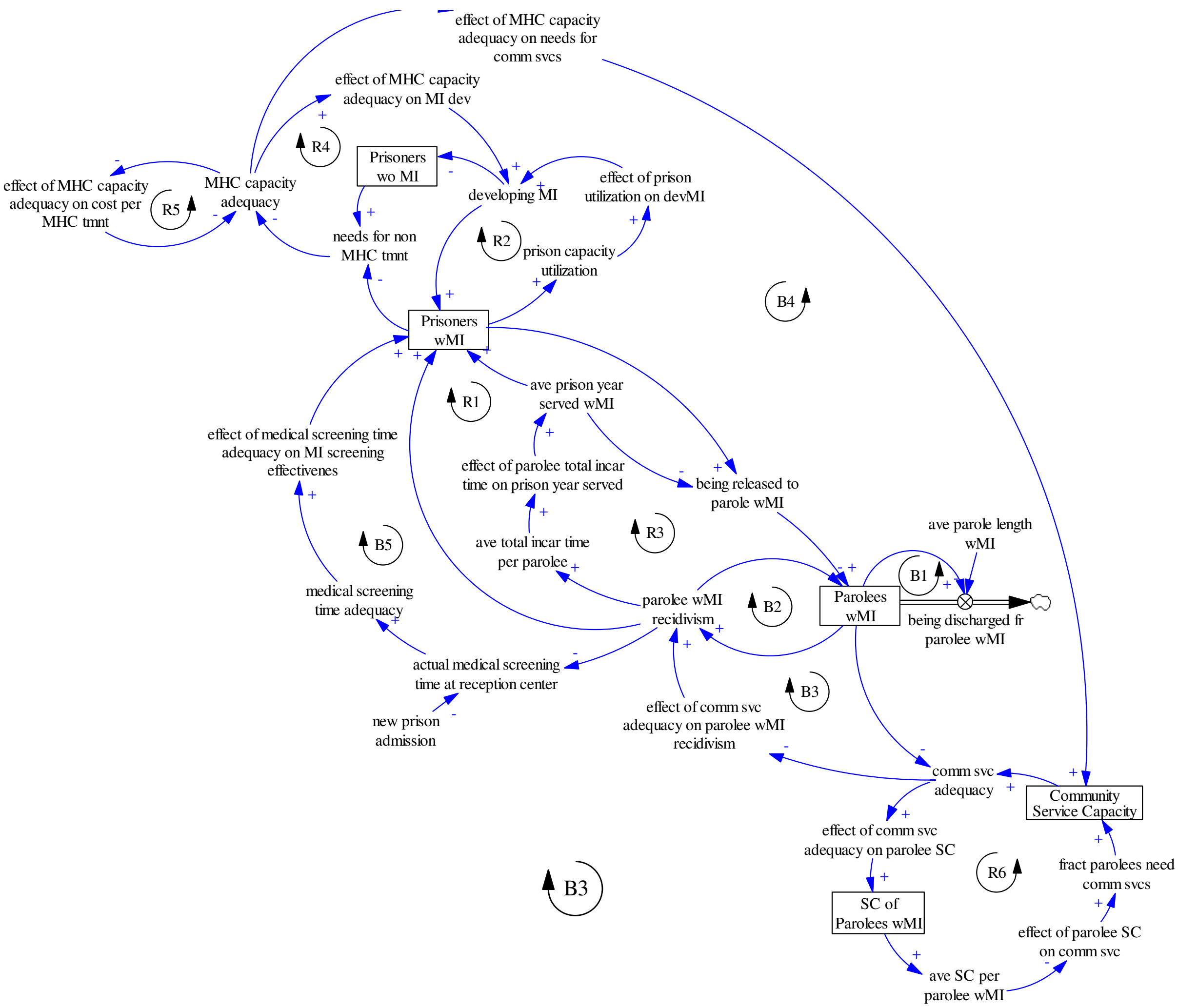


Figure 255 Causal Loop Diagram (CLD) with Major Loops in the Conceptual Model

Reinforcing Loop		Balancing Loop	
R1	Higher Prison Parolees wMI Recidivism Leads to More Prisoners wMI	B1	More Parolees wMI Leads to More Discharges
R2	Prison Overcrowding Effect on MI Development	B2	Higher Parolees wMI Recidivism Leads to Fewer Parolees wMI
R3	Effect of Parolee Total Incarceration Time on Next Prison Sentence Length	B3	Effect of Community Service Adequacy on Parolee wMI Recidivism
R4	Effect of MHC Capacity Adequacy on MI Development	B4	Effect of MHC Capacity Adequacy on Needs for Community Services
R5	Effect of MHC Capacity Adequacy on Cost per MHC Treatment	B5	Medical Screening Affects the Admission of Prisoners wMI
R6	Effect of Community Service Adequacy on Parolee Social Capital and Needs for Community Services		

8.1.1 Prisoners Sector

This section shows the progression of prisoners wMI. Figure 256 illustrates the inflows to the Prisoners wMI stock. This stock contains three inflows: being admitted wMI, developing MI, and parolees wMI recidivism. The progression of prisoners wo MI is similar to that of prisoners wMI.

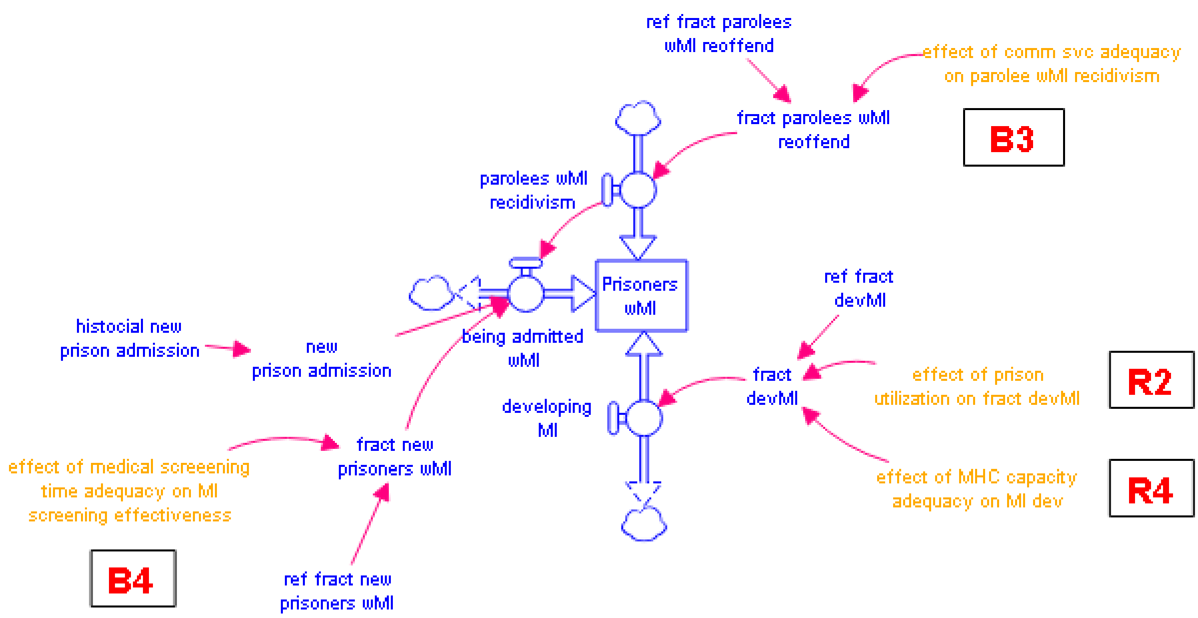


Figure 256 Inflows to the Prisoners with Mental Illness Stock in Conceptual Model 2.0

The inflow of "being admitted wMI" represents the number of first-time convicts being admitted per year. It receives input from historical new prison admission. However, the historical admission data includes first-time admission and reoffence. So, we adjusted the historical data by subtracting the historical recidivism rate from the historical admission data. The “historical new admission” data in Figure 256 is infact consists of first-time admission only. “historical new prison admission” is a time series from 1987 to 2014 represented in a table function. From 2015 onwards, value of “historical new prison admission” remains constant with the value of 2015. “fract new prisoners wMI” represents the fraction of incoming first-time prisoners with MI. “fract new prisoners wMI” is influenced by medical screening adequacy at the reception center (loop B4). The higher the adequacy, the more effective the medical screening will be. The increase in screening effectiveness leads to higher fraction of new prisoners wMI entering the stock. At its current screening capacity, only a fraction of the new prisoners who suffer from MI is diagnosed. Therefore, the inflow of “being admitted wMI” is probably under-reported. As the medical screening capacity grows, a larger fraction of first-time convicts will be identified.

The second inflow characterizes the recidivism rate. A fraction of parolees reoffends and is re-convicted. The fraction of parolees reoffends is affected by community service adequacy (loop B3). When the shortage in community services occurs, parolees fail to receive adequate support. Therefore, a higher fraction of them reoffends.

The last inflow consists of prisoners who develop MI during custody. The fraction of prisoners developing MI is influenced by prison density (loop R2) and MHC adequacy (loop R4). As the prison utilization, defined as the ratio of total prisoners and prison capacity, increases, the environment becomes more stressful and harsher for prisoners. Hence, a larger fraction of the prisoners wo MI develop MI.

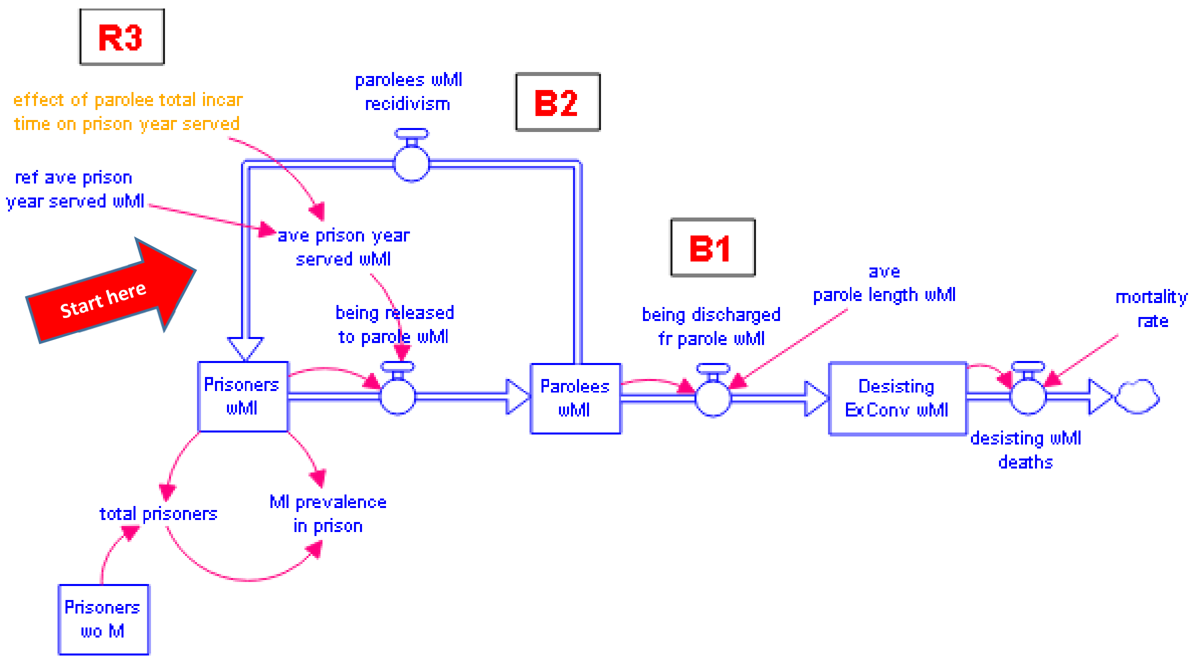


Figure 257 Progression of Prisoners with Mental Illness in Conceptual Model 2.0

Figure 257 depicts the progression of prisoners wMI. After serving prison sentence, the prisoners are released and placed on parole. The rate at which these prisoners are released depends on the average prison year served. "Ave prison year served wMI" refers to *the duration for which these individuals are confined before their release*. This parameter is affected by the effect of Three-strikes Law (loop R3). This effect implies a positive relationship between the previous incarceration time served by the recidivists and the average prison year. The higher the average previous incarceration time served by the parolees who recidivate, the higher the next sentence the recidivating prisoners will receive. Due to a delay in changing "ave prison year served wMI", a built-in third order information delay function, SMTH3 is used in this variable. With the information delay, "ave prison year served wMI" changes over a delay, which is same as "ave prison year served wMI". Hence, this changing "ave prison year served wMI" do not change the prison year of the existing prisoners, but the new prisoners. This information delay also exists in "ave prison year served wo MI".

For the parolees who do not recidivate and stay in the stock until they fulfill the parole requirements, they become desisting ex-convicts wMI (loop B1). Desisting ex-convicts refer to *those who cease engaging in criminal activities permanently*. Therefore, they remain in the Desisting ExConv wMI stock until they leave the stock upon their deaths. The recidivating parolees return to prison and become Prisoners wMI (loop B2). Mental illness prevalence is the reference mode of the study. It is a ratio of the number of prisoners wMI to thr total number of prisoners.

8.1.2 Incarceration Year Served Sector

This section explains the structure and effect of the Three-strikes Law. This structure contains three stocks (Figure 258): Previous Incarceration Time Served by Prisoners, Current Prison Time Served, and Total Incar Time Served by Parolees. These stock units are “person-year”.

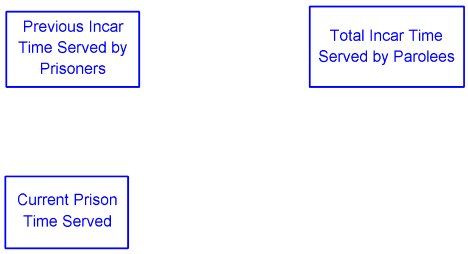


Figure 258 Three Main Stocks for the Incarceration Year Served Structure in Conceptual Model 2.0

The Previous Incar Time Served by Prisoners represents the previously served incarceration time each reoffending prisoner brings in when they are reconvicted for reoffence (Figure 258). First-time convicts bring zero previous incarceration time served. The Current Prison Time Served stock accumulates all the time the prisoners served in the prison before they are released for the most current conviction. The Total Incar Time Served by Parolees stock integrates the previous incarceration time served and current prison time served by prisoners when they are released. The incarceration year served structure integrates incarceration years of both prisoners wMI and prisoners wo MI.

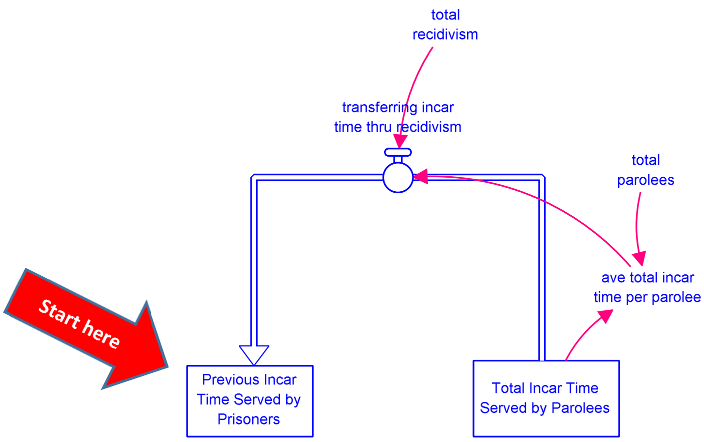


Figure 259 Inflow to the Previous Incarceration Time Served by Prisoners Stock in Conceptual Model 2.0

Figure 259 shows that the only inflow to the Previous Incar Time Served by Prisoners stock is through the transfer of “ave total incar time per parolee” when the parolees who reoffend. “Total recidivism” consists of the parolees wMI and parolees wo MI reoffend. The “ave total incar time per parolee” is defined as the ratio of total incarceration time to the total number of parolees. This formulation blends the average total incarceration time of parolees wMI and parolees wo MI in the Current Prison Time Served stock.

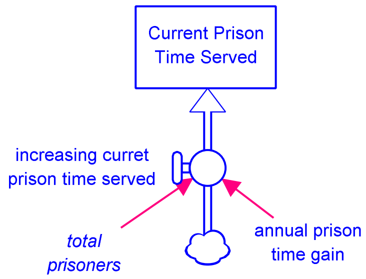


Figure 260 Inflow to the Current Prison Time Served Stock in Conceptual Model 2.0

The only inflow to the Current Prison Time Served stock is through the annual addition of total prison years of all prisoners (Figure 260). Every prisoner, including prisoners wMI and prisoners wo MI, gain one year per person per year.

Figure 261 presents the inflows to the Total Incar Time Served by Parolees stock. As prisoners are released, each of them bring with them the average previous incarceration time served and the average prison year served for the current sentence. “Ave previous incar time per prisoner” is the average previous incarceration time served per prisoner, i.e. the ratio of the Previous Incar Time Served by Prisoners to the total number of prisoners. Note that the “total prisoners” represents prisoners wMI and prisoners wo MI. “ave prison time served at current release” is the average prison year served by prisoners wMI and wo MI.

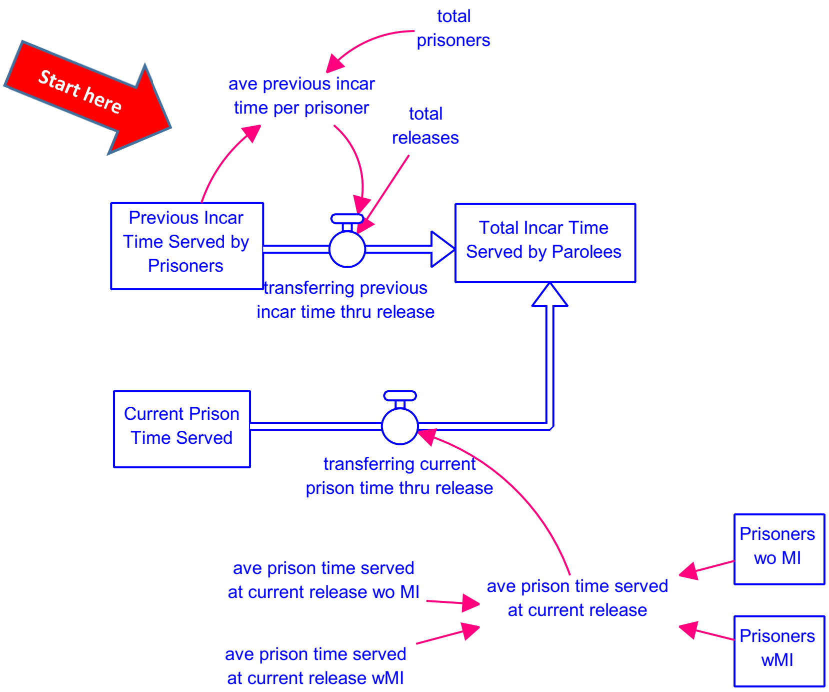


Figure 261 Inflows to the Total Incarceration Time Served by Parolees Stock in Conceptual Model 2.0

“Ave prison time served at current release” is represented by equation 8-1:

$$(Prisoners\_wo\_MI * ave\_prison\_time\_served\_at\_current\_release\_wo\_MI + Prisoners\_wMI * ave\_prison\_time\_served\_at\_current\_release\_wMI) / (Prisoners\_wo\_MI + Prisoners\_wMI) \qquad (8\text{-}1)$$

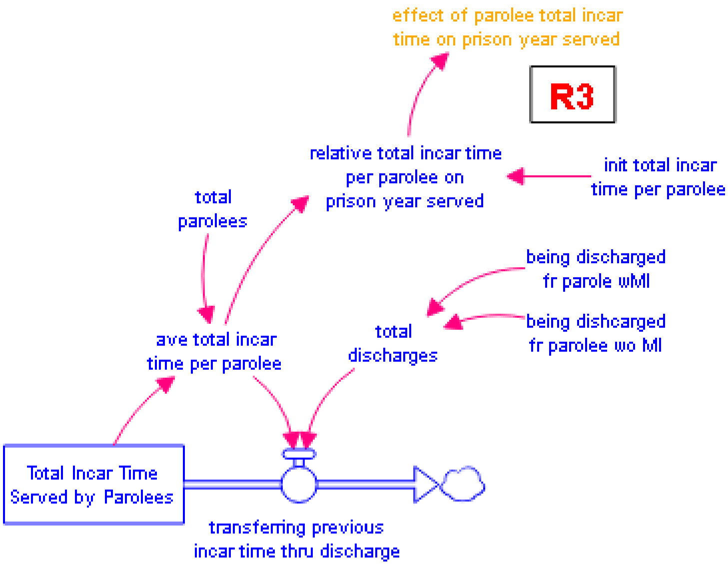


Figure 262 Outflow of the Total Incarceration Time Served by Parolees in Conceptual Model 2.0

Figure 262 demonstrates the outflow from the Total Incar Time Served by Parolees stock. As each of the parolee leaves, the "ave total incar time per parolee" leave with them. The total discharges, which is the combination of prisoners wMI and prisoners wo MI who have successfully fulfill their parole requirements, and "ave total incar time per parolee" determine the size of the outflow.

The average of total incarceration time per parolee has an impact on the next prison year served by the parolees who reoffend (loop R3). The "effect of parolee total incar time on prison year served " is represented in a table function (Figure 263). The input to the table function is the relative change in the "ave total incar time per parolee" compared to the initial value. When the system is in equilibrium, the "relative total incar time per parolee on prison year served" remains at one. As long as the reinforcing relationship between the "ave total incar time per parolee" and "ave prison year served at current offense wMI" or "ave prison year served at current offense wo MI" exist, the "ave total incar time per parolee" will continue to increase.

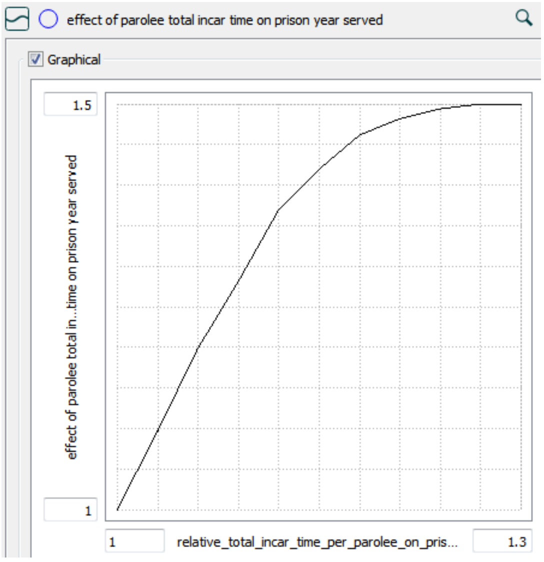


Figure 263 Effect of Parolee Total Incarceration Time on Prison Year Served in Conceptual Model 2.0

8.1.3 Prison Capacity Sector

This section explains the structure for prison capacity with one stock and two flows (Figure 264). The Prison Capacity stock in this model is defined by person. The bi-flow represents the change in prison capacity contingent upon the demand for prison capacity. This bi-flow takes on positive and negative values. The outflow characterizes the annual natural depreciation of prison facility.

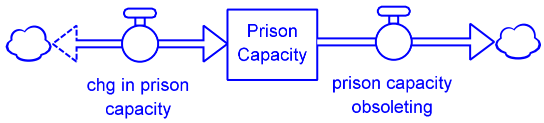


Figure 264 Stock and Flow of Prison Capacity in Conceptual Model 2.0

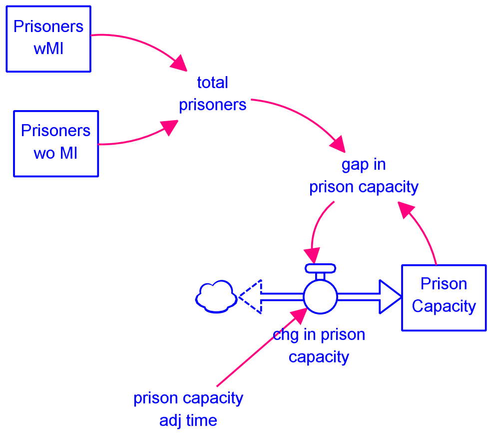


Figure 265 Bi-flow of the Prison Capacity Stock in Conceptual Model 2.0

The bi-flow is determined by the gap in prison capacity and the adjustment time (Figure 265). "Gap in prison capacity" is the discrepancy between the number of prisoners and the existing prison capacity. When the gap is positive, the prison capacity increases over the adjustment time; when the gap is negative, the prison capacity decreases over the adjustment time.

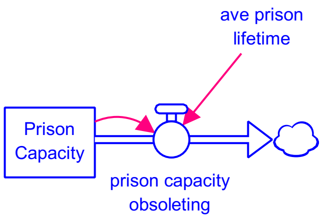


Figure 266 Prison Capacity Depreciation in Conceptual Model 2.0

The prison capacity obsoletes naturally every year (Figure 266). The average prison lifetime is set as 60 years. Every year, it is expected that 1/60 of the prison capacity obsolete. This means that the depreciation will render the prison capacity decreases over time if the capacity that obsoletes is not replenished. Over time, the prison capacity will show a steady-state error as the capacity persistently falls behind the desired level.

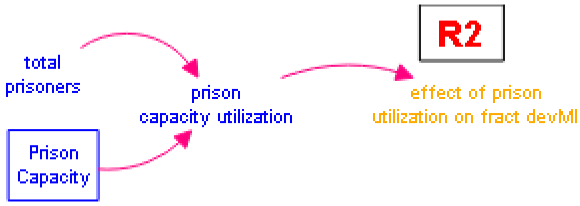


Figure 267 Effect of Prison Utilization on Fraction of Prisoners Develop Mental Illness in Conceptual Model 2.0

"Prison capacity utilization", which represents the density in prison, has a positive relationship to the fraction of prisoners develop MI (loop R2 in Figure 267). The effect is represented in a table function (Figure 268).

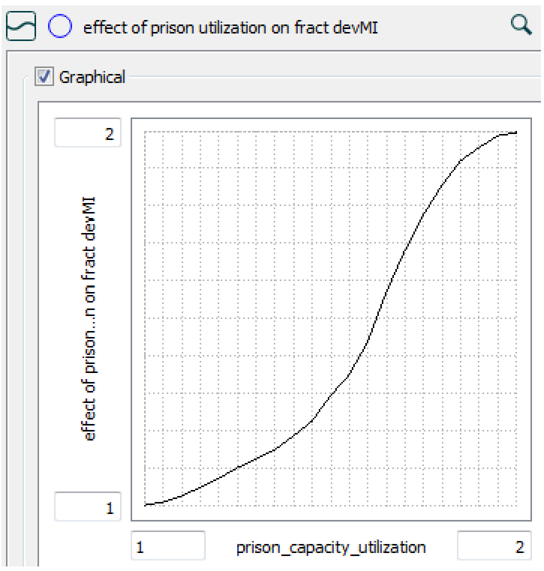


Figure 268 Effect of Prison Utilization on Fraction of Prisoners Develop Mental Illness in Conceptual Model 2.0

The input to the horizontal axis in the table function in Figure 268 is the "prison capacity utilization". The horizontal axis ranges between one and two. The vertical axis, which shows the effect of prison capacity utilization on “fract devMI” ranges between one and two. Under the condition when the prison capacity utilization equals to one, “fract devMI” remains unchanged. If the prison capacity utilization increases, the fraction of prisoners developing MI increases. When prison capacity utilization is closer to one, the effect on “fract devMI” increases slower. If prison capacity utilization is over 1.5 and approaches two, the effect on “fract devMI” grows stronger at a faster rate.

8.1.4 Prison Health Care Resource Allocation Sector

This structure shows the resource distribution decision between non-mental health care and mental health care (MHC) in prison. Figure 269 demonstrates the adjustment of the Total Prison HC Budget stock. Total prison HC fund is adjusted annually based on the expected prison health care budget growth rate. In this model, the growth rate is set as a constant.

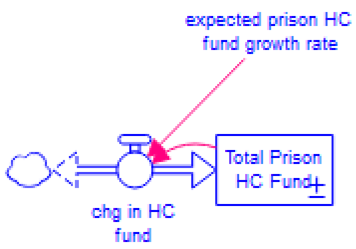


Figure 269 Structure for Total Prison Health Care Budget in Conceptual Model 2.0

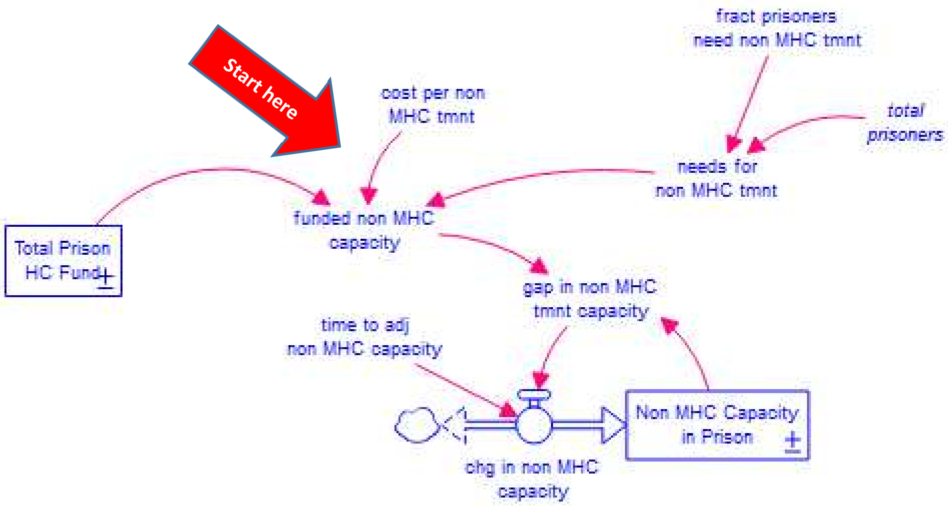


Figure 270 Prioritization of Total Prison Health Care Budget to No-mental Health Care in Conceptual Model 2.0

Prison health care budget is prioritized to fund non-MHC treatment (Figure 270). The “funded non MHC capacity” is either determined by the capacity funded by the prison HC budget or the needs for non-MHC treatment, whichever value is smaller. The capacity funded by the prison HC budget is defined as the number of persons can be treated for non-MHC treatment with the existing prison HC budget whereas the “needs for non MHC tmnt” is the number of prisoners who need non-MHC tmnt. “Fract prisoners need non MHC treatment” is a constant. Then, the funded non-MHC capacity is compared to the existing non-MHC capacity. The “funded non MHC capacity” is formulated with the following equation:

MIN (Total_Prison_HC_Budget / cost_per_non_MHC_tmnt, needs_for_non_MHC_tmnt * cost_per_non_MHC_tmnt) (8-2)

If a gap appears, whether it is positive or negative, it will be adjusted over the “time to adj non MHC capacity”. If the gap is positive, the Non MHC Capacity in Prison stock increases over time; if the gap is negative, the Non MHC Capacity in Prison stock decreases over time. Hence, the “chg in non MHC capacity” is a bi-flow.

After prioritizing prison health care budget to non-MHC treatment, the remaining of the budget is allocated to MHC (Figure 271). The "remaining fund for MHC" is determined by the fund required for non-MHC capacity, which is determined either by the funded non-MHC capacity and the needs for non-MHC treatment. The difference between the total prison health care budget and budget for non-MHC capacity constitutes the remaining fund available for MHC. Similar to the non-MHC capacity adjustment, the "funded MHC capacity" is determined by the capacity funded by the residue of the prison health care fund or prisoners who need MHC treatment, whichever with a smaller value. The formulation of "funded MHC capacity" is similar to equation 8-2. If a gap appears when comparing the "funded MHC capacity" to the existing MHC Capacity in Prison stock, the stock is adjusted over the MHC capacity adjustment time to close the gap.

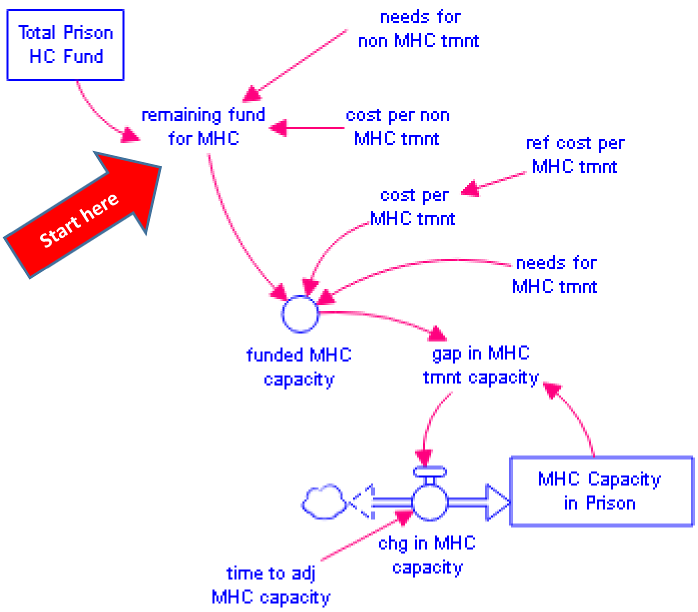


Figure 271 Allocation of Prison Health Care Budget to Mental Health Care in Conceptual Model 2.0

Treatment capacity has an inverse relationship with treatment cost (Figure 272). This inverse relationship occurs in both non-MHC and MHC. "MHC capacity adequacy" refers to *the ratio of MHC capacity in prison to the "needs for MHC tmnt"*. A value of one means that the treatment capacity equals the needs for treatment. When MHC capacity adequacy drops below one, it means the capacity fails to meet the demand. If the capacity is inadequate to meet the needs for treatment, the "cost per MHC tmnt" rises. Consequently, the number of funded MHC capacity will be lower than it would otherwise have been.

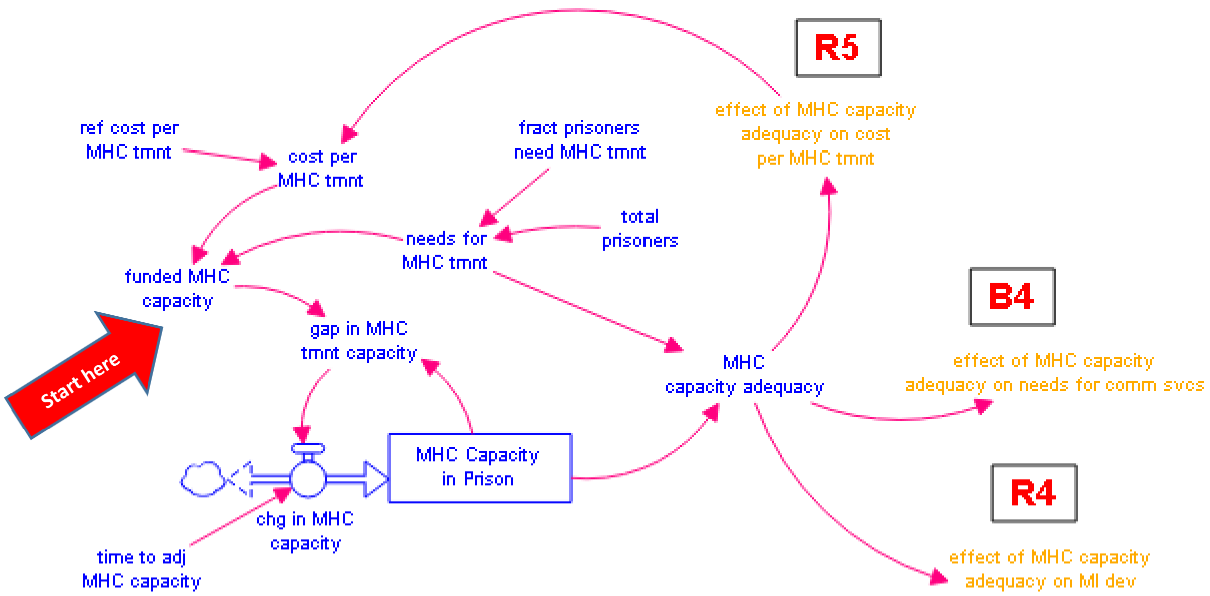


Figure 272 Causal Relationship between Mental Health Capacity Adequacy and Treatment Cost and the Needs for Community Services in Conceptual Model 2.0

Figure 273 shows the effect of MHC adequacy on cost per MHC treatment in a table function (loop R5). The effect on non-MHC treatment cost is similar to the effect on MHC treatment cost.

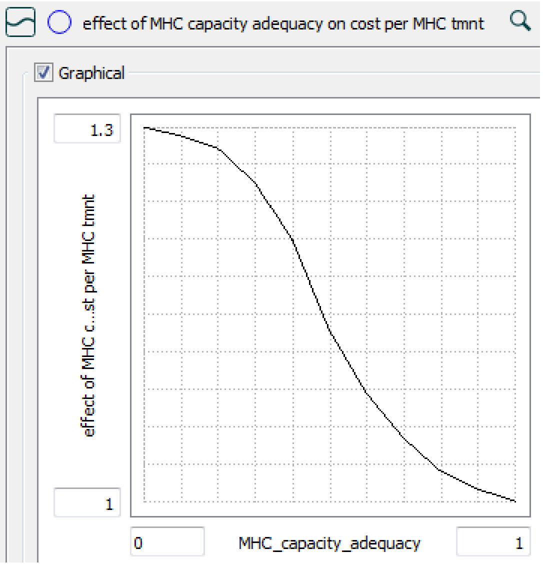


Figure 273 Effect of Mental Health Capacity Adequacy on Cost per Mental Health Care Treatment in Conceptual Model 2.0

The input to the horizontal axis is "MHC capacity adequacy", which ranges between zero and one. The output is the effect on MHC treatment costs, which is reflected on the vertical-axis. When the adequacy level is zero, the effect on cost per MHC treatment is 30% more expensive. When the adequacy level reaches one, the cost per treatment will be at the normal level, which is defined by "ref cost per MHC tmnt".

Another effect arises from MHC adequacy is the need for community services (loop B4 in Figure 272). Inadequate MHC provision in prison implies that the prisoners wMI released to parole reenter the community with their illness; if they recover from MI during custody, they become paroeles wo MI when they leave prison. Parolees wMI requires community MHC in addition to other services provided to the parolees wo MI. Hence, the cost for parolees wMI is expected to be higher than that of the parolees wo MI.

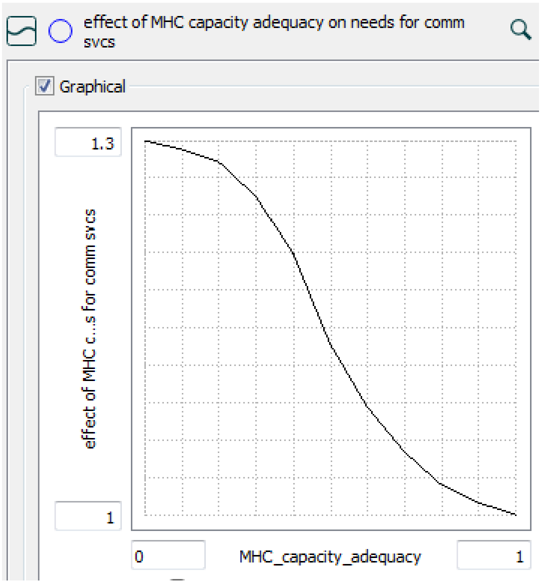


Figure 274 Effect of Prison Mental Health Care Capacity on the Needs for Community Services in Conceptual Model 2.0

Figure 274 presents the effect of MHC capacity adequacy on the needs for community services in a table function. The input to the horizontal-axis is "MHC capacity adequacy", which ranges between zero and one. The output of the table yields the effect on the needs for community services corresponds to the value on the vertical axis, which ranges between one and one. In the normal operating condition when MHC capacity adequacy equals to one, the effect on the needs for community services is one. If the adequacy level declines and approaches zero, the needs for community services increases. In the extreme condition where MHC capacity adequacy is inexistent, i.e. zero, the needs for community services is expected to be 30% higher than the normal condition.

MHC capacity adequacy also the affects the diagnosis of MI development (loop R4 in Figure 272). Without adequate MHC capacity, some prisoners who experience onset of MI are not detected. The more inadequate the MHC capacity is, the smaller the fraction of prisoners who develop MI than it would otherwise have been. Figure 275 illustrates the positive relationship between MHC adequacy and MI development in prison.

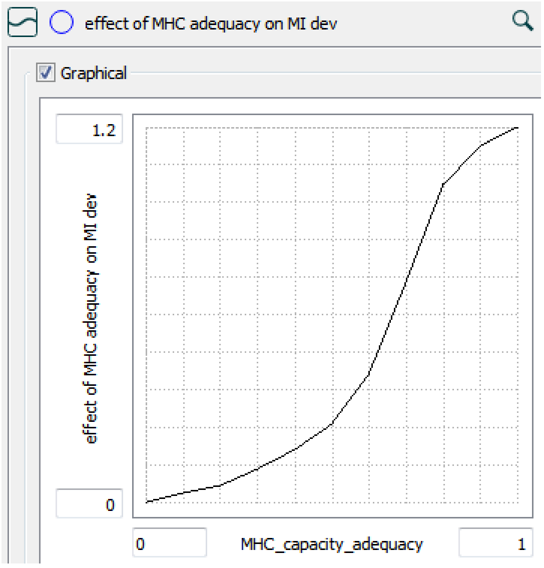


Figure 275 Effect of Mental Health Care Adequacy on Mental Illness Development in Conceptual Model 2.0

The input to this table function is the MHC adequacy, which is reflected on the horizontal-axis with values range between zero and one. The output is the effect on MI development, which is on the vertical-axis with values between zero and one. The shape of the graph expresses the positive relationship between the input variable and its effect. When MHC adequacy is zero, the fraction of prisoners develop MI is zero. On the contrary, when MHC adequacy is sufficient, i.e. one, 20% more prisoners who develop MI are diagnosed and thus moved into the Prisoners wMI stock, in which they will receive treatment eventually. When MHC adequacy is 0.8, the fraction of prisoners develop MI equals to the reference fraction.

8.1.5 Community Services Sector

This section presents the formulation for the community services structure. Community service capacity is modeled as a stock, which is defined as the number of parolees can be served (Figure 276). The bi-flow connects to the stock indicates that the capacity may increase or decrease depending on the value of "chg in comm svc capacity".

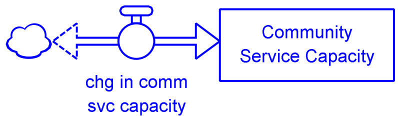


Figure 276 The Community Service Capacity Stock and Its Bi-flow in the Concept Model 2.0

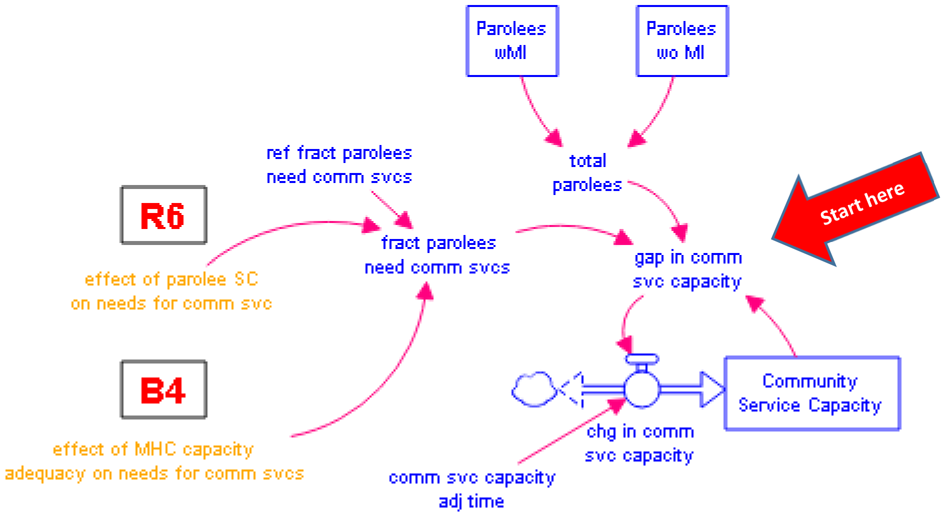


Figure 277 Adjustment Process of Community Service Capacity in Conceptual Model 2.0

The community service capacity adjustment process is represented by a first-order structure with a negative feedback loop (Figure 277). The gap, "gap in comm svc capacity", determines the size of the correction for the stock over the adjustment time. The gap represents the discrepancy between the number of parolees who need community services and the existing community service capacity. "Ref fract parolees need comm svcs" is a constant. The fraction of parolees who need community services is conditioned by prison MHC capacity adequacy and parolees' social capital (loop R6). Prison MHC capacity and parolees' social capital have inverse relationships with the fraction of parolees need community services. The higher the MHC capacity adequacy and social capital per parolee, the lower the needs for community services. This formulation also suggests the interactional effects of MHC capacity adequacy and parolees' social capital. If only one of the effects leads to lower fraction of parolees need community services while the other effect leads to higher fraction of parolees need community services, the gain from the former effect will be offset by the loss incurred from the second effect.

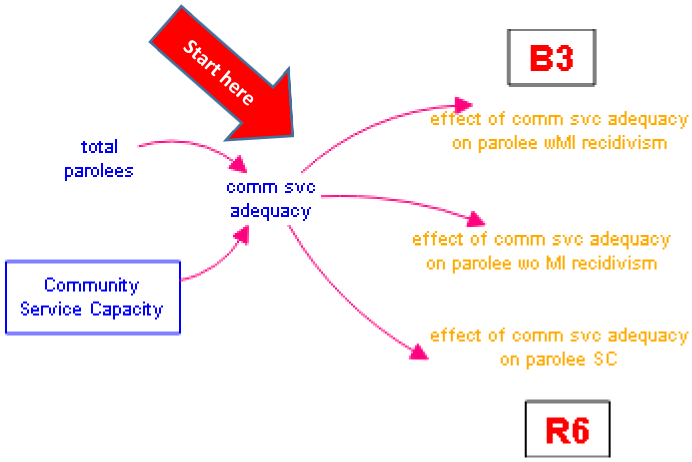
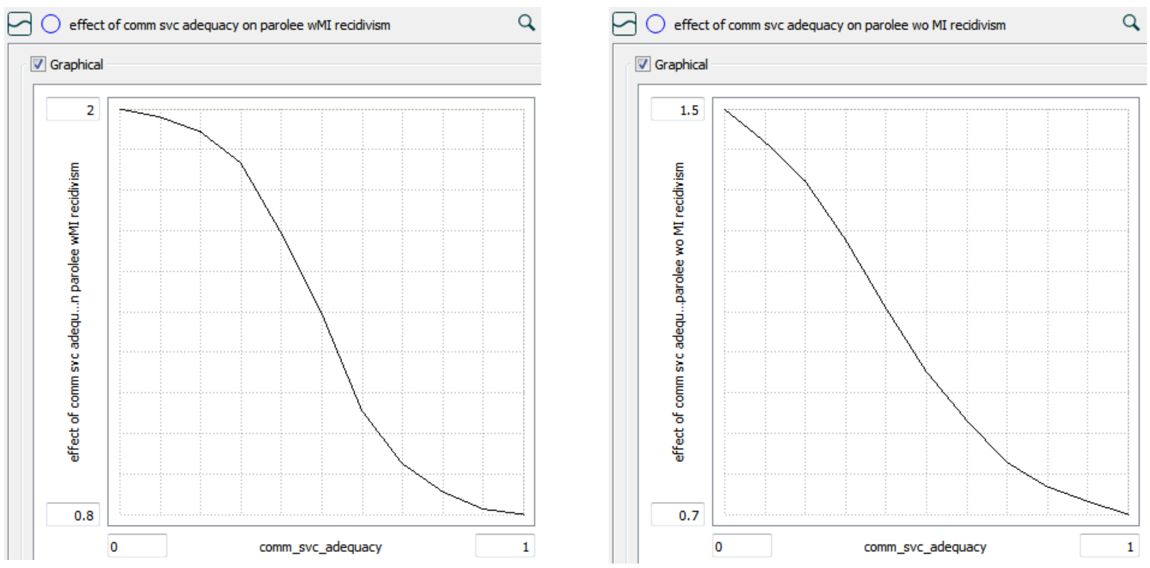


Figure 278 Effect of Community Service Adequacy on Parolees with Mental Illness and Parolees without Mental Illness Recidivism, and Effect on Parolee SC Gain in Conceptual Model 2.0

Community service adequacy has an inverse relationship with parolees' recidivism (Figure 278). In this model, the effect on recidivism combines new crime commitments and return-to-prison rate due to parole violation into the "total recidivism" parameter (loop B3). Figure 279 compares the effect of community service adequacy on recidivism of parolees wMI (Figure 279a) and parolees without MI (Figure 279b).



(a) *(b)*

Figure 279 Effect of Community Service Adequacy on Parolee Recidivism in Conceptual Model 2.0

(a) Effect of Community Service Adequacy on Parolee wMI Recidivism; (b) Effect of Community Service Adequacy on Parolee wMI Recidivism

The shapes of the two table functions in Figure 279 differentiate the effect of community service on parolees wMI and parolees wo MI recidivism. The effect of community service adequacy has a stronger effect on the recidivism of parolees wMI's when community service adequacy is closer to zero compared to the effect on the recidivism of parolees wo MI. This is because that parolees wMI rely more on community services for their reentry. Community MHC is a major needs for parolees wMI. If community MHC provision is inadequate, the parolees wMI may find it difficult to survive even if employment and housing are secured. Note that when community service adequacy is zero, the effect on "fract parolees wMI reoffend" and "fract parolees wMI reoffend" increase to two and 1.5 times of the reference values respectively. The difference of these two values also indicates that community service adequacy affects recividism of parolees wo MI less than parolees wMI when community services are insufficient. However, when community services are abundant for parolees wMI, the reduction in fraction of parolees wMI reoffend is smaller compared to the reduction in parolees wo MI. On the contrary, when community services are inadequate, the increase in fraction of parolees wMI reoffend is relatively larger.

Figure 280 shows the effect of community service adequacy on parolees' social capital gain in a table function (loop R6 in Figure 278). The input to the horizontal-axis is community service adequacy ranges between zero and 1.5. The values on the vertical-axis represents the output, which is the effect on parolees' social capital gain. When the community service adequacy is below 1.5, the parolees gain less than two times of the reference annual social capital increase, which is a constant. At the full operating condition where community service adequacy equals to one, parolees gain as much social capita as indicated in the of the reference annual social capital increase. When the community service capacity falls below one, parolees only gain less than the reference annual social capital increase.

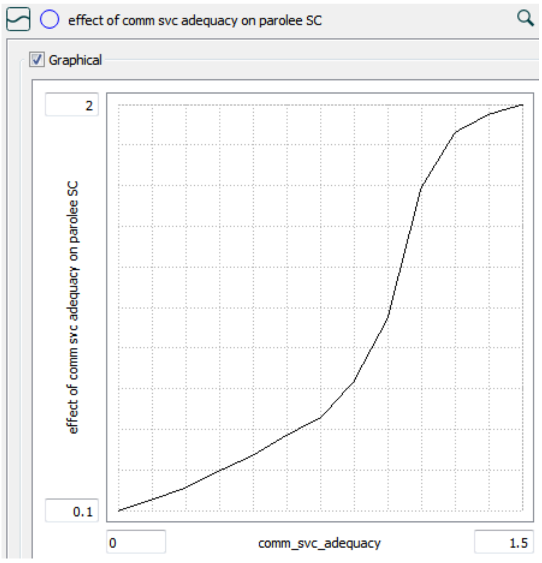


Figure 280 Effect of Community Service Adequacy on Parolee's Social Capital in Conceptual Model 2.0

8.1.6 Social Capital (SC) Sector

This section presents the formulation of prisoners' and parolees' social capital, which is similar to the SC coflows of the prisoners and parolees in Section 3.2.11. Figure 281 depicts the bare stocks and flows for the prisoners and parolees. The stocks of SC accumulates the total SC of prisoners and parolees. Each individual is assumed to carry an average amount of SC, which is defined by a score. The SC in this model is a relative concept. A normal person who is not mentally ill and does not have any criminal history is assumed to have 100 score of SC. The convicts and parolees in the model are assumed to have lower SC than a normal person.

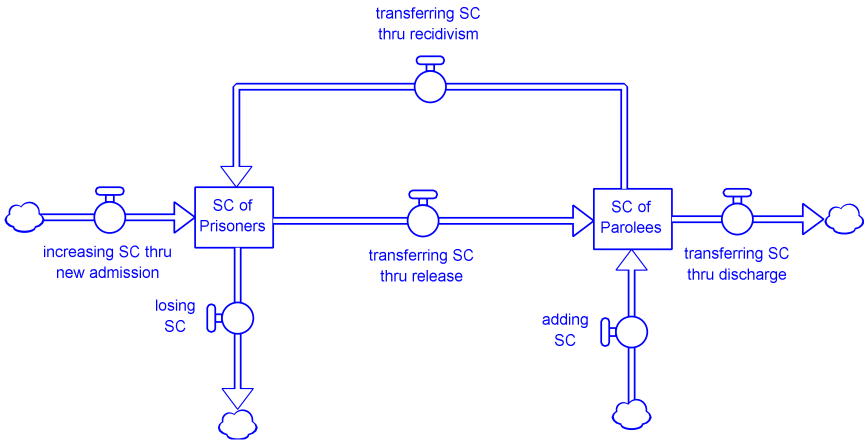


Figure 281 Stock and Flows of Social Capitals of Prisoners and Parolees Stocks in Conceptual Model 2.0

The SC of Prisoners stock has two inflows: “increasing SC thru new admission” and “transferring SC thru recidivism” (Figure 282). The “increasing SC thru new admission” features the total SC the first-time convicts bring into the stock when they are admitted to the prison. The “transferring SC thru recidivism” denotes the total SC to be transferred from the SC of Parolees stock when the parolees reoffend and are re-incarcerated.

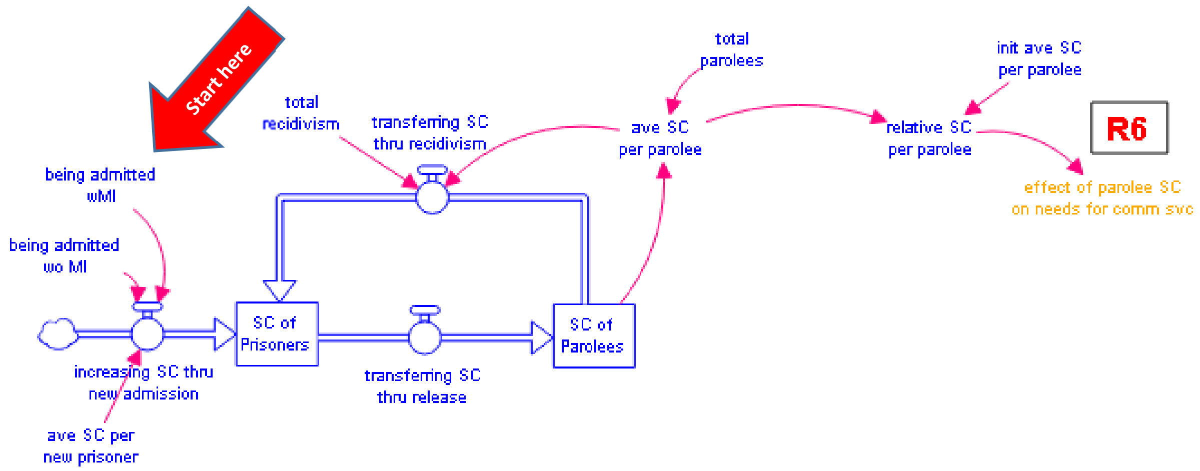


Figure 282 Inflows to Social Capital of Prisoners Stock in Conceptual Model 2.0

The formulation of “increasing SC thru new admission” assumes that the first-time convicts wMI, i.e. the “being admitted wMI” parameter, and first-time convicts wo MI, i.e. the “being admitted wo MI”, have the same average SC per person (Figure 282). “Ave SC per new Prisoner” is a constant. The other inflow, “transferring SC thru recidivism”, is the product of total recidivism and average SC per parolee. Total recidivism is the sum of the number of parolees wMI and parolees wo MI who reoffend. “Ave SC per parolee” is the ratio of SC of Parolees stock to total parolees, which is the sum of parolees wMI and parolees wo MI. Average SC per parolees wMI influences the needs for community services (loop R6).

Prisoners' social capital depreciates annually. This constitutes the "losing SC" outflow (Figure 283). The SC of prisoners is transferred out of the stock when the prisoners move on to parole. As opposed to prisoners, the parolees' social capital increases every year. This is based on the assumption that when one is living freely in the community, an average individual broadens his or her network through the interactions with others, being employed and becoming financially independent. An idealistic goal is to have the parolees to gain SC annually at an increasing rate until their average SC reaches the maximum score, i.e. 100, which is defined as the average score of a normal person in this model. Once the parolees are discharged from parole, the SC of the parolees is transferred out of the SC of Parolees stock.

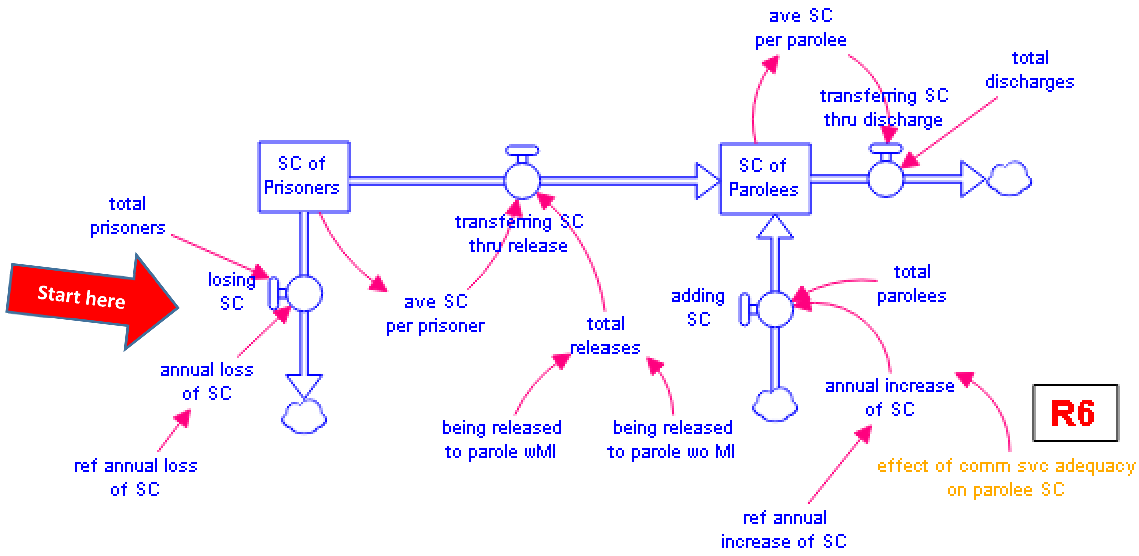


Figure 283 Outflows from Social Capital of Prisoners and Social Capital of Parolees Stocks in Conceptual Model 2.0

The "effect of comm svc adequacy on parolee SC gain" is part of a reinforcing feedback loop that describes the relationship between community service adequacy and parolee SC accumulation (loop R6). When community service is adequate, fewer parolees reoffend. As fewer of the parolees reoffend, the average SC per parolee remains higher. Higher SC contributes to lower recidivism. On the contrary, if the community services is inadequate, the parolees gain lower SC per year.

8.1.7 Prison Health Care Resource Allocation – Medical Screening Capacity at Reception Center

This section is separated from the Prison Health Care Resource Allocation in Section 8.1.4 because the medical screening here refers *to part of the procedures at the reception center where newly convicted offenders are detained for medical screening and classification for facility assignment. Mental health screening is part of the medical screening.*

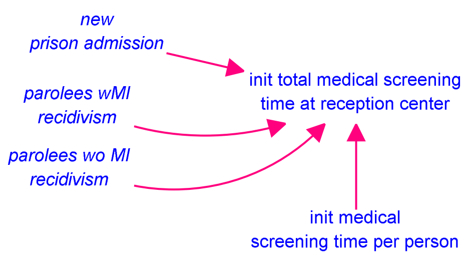


Figure 284 Initial Total Medical Screening Time at Reception Center in Conceptual Model 2.0

At the reception center, the medical screening time in the beginning of the simulation is termed as "init total medical screening time at reception center" (Figure 284). This is the product of the initial medical screening time per person and the total number of incoming prisoners. The total incoming prisoners consists of first-time convicts and total number of parolees who recidivate. "Init medical screening time per person" is a constant.

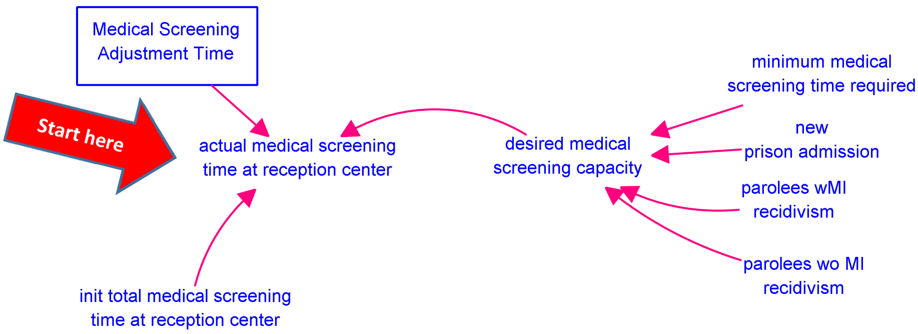


Figure 285 Formulation of the Actual Medical Screening Time at Reception Center in Conceptual Model 2.0

Figure 285 shows that the "actual medical screening time at reception center" is a parameter that is changing over time given that total recidivism, i.e. the sum of parolees wMI recidivism and parolees wo MI recidivism, changes according to the state of the system. For example, when the total recidivism increases, the “desired medical screening capacity” increases. “minimum medical screening time required per person” denotes the minimum screening time per person needed for effective screening. The minimum screening time required, which is a constant, is higher than the initial medical screening time per person.

The medical screening capacity adjustment time is modeled as a stock to facilitate the structural changes after the implementation of the Realignment policy, which is explained in Section 3.3.4.5. For now, the stock value is constant and equals to “init total medical screening time at reception center”. Medical Screening Capacity Adjustment Time will be explained further in Section 8.1.8.

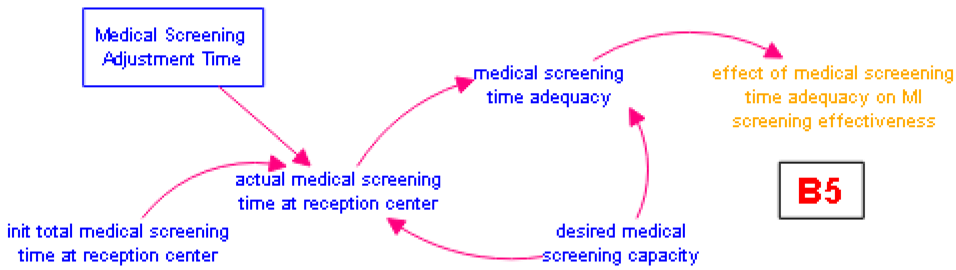


Figure 286 Input to the Effect of Medical Screening Time Adequacy on Mental Illness Screening Effectiveness in Conceptual Model 2.0

“Actual medical screening time at reception center” is formulated with the following equation.

SMTH3 (desired_medical_screening_capacity, Medical_Screening_Adjustment_Time, init_total_medical_screening_time_at_reception_center)

(8-3)

Equation 8-3 reads that “actual medical screening time at reception center” is adjusting towards “desired medical screening capacity” over the Medical Screening Adjustment Time. The initial value for “actual medical screening time at reception center” equals to “init total medical screening time at reception center”.

Medical screening time adequacy is the input variable to the “effect of medical screening time adequacy on MI screening effectiveness” (Figure 286). Medical screening capacity has a positive relationship with MI screening effectiveness (loop B5). This relationship is formulated with a table function (Figure 287).

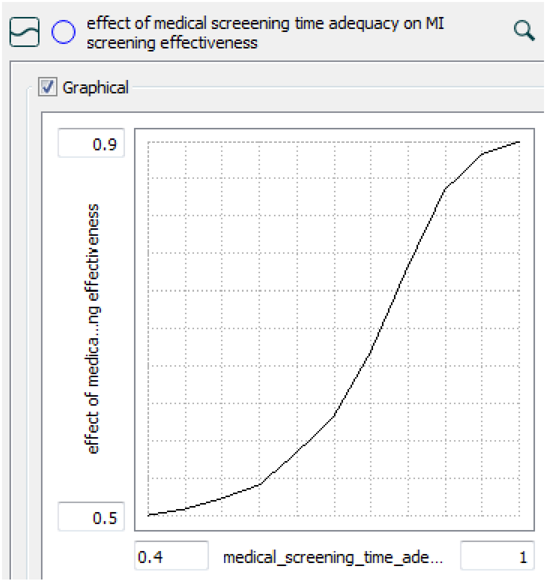


Figure 287 Effect of Medical Screening Time Adequacy on Mental Illness Screening Effectiveness in Conceptual Model 2.0

The input variable, "medical screening time adequacy", to the horizontal-axis of the table function has a range of values between 0.4 and one. The output, which is the effect on MI screening effectiveness, yields the corresponding values on the vertical-axis. The values on the vertical-axis ranges between 0.5 and 0.9. The table function reads that when the medical screening time adequacy falls below one, the effectiveness on MI screening will be lower than 0.9. As there will always be misdiagnosis, to err on the side of caution, 0.9 is chosen as the maximum MI screening effectiveness. When medical screening adequacy is closer to the initial value, which is 0.4, MI screening effectiveness is only about half of the normal condition. As medical screening adequacy increases, MI screening effectiveness increases gradually. When medical screening adequacy approaches one, MI screening effectiveness increases at a faster rate given the increase in screening resources, such as more medical professionals and better screening methods.

8.1.8 Realignment Policy

In the end of 2011, the Realignment policy is implemented. The main objective of the Realignment is to reduce the prison population by reducing admission, including return-to-prison rate due to parole violation and recommitment of new crimes. Steps taken to reduce the prison population include the reclassification of certain crimes from felonies to misdemeanors and diverting some prisoners to serve parole under county supervision instead of state supervision. Reclassification crimes means that some convicts who would have been sent to prison without the Realignment are diverted to jail sentence or probation sentence after the Realignment. The **green** structures in this section features the newly added structure under Realignment.

To model the diversion of prisoners under Realignment, “divert prison admission” is added to reduce the new prison admission from 2012 onwards (Figure 288). The “historical new prison admission” is a time series from 1987 to 2015. From 2015 onwards, the parameter is constant until the end of the simulation.

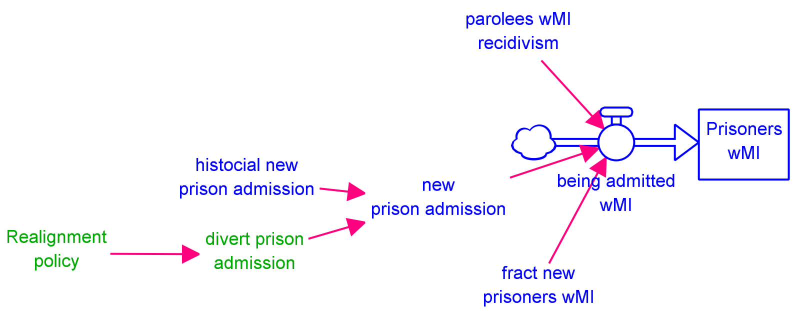


Figure 288 Formulation to Reduce Prison Admission under Realignment Policy in Conceptual Model 2.0

“Divert prison admission” is formulated with a built-in STEP function[87] with the following equation:

$$(1 - \text{Realignment\_policy}) * 1 + \text{Realignment\_policy} * (1 - \text{STEP}(0.3, 2012)) \qquad (8\text{-}4)$$

“Realignment Policy” is considered as a “switch”. When the value for “Realignment Policy” is set as zero, the structure corresponds to the Realignment policy is not simulated. When the value for “Realignment Policy” equals to one, the structure corresponds to the Realignment policy is simulated. Equation 8-4 reads that when “Realignment policy” equals to zero, “divert prison admission” is one.

[87] The STEP built-in function generates a one-time step change of specified height, which occurs at a specified time.

When “Realignment policy” equals to one from 2012 onwards, “divert prison admission” takes on the value of 0.7. Thus, “new prison admission” becomes 30% lower from 2012 onwards.

The formulation for diverting parolees to county supervision requires a more complex conceptualization. As the purpose of diverting some parolees to county supervision is to reduce the number of parolees return to prison due to parole violation, concept model 2.0 lacks the capability to trace the impact of parolee diversion in other part of the system. Therefore, this model is unable to track the progression of county parolees. Under this constrain, to model the effect of Realignment on parolee diversion, outflows are added to both of the prisoner wMI (Figure 289) and wo MI stocks respectively (not shown in Figure 289). These two outflows link to the respective Desisting ExConvicts stocks. A constant fraction of these parolees is eligible for county parole. Those who are eligible for county parole leave the parolees stock faster because the county parolees serve shorter parole duration. However, prisoners diagnosed with severe MI are not eligible for county parole. This formulation assumes that the fraction of prisoners wMI eligible for county parole is lower than the fraction of prisoners wo MI who are eligible. Also, when the county parolees violate conditions, they serve the remaining sentence in jail instead of prison. Since jail structure is outside the boundary of this model, this model assumes that all the county parolees do not recidivate and become desisting ex-convicts after they leave the parolees stocks. “Ave county parolee length” is about half as long as the parolee duration under state supervision. It is assumed that parole duration for county parolees wMI and county parolees wo MI is the same.

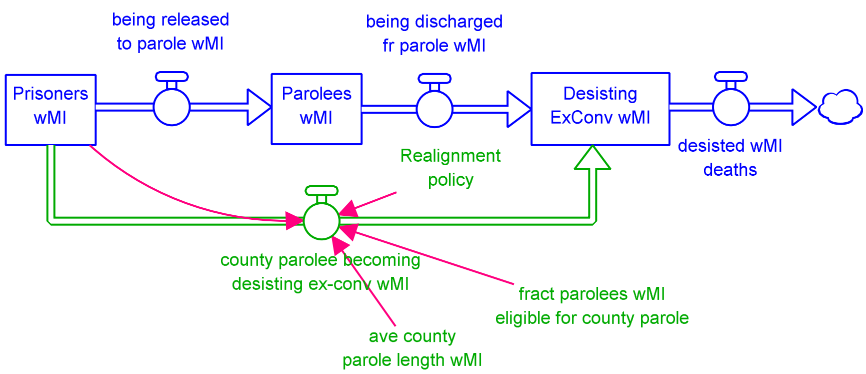


Figure 289 Formulation of Parolee Diversion under Realignment in Conceptual Model 2.0

Note: The new structure for Parolees wo MI is similar to the structure for Parolees wMI.

Under Realignment, the prison health care budget allocation decision rules have also been modified.

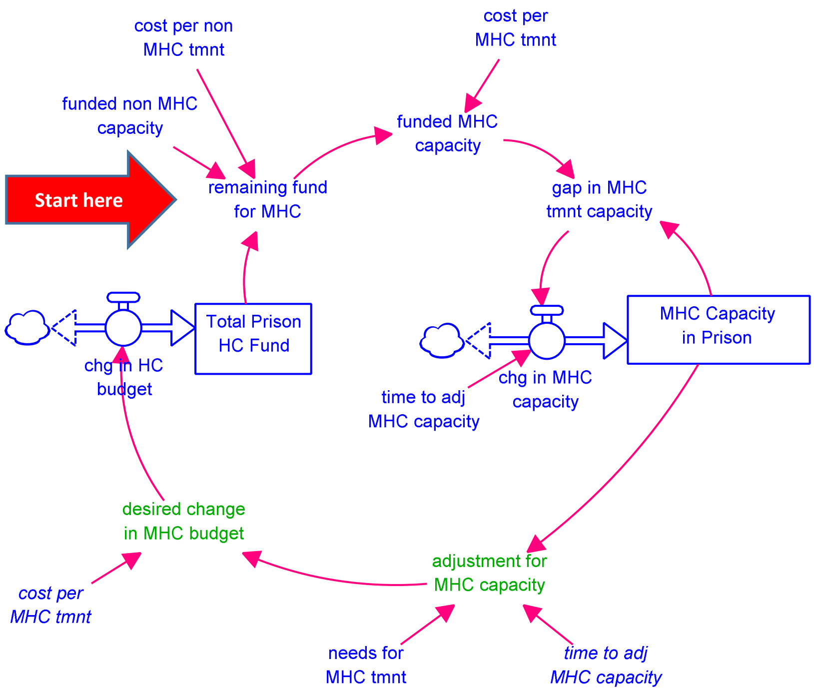


Figure 290 Modified Decision Rule in Total Prison Health Care Budget Adjustment in Conceptual Model 2.0

Before the Realignment, prison health care fund changes based on the expected growth rate determined by the authority and MHC capacity is adjusted based on the availability of the remaining fund after prioritizing non-MHC capacity (Figure 290). Therefore, when the remaining fund is less than the required amount to fulfill the needs for MHC capacity, prisoners wMI who need MHC fail to receive appropriate treatment. After the Realignment, the budget adjustment process takes the time needed to adjust MHC capacity into consideration. “Adjustment for MHC capacity” is the discrepancy between “needs for MHC tmnt” and the existing capacity divided by “time to adj MHC capacity”. “Needs for MHC tmnt” refers to the fraction of prisoners wMI who need treatment. Then, the product of “adjustment for MHC capacity” and “cost per MHC tmnt” becomes the input to “desired change in MHC fund”, which feeds into the “chg in HC budget” bi-flow. Once the Total Prison HC Budget stock is updated, the number of funded capacity will be adjusted. Subsequently, the new “gap in MHC tmnt capacity” emerges. Thus, MHC Capacity in Prison stock is adjusted. The non-MHC capacity has a similar adjustment process under Realignment. With the feedback from MHC capacity to Total Prison HC Fund, MHC capacity will not be under-funded because even after distributing prison health care fund to non-MHC treatment, there will be residue fund to support MHC capacity.

The Realignment also affects the Medical Screening Capacity Adjustment Time. However, this effect begins before the implementation of the Realignment in 2012. The authority starts building medical screening capacity at the reception centers few years before Realignment. In our study, we consider this as the preparation for the Realignment.

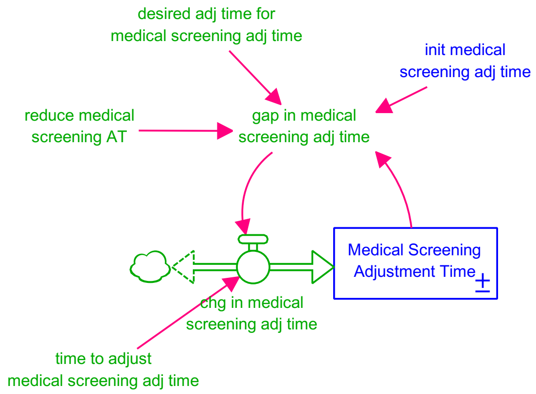


Figure 291 Formulation of the Decreasing Medical Screening Adjustment Time Before Realignment in Conceptual Model 2.0

Initially, Medical Screening Adjustment Time equals to "init medical screening adj time" (Figure 291). The initial medical screening adjustment time is long because the medical screening capacity barely exists in the reception center. Around 2008, the authority invested considerable efforts in building up medical screening capacity. This effort did not only include diverting more resources for medical screening, it also aimed at reducing the time it takes to adjust medical screening capacity. Hence, Medical Screening Adjustment Time reduces gradually from 2008.

"Reduce medical screening AT" is a switch that controls the Medical Screening Adjustment Time. When the switch equals to zero, "gap in medical screening adj time" is zero. Hence, the Medical Screening Adjustment Time stock is constant. When "reduce medical screening AT" equals to one, "gap in medical screening adj time" is the discrepancy between "desired adj time for medical screening adj time" and the stock. This discrepancy is adjusted over "time to adjust medical screening adj time", which is a constant.

8.2 Validation and Comparison

Dimensional consistency test, extreme condition test, and model initialization in equilibrium have been conducted. The results of model initialization in equilibrium and extreme condition tests are listed in Appendix O.

Next, we present the base case scenario from concept model 2.0 and compare selected results with the simulated behavior from the full model. The base case scenario simulates from 1987 to 2050. As such, the Realignment policy is activated from 2012 onwards.

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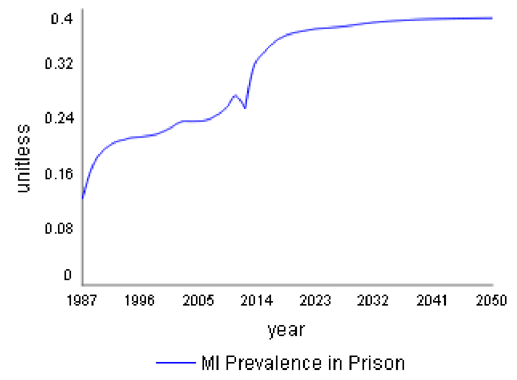
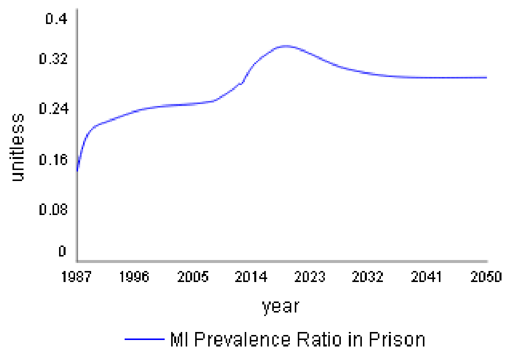
<tr><td>
</td><td>
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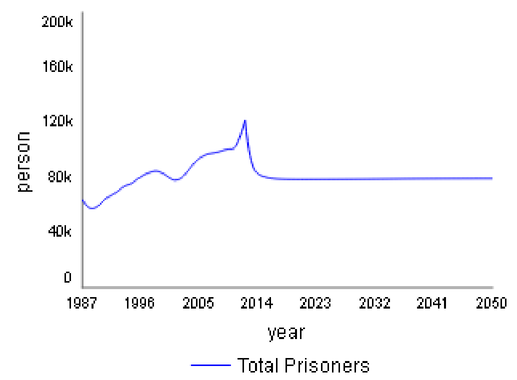
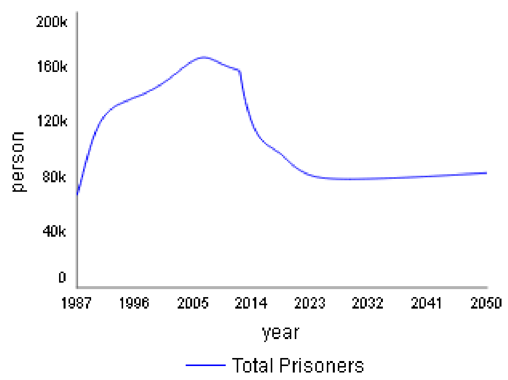
<tr><td>
</td><td>
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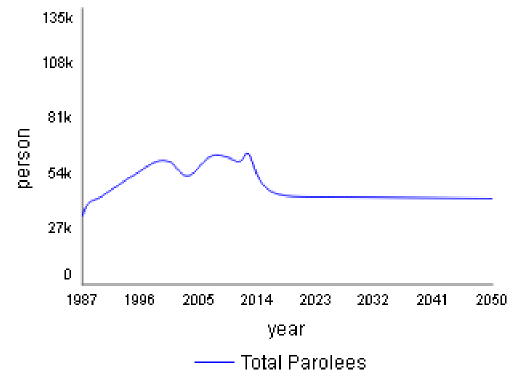
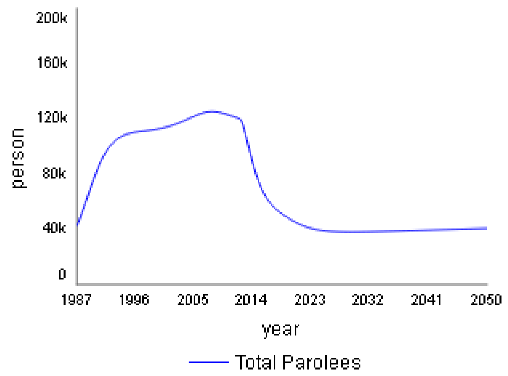
<tr><td>
</td><td>
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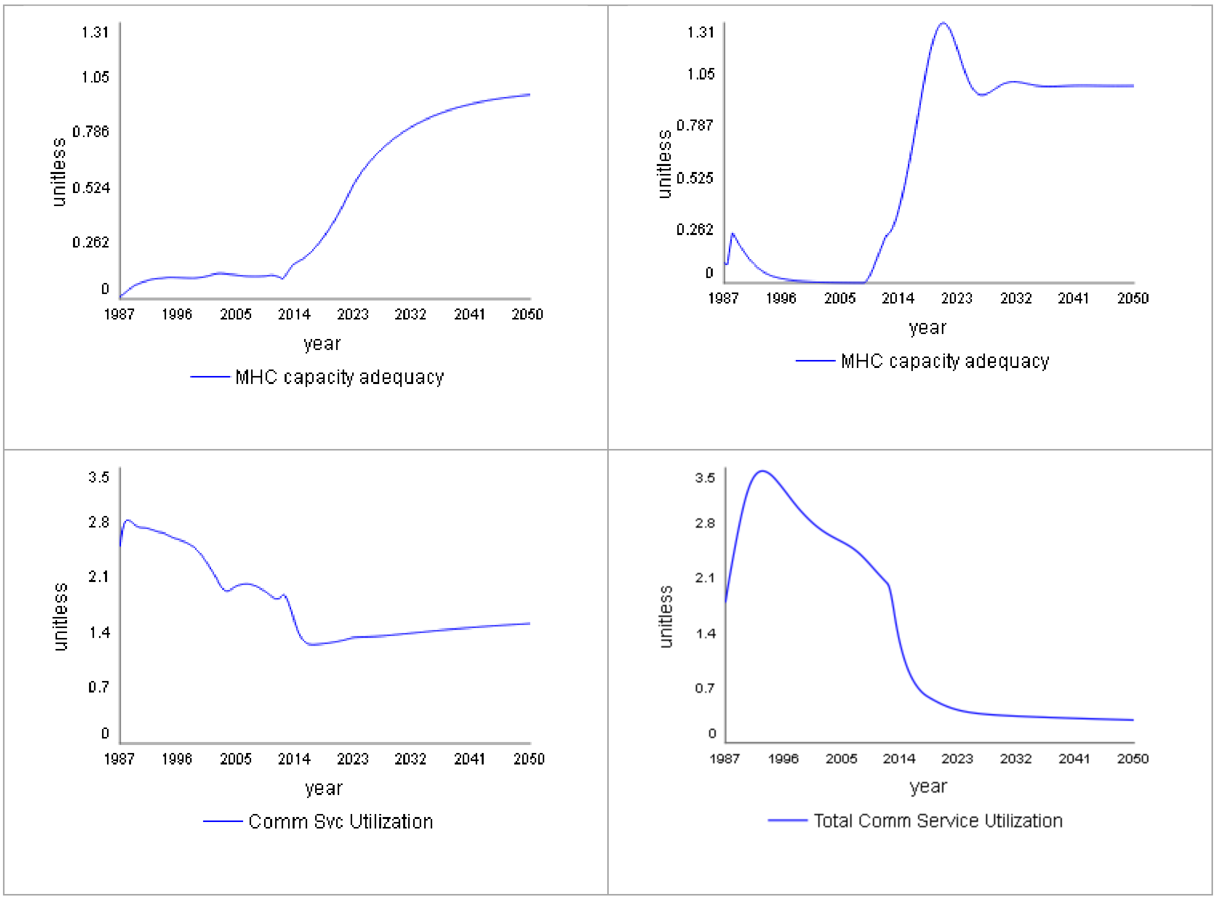

Figure 292 Comparison of Selected Simulated Behaviors from Conceptual Model 2.0 and the Full Model

The comparison in Figure 292 shows that concept model 2.0 is able to produce matching behavior patterns to selected parameters from the full model between 1987 and 2015. When the simulation runs until 2050, the patterns of behaviors differ slightly between the two models. Due to the different level of aggregation, some of the behaviors in concept model 2.0 are unable to replicate the behaviors of the full model. For example, county parolees flow into intermediary stocks characterizes ex-convicts who still have high and low risk of recidivate. Some of these ex-convicts reoffend. Therefore, the total prisoner population in the full model is higher. However, in concept model 2.0, the parolees head straight to the desisting ex-convicts stocks after discharged. The population of parolees is lower when simulated with the conceptual model 2.0 because the structures that retain parolees in the system due to parole violation does not exist in the conceptual model 2.0. Thus, the parolees pass through the system quicker in conceptual model 2.0. These desisting ex-convicts do not reoffend. In the full model, community services for parolees wo MI assist parolees wo MI transit to normal social lives more effectively. In conceptual model 2.0, such differentiation is lacking because merely two nonlinear table functions are used to represent the effect of community services on the recidivism rates of parolees wMI and parolees wo MI.

As mentioned earlier, concept model 2.0 are a useful tool for inexpensive experimentation, introductory presentation, and leverage points identification, reproducing reference modes, which the full model is able to achieve, is not the main purpose of concept model 2.0.

8.3 Chapter Summary

In this chapter, we explained the benefits and purposes of a concept model. Then we presented concept model 2.0, which was built after the full model development. After that, we conducted validation tests on concept model 2.0. Finally, we compared selected simulated behaviors from concept model 2.0 to the behaviors from the full model. Concept model 2.0 is able to produce similar behavior patterns to the behaviors from the full model. However, users should interpret the model conclusion with caution due to the omission of some dynamics from the full model.

9 Conclusions

This thesis posed three main research questions:

a. How has mental illness prevalence in prison evolved over time?
b. What is the underlying social structure that governs the MI prevalence in prison and how does the underlying system structure affects the mental illness prevalence in prison?
c. What may be a sustainable policy to reduce mental illness prevalence in prisons and criminal justice ystem?

Our research study was undertaken with a mixed method approach to integrate cross-disciplinary theories in the form of a system dynamics model.

In answering research question (a), we demonstrated that the hypothesis, which is reflected in the model, is able to produce an increasing trend of mental illness prevalence in prison that replicates the indicated historical data points from various studies.

Our study answered research question (b) by unfolding the pathway through which individuals with mental illness become prisoners and remain in the prison. Our model-based analysis suggests that the "war on drugs" policy is a triggering event that generates an influx of prisoners. However, the lack of screening capacity at the reception center fails to identify the incoming prisoners with mental illness. With an underfunded mental health care, prisoners with mental illness and prisoners who develop mental illness are often neither diagnosed nor treated. As prisoners with mental illness tend to violate prison regulations more often than prisoners without mental illness, the average prison time served by prisoners with mental illness is slightly longer. Longer incarceration time leads to further mental health and social capital deterioration. When these prisoners with mental illness are being released, their needs often are unmet by community services. Hence, they are more likely to return to prison soon after release. In conjunction with the Three-strikes Law, the punishment becomes more severe for the subsequent crime commitments by ex-convicts with or without mental illness. Without proper treatment, ex-convicts with mental illness face challenges in maintaining a proper mental health to survive in the community. Therefore, they are more likely to reoffend or violate parole condition. This holistic view provides a clear picture that high mental illness prevalence in prison is not solely a criminal justice problem. In fact, it is also a public health problem. The lack of community service capacity characterizes the failure in tertiary intervention in public health terms. Tertiary intervention includes education and rehabilitation to deter future recommitment. As such, it is a systemic problem.

To answer research question (c), we compared the "business as usual" scenario (base case) to the "no Realignment" scenario (Section 4.2.3) and sensitivity of several variables to understand the conditions required to reduce mental illness prevalence. The base case scenario runs from 1987 to 2050 (Section 4.2.2). The period between 1987 and 2012 characterizes the pre-Realignment era while the period after 2012 refers to the post-Realignment era. Then, we further investigate the impacts of the Realignment policy on prisoners with mental illness and the necessary adjustment to enhance the effect of Realignment on prisoners with mental illness. Historical data show that the prison population has reduced 20% (about 30,000 prisoners) from 2011 to 2016 after the implementation of the Realignment policy in 2012. Our simulation projects that the prison and parole populations will continue to drop the future. However, our simulation also shows that the reduction in the population of prisoners without mental illness was twice the size of prisoners with mental illness. Our analysis reveals three conditions that will further reduce mental illness prevalence in prison under the Realignment policy.

1. Lower fraction of prison convicts with mental illness;
2. Lower fraction of prisoners develop mental illness;
3. Sufficient fund to support community services for parolees with mental illness;
4. Absence of Three-strikes law

When fewer prison convicts with mental illness enter the prison, mental health care resources are shared among fewer prisoners of this kind. Higher mental health care resources per capita leads to higher mental functions among prisoners with mental illness. When some of the ex-convicts recidivate, the mental functions of these recidivists are also higher. Hence, the average mental functions of prisoners with mental illness continue to be higher until the recidivism reduces and more ex-convicts with mental illness proceed towards desistance. The remaining recidivists are the habitual offenders with lower mental functions. Eventually, the average mental functions of prisoner with mental illness becomes lower than in the base case. As community service utilization for parolees with mental illness reduces significantly (i.e. community service adequacy increases), more parolees with mental illness receive community services that facilitate their reentries into the society. Thus, more parolees with mental illness proceed towards desistance instead of returning to prison. Another positive result from higher mental health care resources is the opportunity to diagnose of mental illness in prison. When mental health care resources are adequate, more prisoners who develop MI are diagnosed and treated. Therefore, more prisoners with mental illness are being relased and transferred to the stock of parolees with mental illness. These parolees receive appropriate community services that facilitate smoother reentry. With the last condition, i.e. the elimination of the Three-strikes Law, recidivists receive the sentence that correspond to the offenses they commit.

Without the Three-strikes Law, the reinforcing relationship between recidivism and average prison time served diminishes. Three-strikes Law requires a convict of severe violent felony with a previous conviction to serve twice the length of the punishment for the crime committed in the second conviction. In the third conviction (regardless of the class of crimes committed), the convict is required to serve a mandatory life sentence or 25 years (whichever is a more severe punishment) in prison. If Three-strikes Law is removed, recidivists are punished according to the crime they commit. Hence, total prison population reduces. The reduction in prisoners has four positive impacts on prison health care system. First, the reduction leads to lower prison capacity utilization. The probability of prisoners developing mental illness is reduced due to a less crowded environment. Hence, mental health care capacity adequacy increases. Second, a lower contact rate between prisoners due to lower crowdedness reduces the infectivity of infectious diseases. Third, the reduction also attributes to a 10% decline in average age in prison because some older prisoners with mental illness leave the prison at a faster rate. As it is costly to treat chronic diseases, predominantly related to age, the funding requirements for chronic disease treatment reduces. Finally, with fewer prisoners with mental illness and less competition on resources from the infectious and chronic disease treatment capacities, more mental health care resources may be allocated to treat each prisoners with mental illness and to prevent mental illness onset among prisoners. Consequently, the funding of mental health care capacity fund may be lower.

Under the Realignment policy, a certain group of first-time offenders and reoffenders are diverted away from prison to jail. Although prison mental health care capacity has increased under the Realignment, one of the main functions of prison is to punishment, not as a de facto mental illness treatment facility. In addition, prisoners with severe mental illness requires disproportionately more resources to treat. As such, our policy recommends that prisoners with severe mental illness (wSMI) to serve their sentence in an alternative facility where punishment, treatment, and rehabilitation are carried out concurrently. With sufficient treatment and rehabilitation to ensure a successful reentry, the likelihood of recidivism is reduced. Hence, the prison focuses its mental health care resources on treating the prisoners with moderate or mild mental illnesses (wMMI). This policy also suggests the exemption of the conviction to the alternative facility from counting as a strike. At the same time, we propose the addition of a feedback to the community service resource and capacity planning to ensure adequate assistance at the point of time that the prisoners reenter the community so as to reduce the likelihood of recidivism among ex-convicts. Instead of allocating correctional fund to community services based on the local population growth projection, the county governments should be equipped in advance with information on the parolees to be released. That way, the county governments may plan in time for community service capacity and request for appropriate funds. With an adequate mental health care in the community and sufficient support for housing and job search, a higher fraction of parolees with mental illness reintegrate into the society. Consequently, fewer of them recidivate. We also advise that the authority to include the expected loss rate of the prison and jail facility due to natural wear and tear into their capacity planning process. In this case, the authorities overcomes the steady-state-error, which refers to *a constant gap between the desired capacity and existing capacity even after the system has settled into a steady state*.

Our work contributes to the literatures by way of explaining the causes to the increasing mental illness prevalence in prison by integrating the major discipline-oriented theories proposed by scholars in disciplines such as public administration, criminal justice, sociology, law, public health, and psychology. Through rigorous testing and model analysis, we have, in our study, distilled and integrated the theories with high explanatory power that contribute to a plausible explanation of the increasing mental illness prevalence in prison. Our study indicates that this prevalence is a systemic problem that extends beyond the scope from one single theory. Particularly, we advocate the public health perspective, by considering this problem at a population level, a problem that requires both secondary intervention (policies tackling the existing offenders and convicts) and tertiary intervention (education and rehabilitation). The primary intervention (prevention) is beyond the scope of our study. By taking this public health view, our study addresses the problem at the secondary and tertiary level.

These findings could be of interest to policymakers and stakeholders as the model and simulation may be used as a projection and decision-making tool. To the best of the author's knowledge, there has not been any modeling and simulation used in the projection of the impact of the Realignment policy. With the fundamental structure built into the model, the model may be used as a guide to identify areas for further research and conduct experiments for policy scenario testing.

Through data collection and analysis, we realize that most of the quantitative and time series data pertinent to our study center on the criminal justice system, namely the prison system, the jail system, and the judiciary system. Even so, data on mentally ill convicts and ex-convicts are lacking. Consequently, our study relies on the reported mental illness prevalence to estimate the number of mentally ill convicts and ex-convicts. The mental illness prevalence is a ratio and is not a reliable measure because a ratio can remain the same even when the prisoners with and without mental illness change in proportion to each other. Thus, a policy may be misperceived as ineffective if the mental illness prevalence is the only performance indicator measured. A frequent prison population survey would greatly contribute to a better understanding of the magnitude of mental prevalence. To handle the lack of community-level quantitative data, we rely on data points mostly extracted from literature or public reports. Population attributes data, such as mental functions, social capital, and incarceration year served are defined and estimated through qualitative data extraction by the author. Age is the only attribute that is extracted directly from data collected by the criminal justice system. Relevant data after Realignment are also limited and fragmented. More consistent community-level and post-Realignment data collection would contribute significantly to the validation of the model and the assessment of the impact (effectiveness) and efficiency of the Realignment policy.

One of the important lesson from this research is the effects of the interaction between population attributes and policymaking. Stocks can only be changed by flows. However, changing the flows to transfer individuals from one stock to another, e.g. from mentally ill to non-mentally ill prisoners, requires the understanding and unfolding of the pathways that lead to the change in mental health status of prisoners. The mental health status or prisoners may only be changed through the prevention of mental illness development in the first place or adequate mental health care in the second place. The confusion in the definition of mental illness by various scholars adds challenges to our study. Hence, we need to identify and establish an acceptable definition of mental illness for our study. Mental illness is not only defined by onset, it is also defined by functional impairment, which implies severity of the illness. Then, we analyzed the factors that influence the onset and severity of mental illness. These factors include prison MHC resources, prison density, cumulative prison time served, community services, and social capital. Understanding how these factors from different sectors may have contributed to the high mental illness prevalence among prisoners relieves us from forming an explanation from an overly narrow view and designing ineffective policy. This holistic view of the system enables us to design strategy (a set of policies) that tackles several sectors in order to sustainably lower mental illness prevalence (in either absolute or severity term).

Observing the changes of attributes associated with the prisoners is particular important in designing policy. The attributes our model tracks and analyzes include mental functions, age, prison time served, and social capital. We learned that these attributes serve as dynamic indicators to determine the effectiveness of various policies at different time. Attributes may improve or deteriorate even though the mental illness prevalence remains the same or worsen.

The following two scenario analyses demonstrate the necessity of monitoring the changes in attributes and mental illness prevalence concurrently. In Scenario 1 of the Scenario Analysis chapter (Chapter 7), mental illness prevalence in prison hikes shortly after the simulation starts when the Realignment policy and recommended policy are introduced in the beginning. This easily turns into a misperception that having the Realignment policy and recommended policy introduced together in the beginning of the simulation generates a worse outcome because it seems that the proportion of prisoners with mental illness is larger than the proportion of prisoners without mental illness. In fact, both of the prisoners with and without mental illness reduce, only that the reduction in prisoners without mental illness is proportionately larger than the reduction in prisoners with mental illness. However, the total discrepancy in mental functions in prison (the difference between the desired cumulative mental functions in prison and actual cumulative mental functions in prison), which implies the needs for MHC, is actually more than 100% lower in this scenario (Realignment policy and recommended policy introduced in the beginning of the simulation) than in the recommended Policy scenario alone. As a result, the average mental functions of prisoners with mental illness is 20% higher. This means that the mental functions of prisoners with mental illness are higher in Scenario 1 and the need for mental health care is lower. Both prison HC fund and correctional fund to community services are much lower than in the recommended Policy scenario alone. In another scenario with Realignment Policy, recommended policy, and the elimination of Three-strikes Law introduced in the beginning of the simulation (Scenario 2 in Chapter 7), mental illness prevalence in prison is slightly higher compared to Scenario 1 (Realignment policy and recommended policy introducedin the beginning of the simulation) for the same reason as in Scenario 1. However, the total discrepancy in mental functions in prison (the difference between the desired cumulative mental functions in prison and actual cumulative mental functions in prison) is 20% lower than Scenario 1. Since the average age in prison is lower in Scenario 2 is lower, health care resources allocated to treat age-related chronic diseases are relatively lower. Therefore, more resources are available to fund prison mental health care. Due to a larger reduction in total number of prisoners in Scenario 2 when Three-strikes Law is removed, the number of prisoners with infectious diseases are lower. With fewer prisoners with infectious diseases and prisoners with mental illness, and younger prisoners, prison health care fund reduces. In addition, recidivists are punished according to the crimes they commit; the average prison time served of ex-convicts is relatively lower. This leads to less severe social capital deterioration among the ex-convicts. With higher social capital, the demand for community services is lower. Consequently, correctional fund needed to support community services is lower in Scenario 2. These two examples show that using attributes in addition to mental illness prevalence as indicators for policy evaluation provides a more accurate evaluation for policy effectiveness.

Finally, we conclude that we have developed a “corroborated” alternative theory to explain the increase in mental illness prevalence in prison by integrating cross-disciplinary and cross-sectoral theories in the form of a model. Through rigorous testing, we built confidence in our model. As such, the explanatory power of the model increases. Our model also serves as a “boundary object” (Black, 2013) or representation to help advance future conversations between individuals with different knowledge, training, and objective to focus on meaningful structured discussion.

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