

# Poverty dynamics among the Dalits of Tarai

by

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*Thor Olav Iversen*

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Thor Olav Iversen, Bergen 1. September 2013

# Abstract

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## **Poverty dynamics among the Dalits of Tarai**

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The literature suggests that links between social identity and economic outcomes can induce poverty among groups with low social status. This seems to be true in Nepal where Dalits, the group at the bottom of the caste system, is also the group with the highest poverty rates. The aim of this thesis is to investigate determinants of poverty dynamics in a distinct village in the Tarai region of Nepal, where around half the population belong to Dalit castes.

The analysis uses quantitative data collected in a household survey done during a fieldwork to Nepal, conducted in cooperation with the Chr. Michelsen Institute (CMI) of Bergen and the National Labour Academy (NLA) of Kathmandu. OLS as well as the logit model is used to investigate possible determinants of occupational outcomes and educational investment. All calculations are done by STATA version 11.2.

A main finding of the thesis is that Dalit households are more probable to be stuck at low human capital levels over time: Illiteracy is more likely to persist over two household generations for Dalit than non-Dalit households. In the descriptive analysis, I furthermore find skilled wage labour in the modern sector of the economy to be a main pathway out of poverty for Dalits. Skilled workers are in turn found to be more likely to have education than lower-income unskilled workers.

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# 1 Introduction

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Poverty has a tendency to persist (Basu, 1997). The rural poor in developing countries are frequently perceived to be trapped in poverty because of lack of access to capital. This capital can take forms such as physical, human and social capital. Households that are poor in terms of capital might tend to end up as poorer not only in the present generation, but also in future generations, while the initial distribution of assets might empower other households to accumulate more wealth. The market power of different agents can affect to which extent they are able to reap the return of their capital stock and lack of different kinds of capital can also limit access to borrowed capital. This mechanism can reinforce structural inequality, where in addition to owning more assets, the well-off in terms of social or physical capital have access to a capital market where poor borrowers are denied.

Social categories can be a powerful determinant as to who escapes poverty or not. This thesis will attempt to shed some light on the question of the interaction between social capital and poverty by focusing on the Dalit population of Nepal, and by extension Dalits in general in South-Asia. Like other forms of capital, social capital has a return and affects individual income. According to Das and Hatlebakk (2009) there is a strong correlation between social and economic exclusion in Nepal, and the traditional caste hierarchy is reproduced in economic inequalities. The specific interest in the Dalits arises from their status in Nepali society. The Dalits are at the bottom of the caste system, and caste can be seen as a form of social capital.

Political and economic changes have affected the status of Dalits in recent years. Dalits have traditionally been excluded from a large part of the labour market, and had to take specific professions such as smiths, sanitation workers and tailors. Many of the Dalits of rural Tarai, the fieldwork-area in the plains of Nepal, have traditionally worked as wage labourers in feudal relations to land owners of other castes. However, due to changes in the political and general economic environment of Nepal, some of the Dalit have managed to take a step up the social and economic ladder by gaining employment as skilled wage labourers in the modern sector of the economy. What separates these group members from the ones that still are employed in their traditional low-income professions?

I will use economic theory to discuss poverty traps and the accumulation of different kinds of capital over generations in interaction with several types of social discrimination. The thesis will also connect this theoretical discussion to actual circumstances. The data used for this thesis was collected during a fieldwork to the village of Baijanathpur in Nepal. Baijanathpur was chosen for the household survey because of its population structure: approximately half of the population belong to Dalit groups. The field work is further described in chapter 3 of this thesis.

## 2 Background

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In this section I provide insights into the background the cultural and economic context of Dalits, Nepal and the Tarai region. I aim to give an understanding of the Dalit social role in the context of the Hindu caste system, highlight the Nepali context and explain why doing research on Dalits in eastern Tarai promises to be an interesting case for poverty dynamics.

### 2.1 Dalits and the caste system

The Dalits of South Asia form a diverse, but distinctive cultural and social community. Dalits are frequently treated as deeply unequal in the daily life of Hindu society. They are excluded and avoided in a range of situations surrounding general social life, religion, food and drink.

Dalits have through history had several other names like the ‘untouchables’, ‘scheduled castes’ or ‘Harijan’. ‘Dalit’ itself is a word that stems from the Marathi language of western India. It means ‘broken’ and was first used in caste context in the nineteenth century. The term is thus political and implies that the Dalit are oppressed by others. Frequent use dates from activist Indian Dalits in the 1970s. ‘Dalit’ is not used by all Dalits as a way to express their own identity, but is gaining ground among themselves and in media (Mendehlson and Vicziany, 1998, p. 4).

According to Mendehlson and Vicziany (1998), the Dalit play a contradictory role in Hindu society. In the oldest Hindu literature, the Vedas, the Dalit have no place at all. Hindu society has traditionally been divided by the Vedas into four Varnas, or castes, associated with different professions; Brahmin (priest and teacher), Ksatriya (ruler and warrior), Vaishya (trader) and Sudra (servant). The Dalit probably formed as a distinguishable group around the second century AD, and are due to their absence from the Vedas frequently referred to as outcastes. Since the Varna has endured as a blueprint for the whole of Hindu society, the position of Dalits as Hindus is somewhat ambiguous. They are present as a group of low status below the Sudra caste, but do not have a clear place in the religious order.

On another hand the Dalit play an important part in the Hindu belief, symbolized in the contrast between Brahmin and Dalit. This is the most consummate representation of the duality between the idea of purity and pollution which forms the basis of the whole hierarchy

in Hindu religion (Mendelsohn and Vicziany, 1998, p. 6). The Dalit are seen as permanently polluted, and being polluted by a Dalit through direct or indirect contact is particularly serious for other castes. This conception is said to arise because of the hereditary professions that Dalits have traditionally performed. Examples of such unclean work is skinning, tanning leather, removal of human waste, removal of corpses, prostitution or cleaning streets. Even though most of Dalits in present day South Asia do not work in these traditional and unclean professions according to common belief they are descended from people that were polluted by their work.

Within each of the four Varnas there exist a large number of smaller and in-marrying 'clans', which serve as the commonly used concept of caste in everyday life. The existence of such groups is harmonized with religious literature by assuming that they represent a refinement of the caste-system. Despite falling outside the formal caste system, Dalits are also divided into such clans. The different Untouchable clans thus fit into an intra-Dalit hierarchy. Two fitting examples of Dalit-clans in Nepal would be the Musahar and Bantar groups of Baijanathapur, which serve as a focus of my thesis. Even though both groups are Dalit they are somewhat different in terms of historical heritage, ethnicity and even socioeconomic status.

In general the Dalit groups of Nepal have a higher poverty level than other groups, both in the hill areas and in Tarai (Das and Hatlebakk, 2009, p. 32). The overall poverty headcount of Nepali Dalits is 42 percent compared to 23 percent for the rest of the population (NLSS, 2012). The caste hierarchy is thus reproduced in economic terms. Dalits tend to work in agriculture or in a large variation of other unskilled occupations. Even though Dalits frequently work in agriculture, they less often own land than other groups. In rural South-Asia, villagers who do not own land are generally worse off than those who do (Mendelsohn and Vicziany, 1998). Dalit groups also suffer from a poor educational situation: Only 8.3 percent of the Dalit Musahar-caste was literate in 2003 (Das and Hatlebakk, 2009).

The Varnas appear somewhat anachronistic as a division of contemporary Nepalese society. This is a result of Nepal's complex ethnic mix that results from the vast array of different groups that are different in terms of linguistic, cultural and historical traits. In Nepal geographical as well as topographical divides are quite important when trying to determine a meaningful partition of the population along caste lines.

## **2.2 Nepal**

### **2.2.1 The Nepal Living Standard Survey**

The Nepal Living Standard Surveys (NLSS) of 1995/96, 2003/04 and 2010/11 provide us with a fairly detailed picture of the economic development of modern Nepal, and is the survey officially used for poverty estimation. The NLSS poverty estimation follows a Costs of Basic Needs (CBN) approach. The CBN poverty line can be defined as the amount of expenditure required by an individual to fulfil basic needs in terms of food and non-food items (NLSS, 2012). In other words it moves as price increases, but is constant when adjusted for price level. The average poverty line for Nepal in 2010-11 has been estimated at 19261 Nepalese Rupee (NR). The NLSS also frequently refers to the poverty gap. The poverty gap estimates how far below the poverty line the poor are on average as a proportion of the income needed for all people to be at that line.

### **2.2.2 Economic development and poverty in Nepal**

Nepal is a small and landlocked South Asian country that borders India and China. It is among the poorest countries in the world and ranks 157 out of 187 countries on the Human Development Index. Nepal has a population of 30 million inhabitants and a gross domestic product per person of only 1300 US Dollars at purchasing power parity (CIA World Factbook, 2013). Despite abject poverty, Nepal has undergone significant progress over the recent years on several social indicators. The data collected in several rounds of NLSS paints a broad picture of a developing country in the process of economic modernization and diversification. The Nepali economy has been growing at a steady pace over the last three decades, poverty has decreased significantly and income inequality has improved.

During the 8 years between 1995 and 2004 the Nepalese economy performed well, with GDP growing at almost 5 percent per year and an increase of 2.5 percent per capita per year. Growth accelerated in manufacturing, services and tourism (NLSS, 2004). In the years from 2005 and 2011 the Nepalese economy continued to grow steadfast by an average of 4.2 percent, while the growth in GDP per capita averaged 2.3 percent (World Bank, 2013a).

The economic growth has coincided with a considerable decrease in both amount and severity of poverty in Nepal. From 1995 to 2004 poverty fell from 41.8 percent to 30.8 percent. The average poverty gap, and thus depth of poverty, also decreased significantly from 11.75 to 7.55. From 2004 to 2011 poverty headcount declined further to 25.2 percent.

Poverty is divided unevenly among the different regions and topographical zones of Nepal. Poverty is most prevalent in rural areas: The poverty rate for urban areas is 15.5 percent and rural areas have a poverty rate of 27.4 percent. In Table 2.1 we see that the urban hill areas of Nepal are by far the least poor group at 9 percent versus 22 percent in the urban areas of Tarai. This geographical imbalance of poverty distribution mirrors the history of Nepal. The political and economic spheres of Nepal have traditionally been dominated by Nepali-speaking groups that stem from the hill regions. The depth and severity of poverty is also the smallest for this region.

In the rural hill areas the poverty headcount rate however range from 16 percent in Eastern Region versus 31 percent in Mid and Far Western Region of the Hills. With each region except the Eastern region, the rural hill areas have a higher poverty rate than the corresponding Tarai region (NLSS, 2012). This can in part be explained by Tarai's concentration of industry, and good conditions for agriculture. There are also significant differences inside Tarai. Eastern Tarai, which traditionally has served as the region's industrial hub, has the lowest poverty level of 21 percent. Meanwhile, the Mid and Far Western region of Tarai has a poverty rate of 31 percent.

**Table 2.1 – Regional poverty in Nepal. NLSS 2012**

<i>Region</i>	<i>Headcount rate</i>	<i>Poverty gap</i>
<b>Mountains</b>	42.3	10.1
<b>Hill</b>	24.3	5.7
<b>Tarai</b>	23.4	4.3
<b>Urban – Kathmandu</b>	11.5	2.8
<b>Urban – Hill</b>	8.7	1.7
<b>Urban – Tarai</b>	22.0	4.3
<b>Rural Hills – Eastern</b>	15.9	2.9
<b>Rural Hills – Central</b>	29.4	8.5
<b>Rural Hills – Western</b>	28.0	5.3
<b>Rural Hills – Mid and far Western</b>	36.8	8.9
<b>Rural Tarai – Eastern</b>	21.0	3.7
<b>Rural Tarai – Central</b>	23.1	4.1
<b>Rural Tarai – Western</b>	22.3	4.4
<b>Rural Tarai – Mid and Far Western</b>	31.1	7.2
<b>Nepal</b>	25.2	5.4

Over the period from NLSS (1996) to NLSS (2012), average Nepali household income in real terms grew by 96 percent, and mean per capita income increased even further by 117 percent. The economy's income disparity narrowed during the same period: Per capita income for the poorest 20 percent of the population increased by 181 percent, while for the richest 20 percent it merely increased by 102 percent. Nonetheless, income is still unevenly distributed: The bottom 10 percent of the population earn 2 percent of total income while the top 10 percent of earners hold 40 percent of total income. The geographical distribution of income follows the



pattern observed for poverty disbursement. Non-surprisingly, the urban areas in the Kathmandu valley have the highest income per capita. Among rural areas, the rural eastern Tarai have the largest mean per capita income while the rural mid and far western hills regions have the lowest per capita income.

Some would claim that consumption is a more accurate indicator of well-being than income. It measures an individual's needs in terms of being able to meet basic needs. It is also measured with more reliability than income and is a better measure of household's long-term welfare because it captures its ability to smooth out income volatility. Overall there has been a fast growth in per capita consumption in Nepal from 1995 to 2011. Consumption increased 109 percent for the bottom quintile and 110 percent for the top quintile in real terms. In contrast to income distribution, the consumption disparity between the top and bottom 20 percent of the population has thus widened slightly. The percentage of households stating a less than adequate consumption within the categories of food, education, health care and housing decreased during the period, while the percentage reporting a just adequate consumption level within the same categories increased.

For many Nepalis, and even Dalits, gaining work in the non-agricultural sector has provided a pathway out of poverty. The richer the group in terms of consumption, the higher is their percentage participation in non-agricultural wage employment and operation of non-farm business (NLSS, 2012, p. 60). Households headed by agricultural wage workers are the most likely to be poor and households headed by formal-sector non-agricultural wage workers are the least likely to be poor. Households headed by professional wage workers have a poverty rate of 6 percent compared to 47 percent for households with a head in agriculture wage labour.

The period from 1995 to 2011 bore witness to an increasing economic diversification away from the previous dominance of the agricultural sector. During the 15 years period, the share of agricultural income in the economy dropped from 61 percent to 28 percent. The proportion of households maintaining non-farm enterprises meanwhile increased from 24 to 35 percent. The large majority of these businesses are very small, as only 17 percent of non-farm enterprises employ hired labour. Despite this economic diversification and development, Nepal remains a nation of farmers: 74 percent of Nepali households own land that is used for agricultural purpose, and roughly 5 percent operate land owned by others, but do not own land

themselves. The large majority of farms are small in terms of land size and production. Landholdings are unevenly distributed. Small farmers own just 22 percent of the land while large land farmers own 18 percent, creating a Gini concentration index of 0.51.<sup>1</sup>

One of the most important traits of the Nepali economy is the prevalence of work migration. A considerable part of the population migrates to areas other than their native region for work. 20 percent of Nepalis are absentees, defined as an existing member of a household that has had a long absence (NLSS, 2012). 57 percent of these absentees reside within Nepal and 43 percent travel abroad. For many Nepali households, and for the economy as a whole, remittances make out a substantial part of income: 31 percent of total income in remittance-receiving household stem from remittances. NLSS (2012) also indicates that remittances are a growing source of income for the Nepalese economy, both in absolute and relative terms. The frequency and size of remittances increased between NLSS (1996) and NLSS (2012). The percentage of households in Nepal receiving remittance swelled from 23 percent in 1995/96 to 56 percent in 2010/11. The share of remittances from India decreased, while the share from other countries increased considerably. The largest share of remittances in terms of total value comes from external sources except India (69 percent), followed by remittances from within the country (20 percent), and India (11 percent). More rural than urban households receive remittances, but the per capita remittance flow is higher for urban areas. The value of per capita remittances is also much higher for the rich: Individuals in the poorest quintile on average receive one eighth of what individuals in the richest quintile do.

## **2.3 Tarai and Baijanathpur**

### **2.3.1 The Tarai region**

The village used for data collection, Baijanathpur, is located in the south-eastern part of the Tarai region. Tarai is a mostly flat strip of land that covers Nepal's border with India. Its area covers 15 percent of Nepal's total land area, but comprises half of its population. Tarai produces over half of Nepal's GDP and has due to topography, infrastructure and connections to fast-developing India become an industrial hub. The closeness to India also affect the household income structure in a more direct sense: About two in three households in Tarai receive remittances as opposed to half of households in the hills and mountains regions (NLSS, 2012).

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<sup>1</sup> The Gini concentration index equals one if all agricultural area is owned by one household and other households own no land. It is zero if all households own same sized areas.

Prior to the eradication of malaria few people from the hill areas of Nepal lived in Tarai (Gaige, 1975). Only after the eradication of malaria in the 1950s it became accessible for most outsiders to settle, even though the region was already inhabited by indigenous groups such as the Tharu. The Madhesis also have long roots in Tarai. They are the descendants of people who either emigrated from North India during the last two centuries or lived there even before the region was included in the Nepali state. After the malaria eradication programs the Nepali state encouraged the migration of Nepali-speaking 'Pahadi' groups from the hills to Tarai. This served to ease a land shortage in the hills, but the indigenous groups of the region sold or lost large areas of land to the immigrant groups. The state's goal was to create a population of people whose loyalty it had no doubt about as it harboured suspicions over the Madhes bonds to India.

The population of Tarai can thus with broad strokes be divided into three groups; Indigenous groups with the largest group being Tharu; Madhesi, inhabitants that share kinship or roots with people across the border to India; and Pahadi, migrants from the hill-regions (Ollieuz, 2012, p. 11). The duplicity of the land acquisition process and the simultaneous lack of support for the indigenous inhabitants created a resentment which has contributed to several Madhesi and Tharu rights movements and also spurred support for the (former) Maoist insurgency. In 2008 the ethnic and political grievances of the Tharu and Madhes erupted in a series of lethally violent incidents commonly phrased as the 'Madhesi Rebellion'. These incidents were related to the long-standing enmity caused in part by the previous land loss to hill-groups, as well as perceived exclusion from influence or positions in the Nepali state.

The Madhesis share with Tharus and Dalits a marginal position in government and military service. Nepal's citizenship laws also make it difficult for certain groups of Madhesis to attain citizenship, particularly for the rural and poor (Gaige, 1975). Most Nepali academics focus on the hill and mountain areas, which for them might represent the real Nepal (Ollieuz, 2012). The Tarai region has often been neglected in terms of both political attention and research.

### **2.3.2 Baijanathpur and eastern Tarai**

Baijanathpur Village Development Committee<sup>2</sup> (VDC) is situated in the Morang district of eastern Tarai. The village borders Biratnagar - a major urban centre and industrial hub.

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<sup>2</sup>A VDC a local administrative unit in Nepal. Each VDC belongs to a district.

Eastern Tarai is considered the most economically vibrant area of Tarai and has a slightly lower poverty level than the central, eastern or western parts of Tarai. That is reflected by the fact that rural eastern Tarai is the rural area in Nepal with highest mean per capita income. As a whole it constitutes the most significant part of the region in terms of population, industries, and hosts a large concentration of Tarai's urban population.

The main rationale for doing a field work in Baijanthpur is the population structure of the VDC. Approximately half of Baijanathpur's population are considered to be Dalit. These Dalits are mainly split in two groups; the Bantar and the Musahar. The traditional occupation of the Musahar is wage-labouring in agriculture and rickshaw pulling. Many Musahars have not been able to attain Nepali citizenship, and thus been rendered unable to register landholdings. The status of the Musahar also sets the rural eastern Tarai apart from other rural areas in Tarai. Despite the low rural poverty rate, eastern Tarai is the only region in Nepal with a large class of landless agricultural wage labourers, a part of the population where the Musahar suffer significant overrepresentation. Agricultural wage labourers typically endure low wages and a demand for their labour which is subject to variations in seasonal demand. Many of them are also trapped in feudal principal-agent relationships with landlords. The landlords have traditionally been able to set contracts that leave only small surpluses to the labourers and might also collude with other people to restrict their outside-options. They can also make their access to work contingent on a restriction on other contracts (Hatlebakk, 2011).

Non-agricultural wage labour has traditionally been a way out of poverty in Nepal, and even for the Musahar the non-agricultural wage rate is considerably higher than the agricultural wage. While the daily wage of a Musahar agricultural worker was 56 Nepali Rupees (NR) in 2003, the average non-agricultural wage rate was 91 NR. Despite non-agricultural wages being considerably higher, Musahar still score considerably worse than other groups also in this category (Das and Hatlebakk, 2009, p. 28). In the latter years a significant part of the Musahar population has been able to gain employment in other sectors of the economy, despite their traditional social status.

The Bantar clan are despite their Dalit status considered to be placed higher than the Musahar in the social hierarchy. Some Bantars are even reported to be owners of large areas of agricultural land in eastern Tarai or own large businesses. Still, their presence in the Nepali

public sector remains negligible and their overall educational situation is poor (Chaudhary, 2011, p. 137). Similar to the Musahar, a large and seemingly increasing share of the Bantars in Baijanathpur find work in the modern and urbanized economy of Biratnagar.

Examining these Dalit groups that traditionally worked in low-income occupations, but has made some headway out of the lower end of agricultural economy, promises to be an interesting case of poverty dynamics. As previously stated, caste can be seen as a form of social capital and despite the somewhat different position in the caste-hierarchy of the Bantar and Musahar, they share the common trait of being Dalit.

## **2.4 Chapter summary**

Nepal is a developing country where Dalits stand at the bottom of a cultural and economic hierarchy that is enforced by the caste system. However, even though Nepal is poor it has experienced economic change and modernization over the last decades, which has brought new possibilities even for those at the bottom of society.

With its large class of landless Dalits working in the agricultural sector, eastern Tarai promises to be an interesting case for studying who breaks out of the traditional low-wage and low-status occupations and climbs the first steps on the ladder out of poverty. Baijanathpur's main attraction is its dense concentration of Dalits, but it is also proximate to a large urban labour market with a large demand for labour, which might provide the Dalits a pathway out feudal relations and offer possibilities of social and economic advancement.

## 3 Fieldwork

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The aim of this chapter is to describe the data collection-process, give an introduction to the questionnaire and describe the qualitative interviews.

### 3.1 Survey

I travelled to Kathmandu 8 February 2013. The survey in Baijanathpur started 14 February and lasted through 4 March. The time from my return to Kathmandu to 15 March was spent completing data-entry. The questionnaire in use is named ‘NLA-CMI survey on poverty dynamics in eastern Tarai’. The same questionnaire has been used in a more extensive project that collected a larger sample of households from several districts and VDCs in the eastern Tarai region. My survey added a distinct Dalit village to the larger study.

The household survey was exclusively conducted in Baijanathpur VDC. The sample is randomized. Each VDC is divided into nine smaller administrative units called wards. Ward 1, 3, 6, 7 and 9 were randomly selected as the areas where we would conduct the survey. 22 households were interviewed in each of the 5 wards giving a total of 110 interviews. Local partners secured voter lists from the local VDC office that were used to randomly select the specific households within each ward. We did one interview in each household, but allowed more than one person to participate in the interview. The main respondent of the interview was preferably the household head, but frequently the spouse, son or other relatives.

The household survey was conducted by two hired assistants from the National Labour Academy (NLA) in Kathmandu. They were experienced field workers, and already familiarized with the relevant questionnaire due to their participation in the previous project. The interviews were conducted in the languages of Nepali or Maithili, and I participated by observing the interviews. Thus I was able to correct observed mistakes and ask elaborating questions. I did data-entry and coding continuously during the field-work, and the survey questionnaires were stored at NLA’s premises in Kathmandu after data-entry was completed.

#### 3.1.1 Questionnaire content

Studies in economics often use data from large samples, but that only cover a short span of time. In contrast to such an approach the questionnaire in use records household-data over

three generations. This approach is inspired by the field of economic anthropology. A long time-horizon could help understand the underlying reasons of why some households stay poor over generations, and others climb out of poverty (Hatlebakk, 2012a).

The questionnaire lists the occupation, education, income and age of the members of every household, as well as all brothers and sons of the household head. Income of each family member is reported either as daily wage or monthly salary, as well as occupational descriptions. The questionnaire records size, source and interest rate of household borrowing in the credit market. It asks a range of questions about among other things housing standards, housing upgrades, explanation for lack of schooling, work migration, renting of land and production shocks. It also asks for the household to state reasons for declining or increasing land ownership over generations, as well as for generations of landlessness.

The questionnaire collects self-reported family history of the household head. We used one page of the questionnaire to describe the family history and listed the names of the grandfather, father and household head. The oldest male individual in the household over 30 years was identified as the household head, regardless of whether he was the household member interviewed or not. If the actual household head was female we listed her husband as household head for family history. In other words, deceased individuals could also be defined as household heads. If the actual household head was a male under 30 years old we defined his father as the household head.

We also listed the father and grandfather of the household head's education, land ownership at 40 years of age, as well as occupation and events of migration.

### **3.2 Qualitative interviews**

In addition to the household survey, I performed six semi-structured qualitative interviews during the fieldwork, with the assistance of a local interpreter. These are intended to provide anecdotal evidence to supplement the quantitative analysis. They also allow me to elaborate on interesting trends in the data. The questions broadly followed the outline of the survey, chronicling the respondents' family history in terms of occupation and land ownership.

In order to avoid any disturbance to the survey, the qualitative interviews were carried out in wards where we already had finished the survey-interviews or wards where we did not conduct the survey at all. One of the interviews was done in Ward 3 after we finished the

survey, while three interviews were done in two villages in Ward 5 and two interviews were done in separate villages in Ward 8. We also interviewed the local VDC officers to provide additional information on the history, economic conditions and caste distribution of Baijanathpur.

### **3.3 Chapter summary**

The field work consisted of both qualitative interviews and a quantitative survey. The quantitative survey is the main material for the analysis sections, and the qualitative interviews are intended to supplement the quantitative discussion. Data treatment and data entry was done by me continuously in the field. Possible issues of the data collection are handled in subchapter 5.5.

The data collected by the household survey allows me to test the extended model for the effect of household endowments on occupational outcomes, while controlling for the effect of caste. In chapter 5 and 6, I will explore the data collected in the survey, before proceeding to describe econometric methodology in chapter 7 and performing the quantitative analysis in chapter 8.

In the coming chapter I will discuss the theoretical literature of poverty traps, and develop an extended version of a theoretical model presented by Ghatak and Jiang (2002). I aim to discuss poverty dynamics among the Dalits by testing if the theoretical model is relevant to the Dalits in Baijanathpur.

## **4 Theoretical framework and hypothesis**

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In this section I aim to provide a theoretical backdrop for analyzing poverty dynamics among Dalits in Nepal. I first do a review of literature on poverty traps in general, and then move on



to the interplay between social identity and poverty traps. After the literature review I extend a model by Ghatak and Jiang (2002) to include social capital. I afterwards compare the model to anecdotal evidence from the qualitative interviews fieldwork, and draw two hypotheses from the model which will be tested in the quantitative analysis of chapter 8.

## **4.1 Poverty trap literature**

Your income today influences your income in the future. The most important idea underlining the term chronic poverty is that an observed household's income consistently falls below the poverty line. The frequent persistence of poverty raises the suspicion that it exists in a state of equilibrium (a poverty trap) that gets restored after every disturbance. Poor people hence tend to remain poor because they start out poor. If poverty traps exist, a single infusion of aid could for instance make a large difference to an individual or country by setting it on a new path that in the long term will lead to a non-poor outcome. Some economists oppose the idea of poverty traps (Banerjee and Duflo, 2011). A frequently used argument is that since many countries that were once poor are now rich, poverty traps is an inherently flawed concept. The same argument also applies at the individual or household level.

In research literature there exist a variety of mechanisms that create supposed poverty traps. These mechanisms can operate at individual level as a result of preferences or abilities, in households or even the economy-wide level. I will present theories that operate at all these levels. In the next section I will discuss both single and multiple equilibrium poverty traps as well as empirical testing of poverty traps.

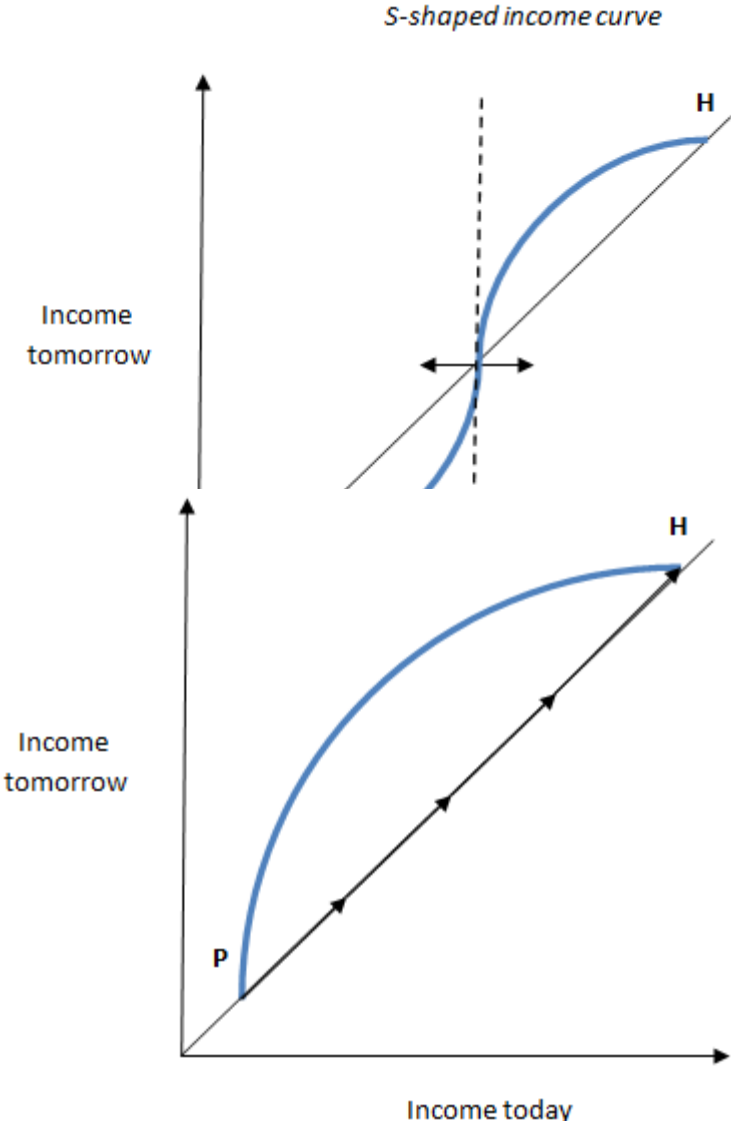
### **4.1.1 Single and multiple equilibrium poverty traps**

Some of the models in the literature on poverty traps operate with multiple equilibrium mechanisms where both poor and non-poor outcomes exist. Individuals stuck in a multiple equilibrium poverty trap thus suffer avoidable poverty. In such models ownership of physical capital is frequently the determinant of whether or not an individual is stuck in a poverty trap. There often exists a critical asset value where if an individual being over or under will decide whether he or she is trapped in poverty or not. An actual economic misfortune might therefore have permanent consequences by pushing the poor under the threshold wealth level required to stay out of a poverty trap and hence trap them at a low income level. A low-cost program that pushes individuals just over the critical asset value would therefore spur additional saving and investment that lift individuals from a poverty-trap trajectory or equilibrium to a long-term high income trajectory. The possible existence of multiple steady states for individuals

or groups thus provides an argument for attempts of poverty-reducing interventions in the economy that could generate large and lasting gains (Barrett and Carter, 2013).

The S-shaped income curve is an example of such a multiple-equilibrium poverty trap mechanism. The S-shape of the curve is the source of the poverty trap (Banerjee and Duflo, 2011). On the diagonal line, income in the future equals income today. For the individuals that are left of the threshold wealth level **T**, income tomorrow will be less than income today and they over time will get poorer and poorer and converge towards equilibrium **P**. For those right of wealth threshold level **T** income will increase from one day to the next until they are in high-income equilibrium **H**. Pushing an individual over wealth level **T** would thus lift an individual out of poverty and towards a long-term path of prosperity. Without the poverty trap, individuals would simply converge towards the high income equilibrium **H**. In chapter 8, I will return to figure 4.1 and 4.2 in order to discuss whether I find any indication of a poverty trap in my data.

**Figure 4.1.: Multiple-equilibrium poverty trap**



**Figure 4.2.: No poverty trap**

Other poverty trap mechanisms in the literature operate in a single-equilibrium environments where there does not exist a non-poor outcome. This kind of poverty trap may exist at an economy-wide level and could be understood as an outcome of technologies like institutional quality or methods of production. There might also exist single stable states for certain groups and individuals. These individuals or groups could possess traits that sort some into a high level steady state, but others into a low-level steady state. A single-equilibrium poverty trap creates a rationale for more long-term investment to change underlying factors for individuals or the economy, for instance improving on institutions or reducing malnutrition. Single and multiple equilibriums can coexist within one economy, with some households facing a single poor or non-poor equilibrium, while other face several different outcomes.

There are many issues to take into account while testing for poverty traps. Even when multiple equilibriums exist, they can be challenging to find empirically. Within one economy some individuals might for instance be subject to multiple equilibriums while other might not. It could thus be very difficult to separate empirically between situations of one multiple equilibrium or several single equilibriums.

Changes in the study-environment can also change underlying parameters and the equilibrium, for instance by varying the critical asset value for each study. The use of assets as a determinant could pose further challenges. The use of money measures is complicated by monetizing different asset types. Empirical tests can prove vulnerable to distortion because of arbitrariness when gathering very different units into one measure. Other kinds of assets like social and natural capital might also remain unobserved.

Some researchers have recently begun to favour a more indirect approach to testing poverty traps, for instance by using behavioural data. These test behavioural implications of poverty trap models. Behavioural patterns that could emerge as a result of a rational response of someone being in a poverty-trap would in such cases serve as an indication of a trap. This approach also allows researchers to experiment with interventions and then examine behavioural change. Some examples of such interventions are randomized handouts of cash transfers, credit or fertilizer (Barrett and Carter, 2013, p. 25).

#### 4.1.2 **Poverty-trap sources**

The literature refers to a multitude of poverty-trap sources. Does being poor for instance make it hard to plan for the future? Some theories model poor individuals' psychological reaction to poverty by shortening time spans.

There is empirical evidence that the saving rate is very low at low income levels and increases once the income rises over certain poverty thresholds. According to Loayza, Schmidt-Hebbel and Servén (2000), a doubling of private income in developing countries increases the savings rate by one tenth. Barriers to saving might not only be externally imposed. The poor in their daily lives already have to exert much self-control because of their material situation. This may make it harder to muster the discipline needed to save. This is further supported by the fact that the poor due to constant high risk levels live with a considerable stress, as well as a bad nutritional situation which might make it hard to consider the long term. A sense of having few opportunities can make behaviour reflect the desperation of very low material living standards, and a sense of stability might therefore be necessary for people to take the long view. According to economic theory, when income level declines towards a minimum it might also become impossible for the poor to accept a lower income level. That means that the marginal utility of consumption goes towards infinity which in turn makes the poor unwilling to save (Hatlebakk, 2012b).

For these reasons we could expect the rich to save more, and the poor do save relatively little. As people get richer they will save and invest a higher fraction as it becomes easier to divert resources for future use. This means that the rich will have more resources in the future than

the poor. The poor hence stay poor because they do not save enough (Banerjee and Duflo, 2011).

The daily lives of the poor are surrounded by large risks. Adverse health events or crop failure are some examples of risks to which the poor are often cited as being disproportionately vulnerable. There may be poverty-inducing effects that are outcomes of such high-risk environments. Risk makes us worry and worrying makes us stressed and/or depressed. Being stressed or depressed in turn makes it harder to focus and makes us less productive. An actual adverse outcome may also hurt the poor more severely than the well-off. It is harder to muster the capital needed to pay healthcare fees or to cut consumption if one is already poor. According to multiple equilibrium poverty trap theory, an adverse shock might also push an individual or an economy below the asset threshold level required to stay out of a poor steady state and thus trap them in poverty.

Having a high marginal utility of consumption will in addition to decreased willingness to save, lead to risk adversity. The poor do in fact tend to react to their increased vulnerability and higher risk level by behaving more risk adverse in the way they manage businesses and farms. They may for example know of new types of crops, but choose not to adopt them since there is a small chance of them failing. Such a mechanic may enforce poverty. That poor individuals behaviour related to risk might affect economics outcomes is well documented. Poor farmers' profit rates can go up as much as 35 percent if they adopt a new technology. In the case of rich farmers there is no such relationship, presumably because they can afford to lose a harvest and therefore are more willing to take risks and actually adopt new technologies (Banerjee and Duflo, 2011).

A large fraction of the poor run small scale businesses, often just for subsistence. By far most of the businesses never grow to the degree where they can hire employees. Rate of returns on investments in businesses in developing countries have been found to be very high at low levels of investment, but to sink fast with additional investment (McKenzie, 2006). Poor entrepreneurs might therefore not invest much in growing their business. The frequently hard competition from other very similar businesses is one possible explanation of low rates of return on additional investment. Hence the businesses of the poor might be stuck with at very small sizes and leave their operators unable to escape from a poverty.

Liquidity traps might also be a source of continuous poverty. Businesses or households could face high borrowing costs or be unable to borrow enough to make poverty-alleviating investments. The poor rarely have access to large loans from banks and credit from informal sources tends to be expensive. Yearly interest rates for the poor in developing countries are often in the 40 to 200 percent range, and frequently higher than for the rich. According to some theories they might also face a greater demand for collateral because threats of punishment are less effective against poor. Running a small business is as mentioned common for the poor in developing countries, but because of these credit restrictions it might be more difficult for them to develop their entrepreneurial activity. Higher interest rates and demands for collateral might hinder individuals from adopting new technologies and performing profitable profession-changes. It might also stop them from making profitable investments in their businesses and expanding production.

There is a general agreement in economic literature that human capital is a determinant of economic outcomes and education is one of the most used measures of human capital. According to a model presented by Barham, Boadway, Marchand and Pestieau (1995), lack of education can cause poverty traps. Education in the model increases income, but poor households can be unable to finance education due to liquidity constraints. Thus the children of poor households can become stuck at low levels of income and education, while children of wealthier households get more education and in turn get higher income.

Another frequently cited source of human capital is health. Poor health could have the potential of creating poverty traps. Workers with poor health might miss workdays, sick children learn less in school or sick mothers give birth to sickly children. Bad health is thus a possible transmission-channel from current misery to future poverty. One positive aspect of a health related poverty trap is that one might only need a push to escape it. For example if one generation gets to grow up and work in a healthy environment, starting a circle of good health and higher income which then is transmitted to the next generations. Poor individuals in developing countries are less healthy than richer ones because they frequently cannot afford to buy health care. They are also less likely to buy prevention before a disease happens and not be able to afford proper treatment after the infection has taken place. In addition the poor as already stated are more likely to be malnourished, increasing their vulnerability to infectious disease (Currais, Lòpez and Rivera, 2005).

The inability of the poor to feed themselves properly has also been stated as a source of poverty traps. General effects from malnutrition vary widely. There is not only discomfort in being malnourished; there might also be impairment from engaging in physical and mental activities. Malnutrition also causes fatigue and might hinder the ability to work, hence decreasing an individual's productivity (Dasgupta and Ray, 1986). Not surprisingly an overwhelming majority of the malnourished live in low-income countries. The poor cannot afford to eat enough or right which makes them less productive. Hence hunger and malnutrition keeps them poor. As people get richer they can buy more food. Once their basic needs are taken care of, more food builds strength allowing people to produce more than they need to stay alive. This mechanic might breed both economic inequality and poverty traps. The poor get poorer and the rich get richer and eat better, and get stronger and then even richer, and the gap increases further.

Some even see a large proportion of the world's poorest people and even entire countries as stuck in health-induced poverty-traps (Bahadur, Faye, Kruk, McArthur, McCord, Sachs and Schmidt-Traub, 2004). One example that has been used is that countries where more than 50 percent of the population are exposed to malaria have per-capita incomes that are one-third of those in countries that get no malaria. According to poverty-trap theory being so much poorer makes it harder for them to take efficient steps toward curbing the malaria epidemic, and malaria in turn keeps them poor. The literature would then suggest that an investment in efforts that would curb the malaria epidemic would be highly efficient. Access to clean water and sanitation are also examples of other kinds of potentially poverty trap-breaking health-investments (Banerjee and Duflo, 2011).

One might imagine poverty traps caused by low levels of human capital (i.e. poor health or education), as multi-equilibrium poverty traps similar to the one envisaged by figure 4.1. In these situations, a one-time investment in health or education could be thought to lift the individual or group over a critical value of human capital, and spur a cycle of growing income. A poverty trap caused by a poor nutritional situation could however also be imagined as a single-equilibrium poverty trap, as sustained effort or change in underlying economic circumstances might be necessary to lastingly improve on the nutritional situation of households or groups.

Some academics however believe that until political institutions are fixed, countries cannot really develop. One view is that countries with better institutions, more secure property right and better policies will invest more in physical and human capital and use these assets more efficiently to achieve a higher level of income. According to Acemoglu, Johnson and Robinson (2000) institutions can be very long-lived. They introduce the term of “extractive institutions” that were set up by European nations in areas where Europeans found it difficult to settle during the colonial-era. At the other extreme we have more easily inhabitable colonies where Europeans settled and brought with them European institutions. The main purpose of the extractive states was to extract as much resources as possible with the smallest amount of investment required. The paper argues that there is a strong correlation between the quality of these early institutions and the quality of institutions today that in turn has a strong effect on national economic outcomes (Acemoglu, Johnson and Robinson, 2000). Bad policies or politics that are outcomes of bad institutions might thus play a part in inducing regional or nation-wide poverty traps.

An example is corruption, which in many developing countries cause massive inefficiencies. Some even see it as a nation-wide poverty trap: Poverty breeds corruption and corruption causes poverty. Aid should therefore be earmarked specific goals that can be monitored with a reasonable effort. Breaking the poverty trap and raising living standard in itself will make the civil society and governments better able to maintain the rule of law and curb corruption.

Lack of family planning might also be a source of poverty traps: Children born in large families might be less likely to be properly nourished, get education or good health care. In economic terms they get less investment in their human capital. According to surveys conducted in Nepal, poverty increases with household size and number of young children (NLSS, 2012). The possible existence of such a poverty trap however raises a question of causality. The main issue is to which direction the causality points: It is not clear whether being poor cause families to get more children, or if having more children makes a family poor. If having more children makes a family poor, lack of family planning can create an intergenerational poverty-trap mechanism in which parents get many poor children. The possible existence of such a poverty trap creates a rationale for active population policy (Banerjee and Duflo, 2011).



## 4.2 Social identity and poverty traps

Most economic analysis tends to focus on monetary utility or motivation such as consumption or income. Economists often assume that preferences are individual characteristics independent of their social and cultural surroundings (Akerlof and Kranton, 2010). In the real world, however, individuals' conceptions depend on the context. Social categories might be an abstract concept, but they are therefore a powerful factor in determining economic outcomes. For instance, we observe that the cultural context is an important factor in deciding who in Nepal escapes poverty or not: The percentage of poor among the Dalits is close to double the percentage for non-Dalits (NLSS, 2012).

Economists often think of production as depending on resources like physical and human capital as well as management. Relationships do not imply any market advantage and are not given any value. However, excluding social capital might be problematic. Two predominant views on social capital in economics can be clearly distinguished. The first sees social capital as a stock of trust and personal attachment for a group or society that facilitate provision of public goods. A second version sees social capital as an asset that exists to the benefit of a single individual or firm, sometimes meaning access to networks of interconnected agents where the individuals derive benefit from those with whom they form the network.

Relationships and trust might enable individuals and societies to lower transaction costs. For instance, trust-based market features, such as easy access to credit, are present in most developed countries, but frequently lack in developing countries. Thus lack of social capital might exert a permanent negative influence on economic development in countries with a low stock of trust. Social capital in both a society and at the individual level can thus make contract enforcement more efficient and relationships can facilitate information exchanges that lower search costs (Fafchamps and Minten, 2002). However, individual social capital could be a source of market imperfections as well as personal enrichment if social ties facilitate collusion and nepotism. It is thus unclear whether social capital is a cause of market imperfections or a cure.

Which individuals in an economy get stuck in poverty traps and who escape could also be affected by social discrimination. An employer may for instance refuse to hire members of a discriminated group, the group might be unable to gain access to the credit market and thus be forced to forego productive investments, or consumers in the product market might be

unwilling to buy products made by members of the group. By using the term of discrimination coefficient it is possible to provide a definition of a taste of discrimination that applies in different markets and scenarios. The monetary cost of an action does not always equal all costs, and such a coefficient can be used to include the preference for discrimination.

An employer might for instance act as if the wage equals  $\pi(1 + d)$  when considering whether to employ a member of the discriminated group.  $\pi$  is the monetary wage.  $d$  is the discrimination coefficient and translates the preference for discrimination into monetary terms. If  $d > 0$ , it is a case of negative discrimination among employers. The discrimination coefficient thus represents a non-monetary cost of production. If productivity was equal and other non-discriminated groups simply received a wage of  $\pi$  then a utility maximizing employer would never use labour from the discriminated group unless they accept lower wages. If  $d < 0$ , this would be a case of positive discrimination where the group subject to the discrimination coefficient would become a preferred group to hire. A discriminating consumer might act as if the price of a product produced by the discriminated group would be  $P(1 + d)$  whereas the normal price of the good was  $P$ . Discriminating customers would if  $d > 0$  not buy the good produced the discriminated group, provided that there are homogenous products made with labour from groups which are not discriminated against. Such discrimination would add an implicit cost for employers when considering whether to hire discriminated labour (Becker, 1971).

Akerlof (1976) outlines a scenario of caste-discrimination in the labour and product market. This product market discrimination is transmitted into the labour market via a caste code that distributes the high-productivity jobs to high castes, low-productivity jobs to low-castes and scavenging jobs to the Dalit. The threat of sanctions for buying goods from firms that break the caste code might deter potential customers from buying from them, rendering it unprofitable to hire cheaper labour and lower castes in the high-productivity jobs. In the right circumstances (small potential break-out coalition or where costs of cooperation are high) this might create an equilibrium that follows the caste code. The equilibrium could thus be discriminating due to features of the caste system that transmit into the economy through product and labour market discrimination. A mechanism that creates a steady state of discrimination in one or more markets might hence trap certain groups in poverty as they are locked in low-income professions. The caste-code equilibrium is a Nash-equilibrium, but not

Pareto-optimal. Optimally all castes would choose their profession freely, and thus the labour force will separate themselves optimally between different types of jobs.

#### **4.2.1 Poverty traps in my thesis**

Does social identity play a role in occupation and asset distribution? In the following subchapter I present a new version of a borrowing-constraint model that was originally presented by Ghatak and Jiang (2002). I will use an extended version of this particular economic model to shed light on how the existence social capital can distort economic outcomes. The patterns of social status are in the model brought into the economy by affecting market structures and can in the right circumstances create multi-generational poverty traps.

### **4.3 A multi-generational model of social capital and mobility**

We know that Dalits constitute the poorest social group in Nepal, and I will investigate why this may be the case. Through what channels does the low social status of the Dalit turn into adverse economic outcomes?

I extend a model outlined by Ghatak and Jiang (2002). The Ghatak and Jiang (2002) model is in turn a short version of Banerjee and Newman (1993), which allows for more specific predictions than the original model. The model allows me to discuss how poverty traps can appear in a setting of castes and social capital. In my extended version I add caste as an economic factor. Then the income and asset ownership of a household depends on caste, in addition to how much wealth the parents inherited from the previous generation. In other words what income your parents make, as well as their caste, will be an important factor in deciding which occupation you end up in.

The original model analyzes a dynamic model of occupational choice in the presence of credit market imperfections. Whether you gain access to the capital market or not depends on your inherited wealth, which again depends on what income your household's previous generations made in their profession. Hence households can become stuck in a liquidity trap where they are unable to finance any investments.

### 4.3.1 The basic model

Consider an economy populated by forever-living households. Each agent of each household lives one period. The population size is normalized to one and there is no population growth. In period  $t$  a household  $i$  is endowed with one unit of labour and wealth  $a_{i,t}$ . The agent of that period earns income by supplying labour and/or capital and the resulting income  $y_{i,t}$  is divided between consumption  $c_{i,t}$  and bequest to the next generation  $b_{i,t} = a_{i,t+1}$ .

Each agent's budget constraint is thus

$$y_{i,t} = c_{i,t} + b_{i,t} \quad (4.1)$$

We assume a Cobb-Douglas utility function where utility depends on consumption and what is left for the next generation as bequest.

$$U^i(c_{i,t}, b_{i,t}) = c_{i,t}^{1-s} b_{i,t}^s \quad (4.2)$$

In optimum the current generation will save  $s$  of its income and passes it on to the next generation.

$$a_{i,t+1} = s y_{i,t} \quad (4.3)$$

In period  $t$ , the economy's wealth is distributed according to the probability measure  $\lambda_t(\cdot)$ . And below we will need the distribution function for wealth up to  $a$ , but not including  $a$ ,  $G_t(a) = \lambda_t((-\infty, a))$ . This is the share of the population with wealth (assets) below the capital  $a = I$  needed to invest in modern technology.

### 4.3.2 Production technologies

There are two production technologies. The subsistence agriculture technology uses one unit of labour to produce  $\underline{w}$  units of output. The entrepreneurial technology uses  $I > 0$  units of capital and two units of labour to produce  $q$  units of output at price 1. The entrepreneur spends his unit of labour monitoring the worker, who in turn is spending a unit of labour to produce the output. The net income with the entrepreneurial technology is greater than what two units of labour can produce using the subsistence technology.

$$q - rI > 2\underline{w} \quad (4.4)$$

Where  $r (\geq 1)$  is an exogenous rate of return on saved capital.

### 4.3.3 Occupations

In Nepal switching from the agricultural sector to wage labour in the modern sector has been a pathway out of poverty, as non-agricultural wages on average are close to double as high (Das and Hatlebakk, 2009). Similarly, in the Ghatak and Jiang (2002) model agents can be employed in three different occupations, ranging from self-employed subsistence through being a worker to entrepreneurship.

- a) Subsistence: The agent earns income by using his labour supply to produce  $\underline{w}$  using the subsistence technology. In this model it is possible to put assets in the bank which yields  $ra_{i,t}$ . But one may also imagine that the person lend money in the informal credit market. Total income is:

$$y_{i,t}^S = \underline{w} + ra_{i,t} \quad (4.5)$$

- b) Worker: The agent works for an entrepreneur for a wage  $w_t$  that will be determined in the model. He can also earn interest income on his assets, so that total income becomes:

$$y_{i,t}^W = w_t + ra_{i,t} \quad (4.6)$$

- c) Entrepreneur: An agent is unable to borrow in the credit market. He therefore needs  $I$  to start a firm. He hires one worker to produce output  $q$ , and spends his own time monitoring the worker. Excess capital will earn interest rate, so the total income becomes:

$$y_{i,t}^E = q - w_t + r(a_{i,t} - I) \quad (4.7)$$

### 4.3.4 Social capital and castes

What kinds of capital do people need to start a successful business? Evidence indicates that in addition to financial capital, social capital is an important input. According to a study by

Kolstad and Wiig (2013), certain forms of social networks are highly correlated with business success. They found a significant positive correlation between knowing a policeman and the business profits of entrepreneurs in Angola. Fafchamps and Minten (2002) document a strong positive effect of social capital via non-family social networks on the *productivity* of Madagascan grain traders. Traders with high stocks of social capital get an advantage via lower costs of information collection, credit provision and quality inspections. Social capital thus seems to economize on transaction costs. It could also influence economic outcomes indirectly, through influencing accumulation of other forms of capital such as human capital.

Caste can be looked upon as a form of social capital both in the sense that caste discrimination can cut individuals off from such valuable networks, and because individuals of low caste could be liable to suffer different forms of market-discrimination. In the following sections I present an extended model where Dalit households due to low social capital suffer discrimination in the product market and decreased entrepreneurial income.

#### 4.3.5 Social capital and entrepreneurship

I introduce two different castes in the previous model, one high caste and one low caste. Low castes will be referred to as Dalits and high castes as high castes. Due to low levels of social capital, Dalit entrepreneurs suffer discrimination in the product market:

$$q^d = q^h - d \quad (4.8)$$

$q^h$  is the entrepreneur production of high castes and  $q^d$  is the entrepreneur production for Dalits, with  $d > 0$ . As prices are set to 1, production equals income. Dalits thus earn less as entrepreneurs.

Households need assets  $a_{i,t} \geq I$  to become entrepreneurs. I define  $G_t^d(I)$  as the capital constrained Dalit fraction of the total population and  $G_t^h(I)$  as the capital constrained high castes fraction of the total population. Both  $G_t^h(I)$  and  $G_t^d(I)$  are thus fractions of total population and can be summarized,  $G_t^h(I) + G_t^d(I)$ , to get all capital constrained individuals as fraction of the entire population. I will refer to individuals with  $a_{i,t} \geq I$  as non-constrained individuals. Below we also need the Dalit fraction of the population,  $F^d$ , and the high caste fraction of the population,  $F^h$ .

## 4.4 Labour market

For there to exist a labour market, both entrepreneurship and being a worker needs to be a viable option for one or more individuals in the economy. In order to find stable equilibriums in the labour market, it is useful to find the wages where households are indifferent between being workers or entrepreneurs.

### 4.4.1 Wage rate of indifference

The wage rate of indifference between being worker and entrepreneur is dependent on the income of entrepreneurs. I therefore have to find a wage rate of indifference for both Dalits and high-castes. Even though I end up with separate wage rates of indifference, there can still only be one equilibrium wage for workers and this wage may equal one of the wage rates of indifference.

The wage rates of indifference are found by solving an equation where worker' and entrepreneur' income is equalized, but where the entrepreneur earns either  $q^d$  or  $q^h$ .

$$q^d - w + r(a_{i,t} - I) = w + ra_{i,t} \quad (4.9)$$

$$q^h - w + r(a_{i,t} - I) = w + ra_{i,t} \quad (4.10)$$

I find the wage rate of indifference for Dalits and high castes by solving each of the equations for  $w$ :

$$\bar{w}^d = \frac{q^d - rI}{2} \quad (4.11)$$

$$\bar{w}^h = \frac{q^h - rI}{2} \quad (4.12)$$

Dalits earn less as entrepreneurs and will thus accept lower wages as workers. I see that if  $\bar{w}^d < w < \bar{w}^h$  all non-constrained high castes will become entrepreneurs, while all Dalits

will choose being workers. If  $\underline{w} < w < \bar{w}^d$  all non-constrained Dalits and high castes will become entrepreneurs and only constrained individuals become workers.

#### 4.4.2 Labour supply and demand

In Ghatak and Jiang (2002) the labour market has two equilibriums, one with the subsistence wage as the equilibrium and one with the wage rate of indifference as described above as the equilibrium. Unlike the original model, the extended version has two separate wage rates of indifference. In order to describe the labour market I need to find the wage intervals that contain both a labour supply and demand.

For  $w_t < \underline{w}$  the labour supply is zero. Thus  $\underline{w}$  acts as a lower wage bound in the labour market. If the wage is  $\underline{w}$ , the labour supply is  $[0, G_t^d(I) + G_t^h(I)]$  as capital constrained individuals become indifferent between being workers and employed in the subsistence sector. If the wage is in the interval  $\underline{w} < w < \bar{w}^d$ , then all would like to be entrepreneurs, but some are capital constrained and thus have to supply labour, so the total supply is  $G_t^d(I) + G_t^h(I)$ . If the wage is  $\bar{w}^d$  the labour supply is  $[G_t^d(I), F^d] + G_t^h(I)$  as Dalits become indifferent between working as entrepreneurs or workers. If the wage is in the interval  $\bar{w}^d < w < \bar{w}^h$ , where only high castes want to be entrepreneurs, all Dalits want to be workers and labour supply become  $F^d + G_t^h(I)$ . If  $w = \bar{w}^h$  labour supply is  $F^d + [G_t^h(I), F^h]$ , as high castes become indifferent between working as entrepreneurs or workers. If  $w > \bar{w}^h$ , the labour supply equals one as all individuals supply labour.  $\bar{w}^h$  therefore acts as an upper wage bound in the labour market. Now I am ready to write down and draw the labour supply schedule.



Labour supply:

$$w < \underline{w} \qquad \qquad \qquad 0 \qquad \qquad \qquad (4.13)$$

$$w = \underline{w} \qquad \qquad \qquad [0, G_t^d(I) + G_t^h(I)] \qquad \qquad \qquad (4.14)$$

$$\underline{w} < w < \bar{w}^d \qquad \qquad \qquad G_t^d(I) + G_t^h(I) \qquad \qquad \qquad (4.15)$$

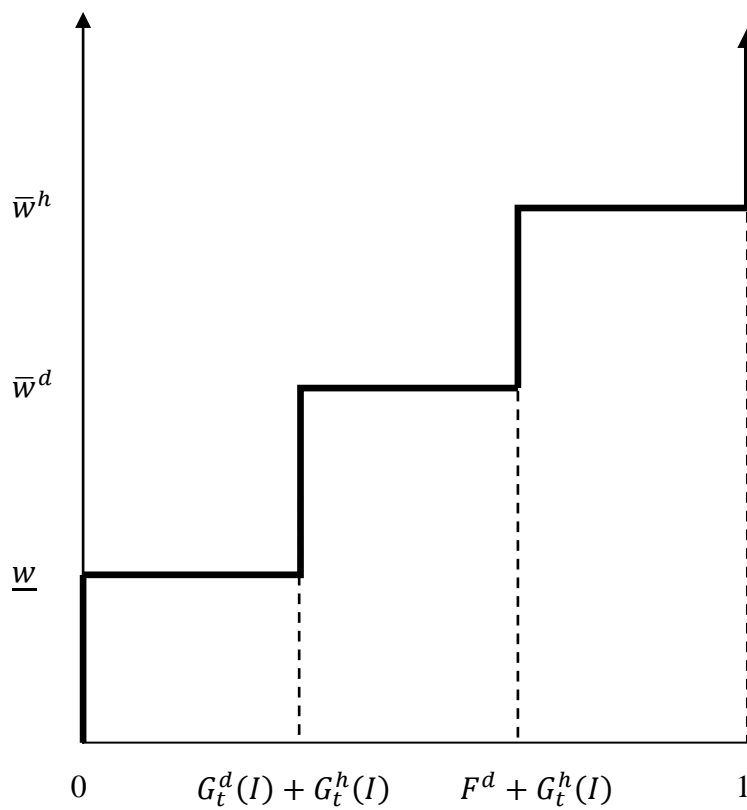
$$w = \bar{w}^d \qquad \qquad \qquad [G_t^d(I), F^d] + G_t^h(I) \qquad \qquad \qquad (4.16)$$

$$\bar{w}^d < w < \bar{w}^h \qquad \qquad \qquad F^d + G_t^h(I) \qquad \qquad \qquad (4.17)$$

$$w = \bar{w}^h \qquad \qquad \qquad F^d + [G_t^h(I), F^h] \qquad \qquad \qquad (4.18)$$

$$w > \bar{w}^h \qquad \qquad \qquad 1 \qquad \qquad \qquad (4.19)$$

**Figure 4.3:** Supply schedule



The labour demand mirrors the supply decisions as entrepreneurs demand labour. If  $w > \bar{w}^h$ , the labour demand is zero as all individuals prefer being workers. If the wage is  $\bar{w}^h$ , labour demand becomes  $[0, F^h - G_t^h(I)]$  as non-constrained high castes become indifferent between being entrepreneur and worker. If the wage is in interval  $\bar{w}^d < w < \bar{w}^h$ , only non-constrained high castes,  $F^h - G_t^h(I)$ , demand labour. For wage  $\bar{w}^d$  labour demand equals  $[0, F^d - G_t^d(I)] + [F^h - G_t^h(I)]$  because Dalits are indifferent between being entrepreneurs and workers. For any wage in the interval  $w < \bar{w}^d$ , the labour demand is at a maximum of  $[F^d - G_t^d(I)] + [F^h - G_t^h(I)]$ , as all non-constrained individuals become entrepreneurs and demand labour. I can now write and draw the full labour demand schedule.

Labour demand:

$$\bar{w}^h < w \qquad \qquad \qquad 0 \qquad \qquad \qquad (4.20)$$

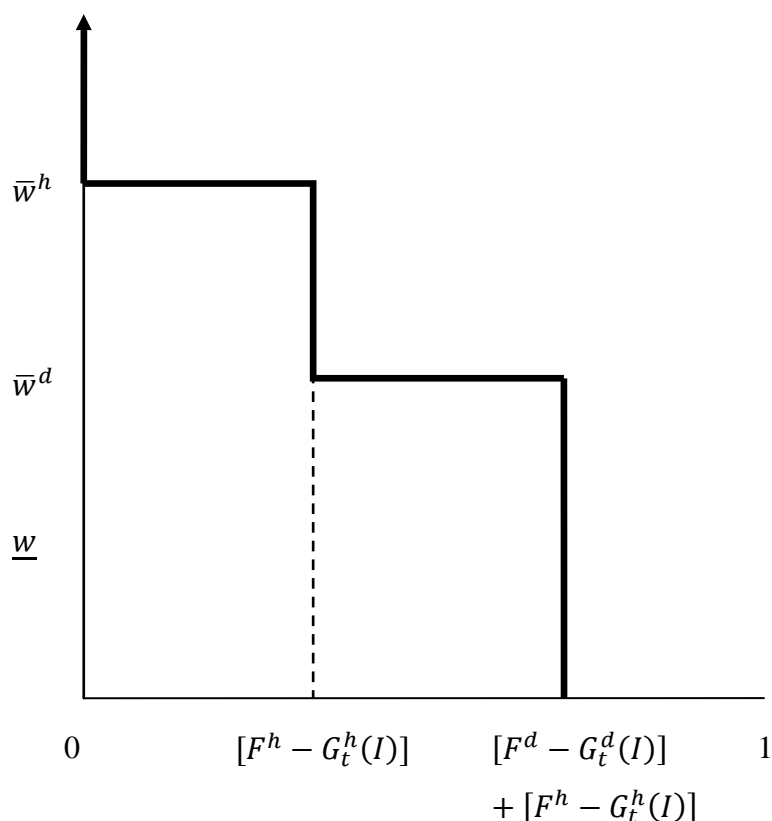
$$w = \bar{w}^h \qquad \qquad \qquad [0, F^h - G_t^h(I)] \qquad \qquad \qquad (4.21)$$

$$\bar{w}^d < w < \bar{w}^h \qquad \qquad \qquad F^h - G_t^h(I) \qquad \qquad \qquad (4.22)$$

$$w = \bar{w}^d \qquad \qquad \qquad [0, F^d - G_t^d(I)] + [F^h - G_t^h(I)] \qquad \qquad \qquad (4.23)$$

$$w < \bar{w}^d \qquad \qquad \qquad [F^d - G_t^d(I)] + [F^h - G_t^h(I)] \qquad \qquad \qquad (4.24)$$

**Figure 4.4:** Demand schedule



Entrepreneurship and being employed as a worker is an option for parts of the population in two connected wage intervals. In the interval  $[\underline{w}, \bar{w}^d]$ , entrepreneurship is possible for both non-constrained high castes and Dalits, and the wage is high enough to create a labour supply. In the interval  $[\bar{w}^d, \bar{w}^h]$ , entrepreneurship remains an option for non-constrained high castes, while all Dalits want to be workers once the wage rises over  $\bar{w}^d$ .

#### 4.4.3 Labour market equilibrium

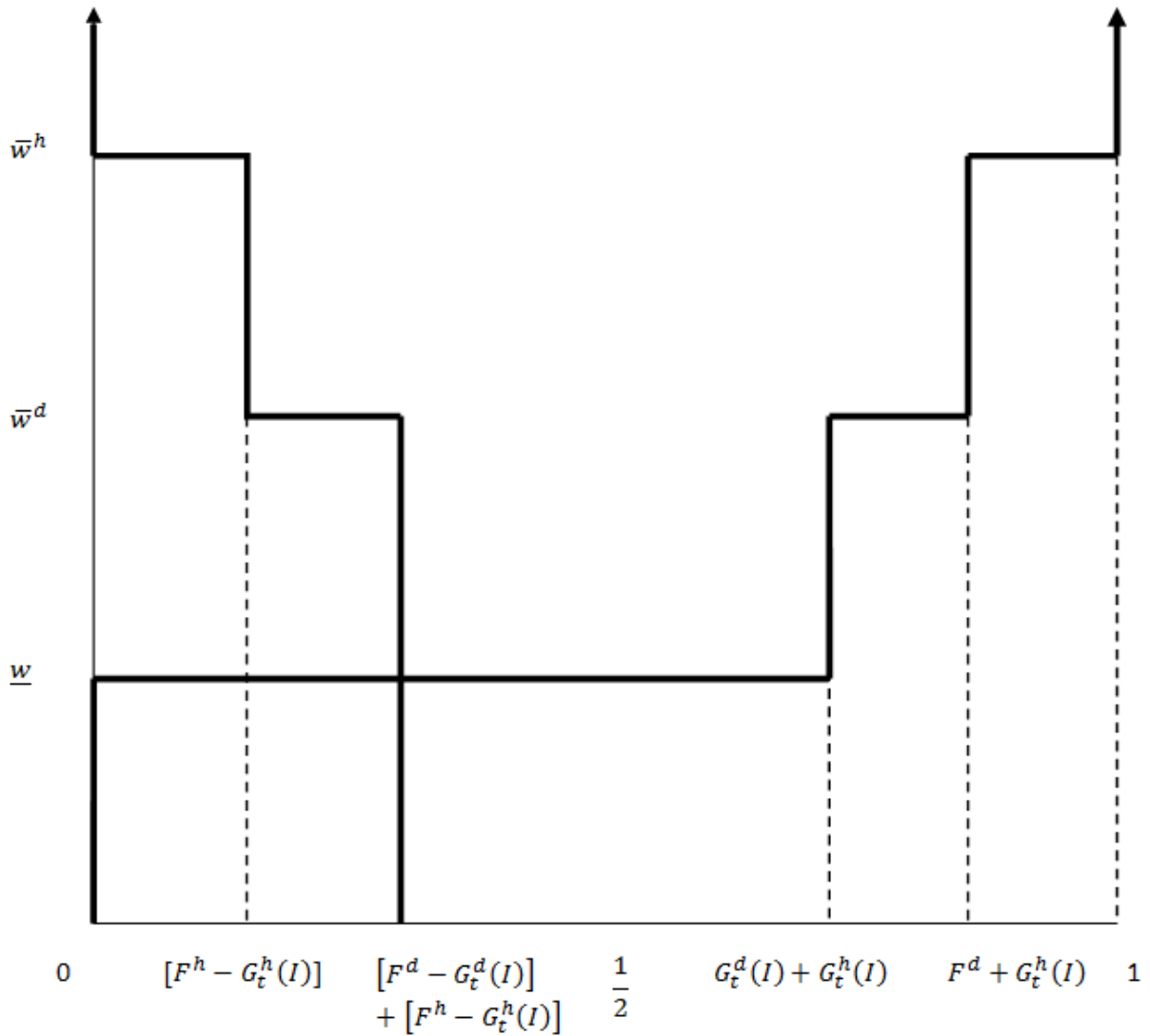
From the labour demand and supply schedules of the previous section I can find and draw the equilibrium wage rates of the extended model. Each entrepreneur can only hire one worker. If more individuals supply (demand) labour, the wage is pushed downwards (upwards).

If most individuals are capital constrained (most people supply labour), over half the population will be unable to become entrepreneurs and demand labour. There will therefore be a labour surplus in wage interval  $[\underline{w}, \bar{w}^d]$  and  $[\bar{w}^d, \bar{w}^h]$  that will push the equilibrium wage rate down to lower wage bound  $\underline{w}$ . Thus a stable equilibrium at  $\underline{w}$  is possible under assumption:

$$\underline{w} \text{ if } G_t^d(I) + G_t^h(I) > \frac{1}{2} \quad (4.25)$$

Thus an economy of high income inequality will produce a low-wage equilibrium of  $\underline{w}$ .

**Figure 4.5:** Wage equilibrium in  $\underline{w}$



For an equilibrium in  $\bar{w}^d$  to exist, demand needs to outstrip supply and push wages upwards in wage range  $[\underline{w}, \bar{w}^d]$  while supply needs to be larger than demand and push wages downwards in wage range  $[\bar{w}^d, \bar{w}^h]$ . I need to assume that capital constrained individuals make up fewer than half the population, which will cause a demand surplus and push the

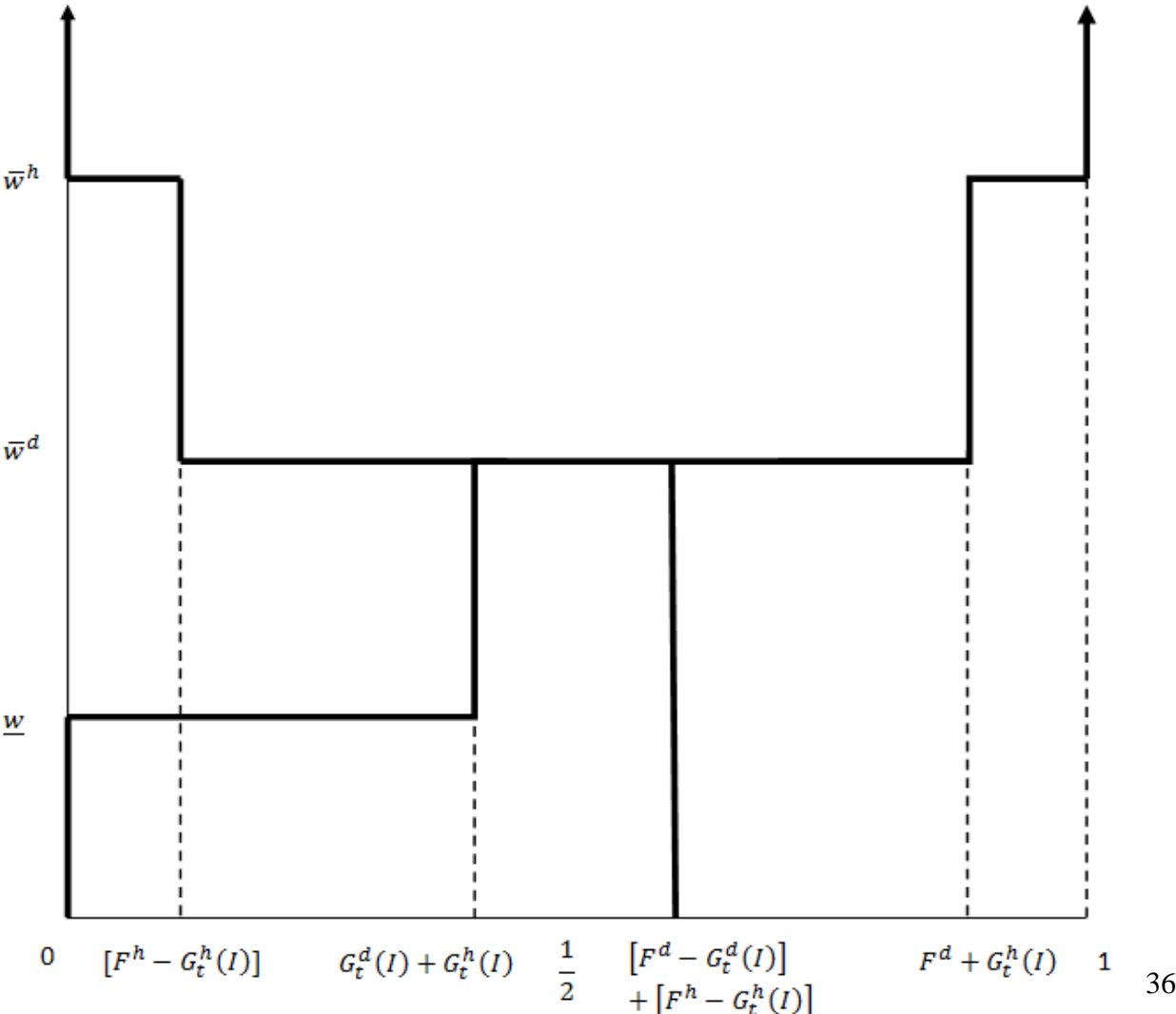
wage to upper bound in  $[\underline{w}, \bar{w}^d]$ . I also need to assume that the Dalit population added to the capital constrained fraction of high castes count over half the population, which will cause a supply surplus in  $[\bar{w}^d, \bar{w}^h]$  and move the wage to the lower bound. I therefore need a dual assumption:

$$\bar{w}^d \text{ if } G_t^d(I) + G_t^h(I) < \frac{1}{2} \tag{4.26}$$

$$\text{and } F^d + G_t^h(I) > \frac{1}{2} \tag{4.27}$$

Assumption (4.26) pushes the wage to upper bound in wage range  $[\underline{w}, \bar{w}^d]$  while (4.27) pushes it to the lower bound in  $[\bar{w}^d, \bar{w}^h]$ , thus creating an equilibrium in  $\bar{w}^d$ . Thus an economy with many Dalits and low income inequality will be likely to produce an equilibrium of  $\bar{w}^d$ .

*Figure 4.6: Wage equilibrium in  $\bar{w}^d$*

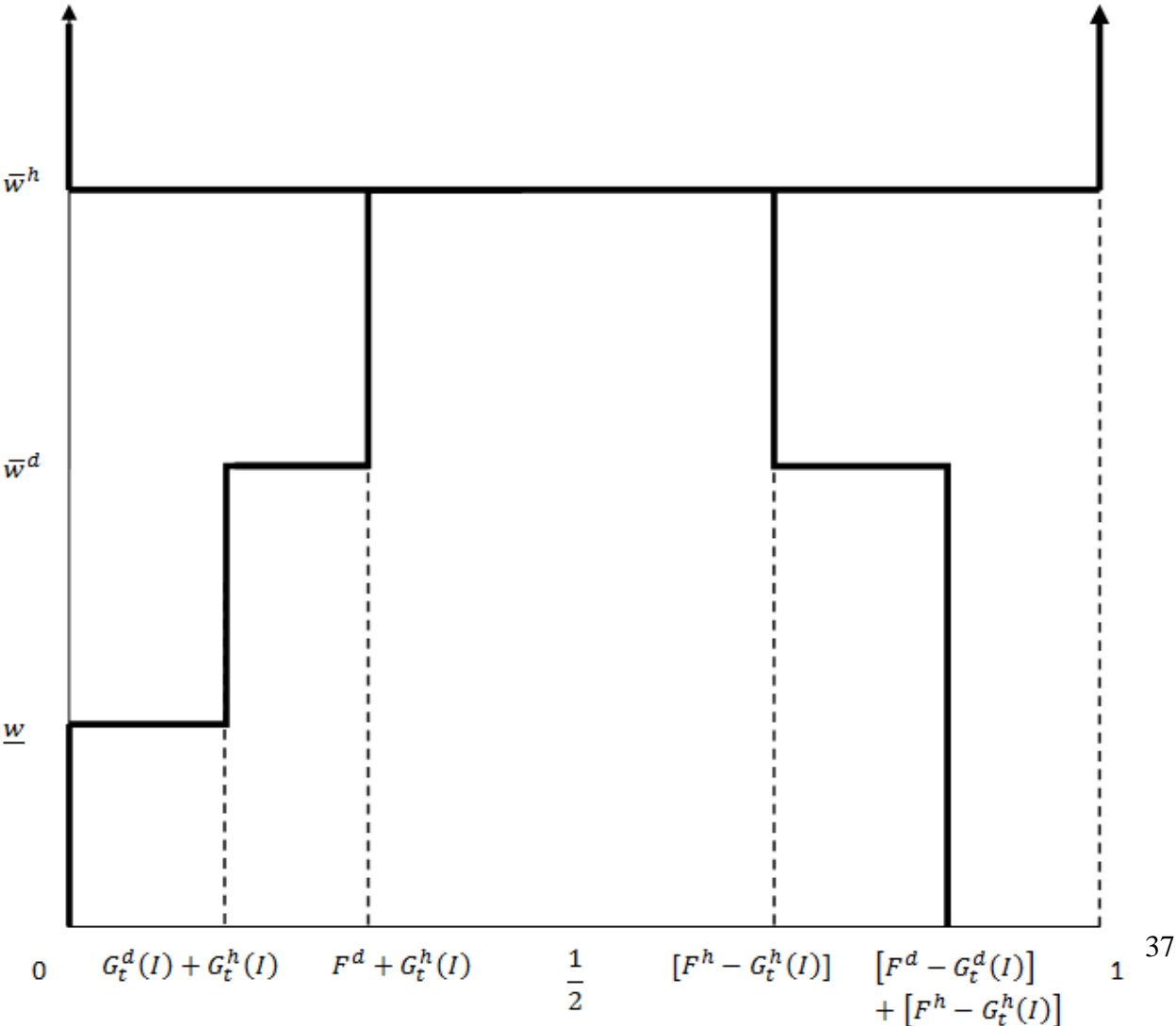


(4.17) shows that all Dalits want to be workers if the wage rises over  $\bar{w}^d$ . An assumption of  $G_t^d(I) + G_t^h(I) < \frac{1}{2}$  is therefore not sufficient to get an equilibrium at the upper wage bound  $\bar{w}^h$ . I also need to make an assumption on the size of the Dalit population. To ensure a demand surplus that pushes the wage upwards in both  $[\underline{w}, \bar{w}^d]$  and  $[\bar{w}^d, \bar{w}^h]$ , I need to assume that the Dalit population and capital constrained fraction of high castes together make up under half the total population:

$$\bar{w}^h \text{ if } F^d + G_t^h(I) < \frac{1}{2} \tag{4.28}$$

An economy with few Dalits and low income inequality will therefore be likely to produce an equilibrium wage of  $\bar{w}^h$ .

*Figure 4.7: Wage equilibrium in  $\bar{w}^h$ :*



The extended version of the model thus has possible wage equilibriums in  $\underline{w}$ ,  $\bar{w}^d$ , and  $\bar{w}^h$ . In order to simulate a situation where parts of the population become trapped in low income, I make assumption (4.25) and obtain equilibrium wage  $\underline{w}$ . An agent who is capital constrained can then choose between being a worker and engaging in subsistence, and in either case the income is  $\underline{w}$ . Both Dalit and high-caste individuals who are non-constrained will want to become an entrepreneur and earn total income  $q^{j=d,h} - \underline{w} + r(a_{i,t} - I)$ .

#### 4.4.4 Wealth transition

With the knowledge of occupational income I write down the difference equations, describing the development of household  $i$ 's capital  $a_{i,t}$  from one generation to the next. A part  $s$  of the labour and capital income is left for the next generation of each household.

If an agent is employed as a worker or in subsistence, the wealth transition from one household generation to the next will be equal to:

$$a_{i,t+1} = s[\underline{w} + ra_{i,t}] \quad (4.29)$$

If an agent is entrepreneur, the wealth transition will be equal to:

$$a_{i,t+1} = s[q^{j=d,h} - \underline{w} + r(a_{i,t} - I)] \quad (4.30)$$

Dalits have less profit as entrepreneurs and save the same fraction  $s$  as high caste households do. Dalit-entrepreneurs' generational transfers are therefore lower than those of high castes.

#### 4.4.5 Long run equilibrium

I now proceed to describe the long-run equilibrium of the economy where the wealth level is stationary over generations for all households. Let  $a_K$  be the stationary point of the difference equations that describe the wealth of a household in occupation  $K$  at wage level  $\underline{w}$ . I insert the stationary points in the difference equations (4.29) and (4.30) and solve for  $a_K$  to find the long run wealth of each occupation. I first solve the equation for workers and households in subsistence:

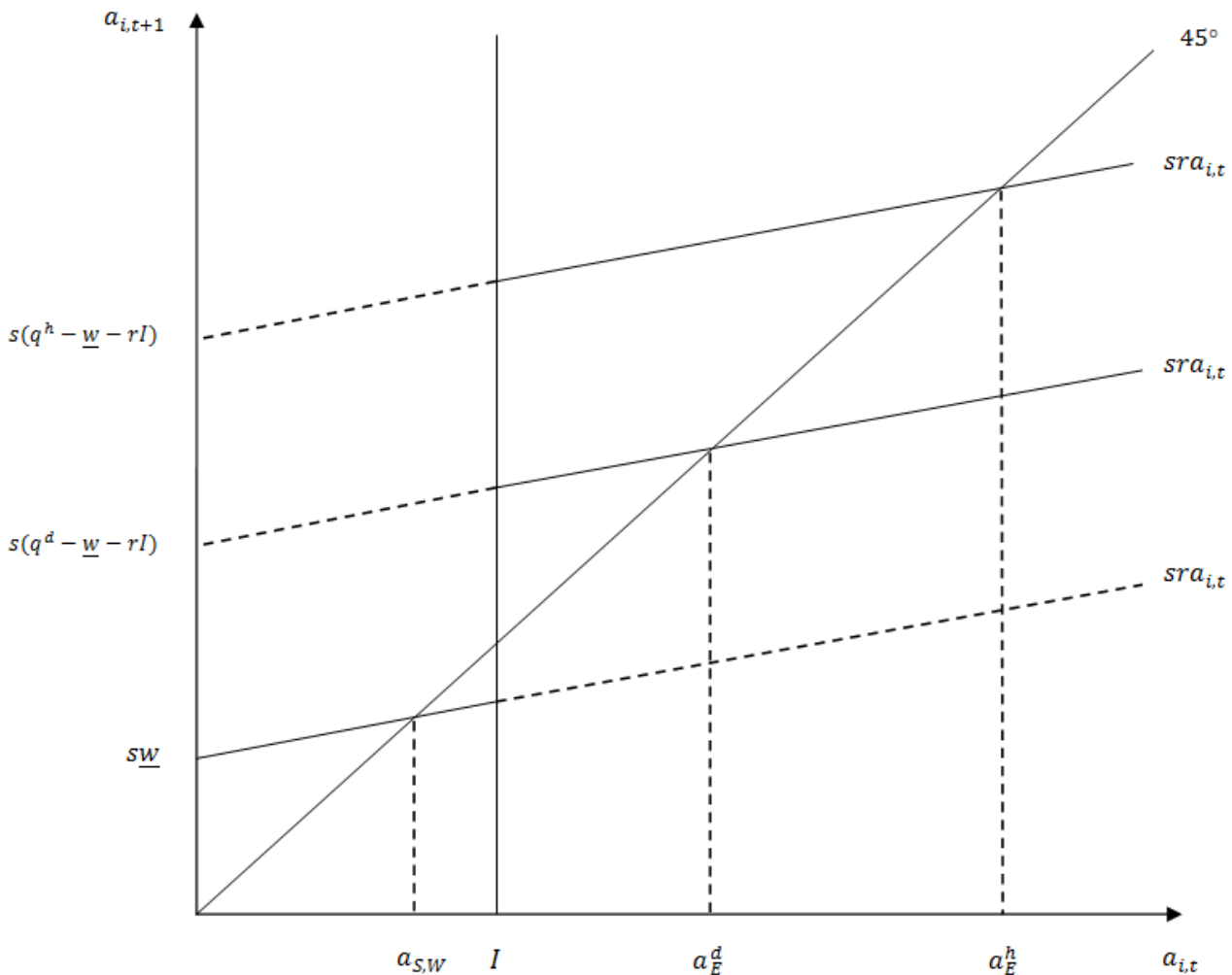
$$a_S = a_W = \frac{s\underline{w}}{1 - sr} \quad (4.31)$$

All households that are initially capital constrained will converge towards  $a_{S,W}$ . The long-run wealth level for workers and household in subsistence is equal for Dalits and high castes. Long run wealth however differs between Dalit and high caste entrepreneurs since Dalits earn less income due to low social capital,  $q^h > q^d$ :

$$a_E^{j=d,h} = \frac{s(q^{j=d,h} - rI - \underline{w})}{1 - sr} \quad (4.32)$$

Non-constrained Dalit households will in the long run converge towards wealth level  $a_E^d$  and non-constrained high caste households will converge towards  $a_E^h$ . Dalit entrepreneurs thus have less wealth in the long-run equilibrium than high caste entrepreneurs,  $a_E^h > a_E^d$ . In Figure 4.8 below we see the long-run wealth level of each occupation, which is determined along the 45 degree line.

**Figure 4.8:** Long run equilibrium





If I define a household with wealth level  $a_{S,W}$  as poor, lack of social capital is able to induce a group-specific poverty trap. If  $a_E^d < I < a_E^h$ , all Dalit households would in the long run become capital constrained and unable to invest in entrepreneurship, while non-constrained high castes would be entrepreneurs. Product market discrimination could therefore make it impossible to maintain entrepreneurship over generations. If the coefficient for the effect of low social capital  $d$  is sufficiently high, discrimination could also shift long-run Dalit entrepreneur wealth  $a_E^d$  below worker and subsistence wealth  $a_{S,W}$ . Dalit households would then prefer subsistence or being a worker as these occupations yield higher long-run wealth.

Discrimination in the product market is however not likely to be the only economic disadvantage that Dalits face as a result of low social capital. As previously mentioned Dalits have traditionally held low-income occupations, and is currently the poorest group in Nepal (NLSS, 2012). In the model, this could translate into Dalits being more likely than other groups to be initially capital constrained and thus poverty trapped. Non-constrained Dalit households would due to low social capital also suffer reduced entrepreneur-wealth, potentially making investment in entrepreneurship impossible to maintain over generations, or unprofitable when compared to subsistence or being a worker.

#### **4.5 The entrepreneurs of Baijanathpur**

In this subchapter I compare the occupational structure of the model to anecdotal evidence from the qualitative interviews done during the fieldwork. Descriptive statistics showing the full occupational distribution of my sample divided by caste are displayed in chapter 5.

So who are the entrepreneurs of Baijanathpur? The entrepreneurs of the model are self-employed, earn more than other occupations and demand labour. Dalits as a group are poor and discriminated so I do not expect Dalit households to become entrepreneurs by investing in large businesses. During the fieldwork we encountered few Dalit entrepreneurs with businesses that surpassed self-employment. A large portion of the Dalit households interviewed however participated in the modern and urbanized economy of Biratnagar by working in the construction sector. The construction workers were split between unskilled workers and workers with vocational skills, of which most were masons. Are these skilled workers comparable to the entrepreneurs of the theoretical model?

The construction workers are self-employed and travel in groups to the urban labour market in Biratnagar where they rent out their labour to building contractors via short-term contracts. Those with specific vocational skills such as masonry were during interviews stated to be better paid than those unskilled. It is however not obvious that the skilled workers themselves hire labour in the same manner as entrepreneurs in the model. On the other hand, skilled workers such as masons are needed for construction work projects. Thus, the presence of skilled construction workers is necessary for there to be a labour demand for unskilled construction workers.

Households in the model invest to become entrepreneurs. Is there an investment needed to become a skilled worker? According to Aboud, Barrett and Bezuneh (2001), endowments such as human capital are determinants of the choice of occupational strategy in rural Africa, including whether individuals gain income from skilled or unskilled work. Several respondents of our qualitative interviews named basic education as an important factor in deciding which workers acquire vocational skills. Masonry was for instance reported to require both reading and calculation. Educating children is a household investment in human capital which comes with opportunity costs as well as financial costs. It makes the household forego income which would be earned by putting children to work, and might require a financial resources that would earn interest if not invested (Barham et al., 1995). The investment in turn could yield a return of higher earnings. Educational investment is by no means trivial in the context of Baijanathpur: Tarai Dalits are at the bottom of educational indicators in Nepal (Das and Hatlebakk, 2009).

Skilled workers thus seem to fit the description of entrepreneurs from the theoretical model. According to anecdotal evidence from the fieldwork they are self-employed, have higher income than unskilled workers and are required to undertake educational investment to become skilled. We were not provided indications that skilled construction workers like entrepreneurs hire other workers, but the presence of skilled workers in the construction sector is necessary for there to exist demand for unskilled work in construction.

Another group which might resemble the entrepreneurs of the theoretical model and be skilled workers in terms of having high wages is factory workers. Eastern Tarai is as previously mentioned a manufacturing hub, and according to qualitative interviews Dalits are employed

in factories, frequently via short term contracts. Education was reported by respondents as being an advantage for gaining factory-employment.

In the model, capital constrained individuals are either low-wage workers or self-employed in subsistence. These occupations resemble low-income occupations such as unskilled wage labour or rickshaw pulling, which are common occupations among the Dalits of Tarai.

#### **4.6 Research question and hypothesis**

Traditionally many Dalits have worked as unskilled wage labourers or rickshaw pullers. Some have however managed to take a step up the economic ladder by gaining employment as skilled wage labourers in the modern sector of the economy. I first formulate a research question

*What factors decide which Dalits escape poverty?*

I will attempt to answer the research question by testing whether the extended version of Ghatak and Jiang (2002) can be applied to the case of Dalits of Baijanathpur. It would thus be appropriate to formulate some hypotheses which are drawn from the theoretical model.

I will test if skilled workers conform to the model predictions of entrepreneurs in the model, and if unskilled workers conform to the predictions of workers and subsistence. In the case of the Dalits of Baijanathpur, anecdotal evidence indicates that education is important to advance to skilled work. Investing in education could therefore be the entrepreneurial investment of skilled workers: *Education increases the likelihood of skilled compared to unskilled work for Dalits*. I will refer to this hypothesis as **H1**. To my knowledge, no such studies of transitions between skilled and unskilled work have been undertaken in the context the Dalit community of Nepal.

In the model, Dalits could be caught in long run poverty due to low social capital. Dalit households should thus invest less in education over the generations than non-Dalit households: *Dalit households are more likely than non-Dalit households to experience persistently low levels of education over generations*. I will refer to this hypothesis as **H2**. The results from the investigation of this hypothesis will be used to discuss whether the Dalits of Baijanathpur could be caught in a poverty trap.

## 4.7 Chapter summary

Poverty traps in the literature assume many forms and occur for individuals, groups or even nations in both single- and multi-equilibrium environments. They can be caused and enforced by a highly diverse group of factors such as for example; health shocks, bad institutions, risk adversity and the limited growth-potential of small-business. The literature also provides a link between social identity and poverty traps. The model presented by Akerlof (1976) states that those disfavoured by the caste system through certain forms of discrimination can be trapped in poverty in a stable equilibrium. This is supported by the fact that Dalits are the poorest group in Nepal, a placement that mirrors their position at the bottom of the caste system. What I have learned about poverty traps will be used in chapter 8 to discuss whether or not there exists a poverty trap for the Dalits of Baijanathpur.

I extend a model presented by Ghatak and Jiang (2002) to include social capital. The predictions of the theoretical model provide hypotheses to test in order to discuss poverty dynamics among the Dalits of Nepal. In chapter 6 I will construct an empirical specification which is a reduced and estimable form of the extended version of the theoretical model, before proceeding to in chapter 7 where I choose econometric the models that will be used to do the estimation. In chapter 8 I estimate the empirical model in order to test **H1** and **H2**.

## 5 Data structure and descriptive analysis

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My aim in chapter 5 is to describe the structure of the survey-data through use of descriptive statistics. Female family members are omitted from the sample as there are very different processes that explain occupational outcomes among males and females in rural Nepal. I first show the caste distribution among the 110 households in the sample. Afterwards I split the sample into different occupational categories in order to compare the occupational distribution among different caste-groups, and examine what are the most important channels of economic mobility for the Dalits of Baijanathpur. The occupational structure in rural Tarai is far more varied than in the theoretical model, something that is reflected in the wide range of occupational categories.

According to **H1**, individuals progress to skilled work via investing in education. In order to test this hypothesis I need to identify a general wage threshold between skilled and unskilled work. This is done by exploring the wage levels of construction workers with specific vocational skills. After displaying occupational distribution I discuss some possible issues of data validity in the sample.

### 5.1 Caste distribution

Over half of the households interviewed are Dalits. As we see in Table 6.1, the Dalits surveyed are split among the Bantar and Musahar, with a clear majority belonging to the Bantar group. The main explanation for the Bantar majority is the high concentration of Bantar households in Ward number 3 and 6 of Baijanathpur. All interviews done in these areas were exclusively conducted with Bantar households, while the Musahar households were spread out over number Ward 1, 7 and 9.

The rest of the sample is split between middle castes of Tarai and Madhes origin. The Tharu and Rajbanshi are both indigenous ethnic groups of the eastern Tarai whom are considered to be middle castes. The Madhes middle castes descend from middle caste immigrants that the last few generations migrated to Tarai from India. They have a smaller presence in the sample, but are highly heterogeneous with a small number of families belonging to groups such as the goldsmith caste Sonar or barber caste Thakur. One household of the religious hermit caste Barathi Yogi have also been included in this Madhes middle caste category, as

they despite traditional religious functions are not considered to be among the high-caste Brahmins.

The only surprise with the caste distribution is the lack of any Pahadi hill migrants in the sample. No hill migrants have thus settled on this land on the less developed outskirts of Biratnagar. As previously mentioned, considerable numbers of families and individuals stemming from Nepal’s hill areas have migrated to the plains of Tarai since the middle of the 20<sup>th</sup> century.

<b>Table 5.1 – Households in sample by caste</b>		
<b>Caste</b>		<b>Frequency</b>
	<b>Dalit</b>	
<b>Bantar</b>		44 (40.0)
<b>Musahar</b>		17 (15.5)
	<b>Non-Dalit</b>	
<b>Tharu</b>		27 (24.5)
<b>Rajbanshi</b>		14 (12.7)
<b>Madhes</b>		8 (7.3)
<b>Total</b>		110 (100.00)

**5.2 Occupational categories**

Agricultural wage labour is included in its own category as this is traditionally a common occupation among Dalits, which is low-wage and typically considered unskilled. Rickshaw pulling is a small-business occupation where we might expect poor and low-status groups to be over-represented, and is also listed in its own category.

I divide workers that are not engaged in the agricultural labour or rickshaw pulling into skilled and unskilled work along the lines of income. Income was during the interviews reported as either daily wage or monthly salary. Individuals working in the construction sector with specific vocational skills such as masonry or carpentry do not to earn daily wages of less than 400 NR (Table A3, Appendix). I therefore set 400 NR or more as the daily wage threshold that qualifies workers for being ranked as ‘Skilled worker’. In Table A4 of the Appendix we see that this wage is higher than the wage of any agricultural labourer, and higher than the daily income of the large majority of rickshaw pullers. Workers that earn less than 400 NR are categorized as ‘Unskilled worker’. I set a monthly wage divide between skilled and unskilled labour at 8000 NR in monthly wage, as this wage seems consistent with a daily wage-threshold of 400 NR.<sup>3</sup>

I create an upper class category, ‘Office’, for high-salaried employees in the government and private sectors. It contains individuals that report monthly salary of 10 000 NR or more. Workers that obviously do not have an office job are excluded from the category, and so are workers that report daily wages instead of monthly salaries. ‘Office’ thus does not include factory workers, restaurant/hotel workers or construction sector workers, regardless of wage level.

Ideally I would create several business-owner categories that were ranked after the size of the business, but the survey lacks sufficient information on revenue or turnover. The ‘Business’ category is therefore highly heterogeneous in terms of business-size. Over-seas work migrants are also listed in their own category, ‘Migrant’, as their salaries tend to be higher than that of any other groups even though their work tends to be similar to the work done by workers in the middle-income ‘Skilled wage’ category, rather than the high salaried employees of the ‘Office’ category (Table A6, Appendix). Nepali migrants in India are excluded from the ‘Migrant’ category, as their wage level is expected to be more similar to Nepali wage level.

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<sup>3</sup> A daily wage threshold of 400 NR and monthly wage threshold of 8000 NR also seems consistent with wage data across occupations: The mean wage for individuals that state their salary in terms of a daily wage is 374 NR while the median wage is 350 NR. The median wage for workers that report their income in terms of monthly salary is 8000 NR and the mean is 8443.7 NR. The “Migrant” category is excluded from this calculation as these would distort the results due to their high wage levels. (Table A1, Appendix)

Table 5.2 – Sample population

Categories	Dalit groups		Non-Dalit groups			Total
	Bantar	Musahar	Tharu	Rajbanshi	Madhes	
<b>Agri-labour</b>	15 (10.5)	17 (27.4)	1 (1.1)	3 (5.6)	0 (0.0)	36 (9.4)
<b>Rickshaw</b>	26 (18.2)	9 (14.5)	0 (0.0)	0 (0.0)	2 (6.3)	37 (9.7)
<b>Unskilled worker</b>	20 (14.0)	15 (24.3)	18 (19.6)	12 (22.6)	5 (15.6)	70 (18.3)
<b>Farmer</b>	14 (9.8)	1 (1.6)	26 (28.3)	12 (22.6)	3 (9.4)	56 (14.7)
<b>Business</b>	11 (7.7)	0 (0.0)	10 (10.9)	4 (7.6)	7 (21.9)	32 (8.4)
<b>Skilled worker</b>	27 (18.9)	10 (16.1)	13 (14.1)	10 (18.9)	5 (15.6)	65 (17.0)
<b>Office</b>	3 (2.1)	0 (0.0)	6 (6.5)	3 (5.7)	4 (12.5)	16 (4.2)
<b>Migrant</b>	1 (0.7)	0 (0.0)	4 (4.3)	3 (5.7)	0 (0.0)	8 (2.1)
<b>Inactive</b>	26 (18.1)	10 (16.1)	14 (15.2)	6 (11.3)	6 (18.7)	62 (16.2)
<b>Total</b>	143 (100.0)	62 (100.0)	92 (100.0)	53 (100.0)	32 (100.0)	382 (100.0)



### **5.3 The occupational distribution among different castes**

The Bantar are traditionally considered above the Musahar in the caste hierarchy even though both groups are Dalit. The extended version of the Ghatak and Jiang (2002) model, predicts that different levels of social capital, represented by different castes, could transfer into different occupational outcomes. I therefore expect the Musahar to be more concentrated in low-income groups than the Bantar, and that the Bantar in turn are more concentrated in low-income occupations than the middle-caste Tharu, Rajbanshi and Madhes.

As we see from Table 5.2, the Musahar of the sample are concentrated in a smaller set of occupations than the Bantar. They are the best represented group in the agricultural labour category, and also well represented among rickshaw pullers. There are no Musahar present in the high-income 'Migrant' or 'Office' category and none are business owners. The middle-income 'Skilled worker' group seem to provide the Musahar with some upwards mobility, as this category is generally better paid than 'Agricultural labour', 'Rickshaw' and of course 'Unskilled worker' (Table A4, Appendix). The Bantar are in accordance with my expectations more concentrated in low-income occupations than the non-Dalit groups. Most Rickshaw-pullers are Bantar and the group is over-represented as agricultural workers compared to the non-Dalit groups. They nonetheless have a more varied occupational structure than the Musahar. There are a small number of Bantar present in the high income categories, 'Migrant' and 'Office'. The Bantar are even the best represented caste in the middle-income 'Skilled worker' category. They are equally well-represented in the 'Business' category as the non-Dalit Rajbanshi group.

There are very few non-Dalits working in low-income occupations such as agricultural labour or as rickshaw pullers. The non-Dalit groups are however not under-represented among other types of unskilled workers. Compared to the Dalit groups the other castes are over-represented in the high-salary category 'Office' and the Tharu and Rajbanshi are over-represented in the 'Migrant' category which is the best paid category of the sample (Table A2, Appendix).

The Dalit groups are concentrated in the least attractive occupations and under-represented in the most attractive ones. Among the Dalits the Bantar do better than the Musahar. The non-Dalits groups are compared to the Dalits over-represented in high-income occupational categories such as 'Office' or 'Migrant'.

#### **5.4 Who are the skilled workers?**

Using the wage level of construction workers with specific vocational skills, I formed a wage threshold between skilled and unskilled for workers in my sample. In Table A5 of the Appendix we see that 42 out of 65 skilled workers are employed in the construction sector. Dalits are to a greater extent employed in the construction sector than non-Dalits: Three out of four Dalit skilled workers are employed in construction, and only half of non-Dalit skilled workers. The second largest group in the skilled worker category is for both groups' factory workers, while the rest are employed in private businesses or organizations.

The large group of skilled construction and factory workers with a wage premium over low-income occupations supports the anecdotal evidence from the qualitative interviews: Skilled work in the construction sector and factory employment are important means of economic mobility for Dalits.

#### **5.5 Data reliability**

Data reliability measures how trustworthy the data is (Grønmo, 2004), and our interview-context might have induced biases for the respondents when reporting certain variables. Despite stating clearly and in advance of each interview that the survey is not a possible source of economic benefit for the respondent, the respondent could for instance feel incentivised to under-report their current economic status. We clarified during each fieldwork-interview that we were not from developmental organizations. The respondent might still expect that research results displaying adverse economic conditions will lead to longer term economic benefit. This income-reporting bias could be amplified by the attendance of a foreigner, me, which in the mind of the respondent could be linked to developmental motifs. The variable most liable to be affected by such a bias would be income. Despite this it is reassuring to see that the daily wages for low-income occupations are highly concentrated. For instance, the wage for workers in unskilled occupations like agricultural labour or rickshaw-pulling are concentrated in a small range (Table A4, Appendix).

In the interviews we probed for information on individuals in the household head's family. In some cases, the respondent might not be able to remember all family members. If the household head for instance is deceased, it is not sure that the respondents, his children or spouse, will remember all his brothers. In South Asia family sizes have decreased rapidly in

recent decades. In 2011 the average number of child births for a Nepali woman was 2.7. In 1983, the earliest year of birth of any household head<sup>4</sup>, the average number of child births was however 5.7 (World Bank, 2013b). I would therefore expect considerably more brothers than household head. There are few brothers in sample, only slightly more than there are household heads (Table A7, Appendix). There is thus likely to be some extent of under-reporting.

## 5.6 Chapter summary

The occupational distribution of Baijanathpur seems to correspond to the predictions of the theoretical model. Dalit groups with a low placing in the caste hierarchy, which in the model translates into less social capital, are more probable to be found in less attractive occupations. This also holds true for comparisons between the two Dalit groups of the sample as the higher placed Bantar do better than the Musahar.

The anecdotal evidence provided by the qualitative interviews is supported by the descriptive statistics of Table 5.2: The main pathway out of poverty for Dalits seems to be engaging in skilled work that has a wage premium over unskilled occupations. This occupational category is with few exceptions better paid than the low-income occupations where Dalits are over-represented, such as agricultural labour and rickshaw pulling. Among the skilled workers, construction workers related to specific vocational skills are the largest group, followed by factory workers.

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<sup>4</sup> Household heads in my sample are at least 30 years of age.

## 6 Empirical model and variables

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In this chapter I present an empirical specification of the theoretical model which will be used to test the hypotheses that were put forward in chapter 4. Afterwards, I proceed to define the variables that will be used to estimate the empirical model in chapter 8.

My sample would ideally accommodate the use of all occupations and castes from Table 5.2 when testing test hypotheses **H1** and **H2**. As the sample size is not large enough, I however merge some of the caste-groups and occupational categories.

As shown in the previous chapter, the occupational structure of the sample is more complex than in the theoretical model. In my application of the model, human capital investment is predicted to determine whether workers become skilled or unskilled. Other factors might however decide whether individuals become workers in the first place. In particular, I suspect that ownership of agricultural land, a form of physical capital, could make individuals less prone to become workers as they can more easily engage in farming. In the empirical model, I therefore assume that present ownership of physical capital can have an effect on occupational outcomes.

Another deviation from the theoretical model is the inclusion of a control variable for family size. According to surveys conducted in Nepal, poverty increases with household size and number of young children (NLSS, 2012). Being born in a large family could thus affect an individual's probability of getting education.

### 6.1 Empirical model

In my application of the theoretical model, educational investment decides occupational outcomes. As land ownership is likely to affect occupational choice, I assume that physical capital can have a separate effect. Present occupation,  $Y_2$ , is thus dependent on physical capital,  $P_2$ , as well as human capital,  $H_2$

$$Y_2 = f(H_2, P_2) \tag{6.1}$$

Present human capital is in turn dependent on the physical and human capital of the previous generation. Furthermore, social capital affects whether one can afford or is willing to invest in human capital.

$$H_2 = f(P_1, H_1, S_1, X) \quad (6.2)$$

I treat caste as a fixed amount of social capital over generations. I therefore replace  $S_1$  with  $C$  which stands for caste. Other factors which are not included in the theoretical model,  $X$ , could also affect human capital investment.

$$H_2 = f(P_1, H_1, C, X) \quad (6.3)$$

Human capital today is thus a function of physical and human capital in the last generation, as well as caste and other factors. In chapter 8 I proceed to estimate the empirical model. Equation (6.1), occupational outcomes, is estimated in order to test hypothesis **H1**. Equation (6.3), human capital investment, is estimated in order to test **H2**.

## 6.2 Variables

### 6.2.1 Occupation

In chapter 5 I observed that the occupational structure of rural Tarai is far more varied than in the theoretical model. The number of observations in my sample is however too small to test all occupational categories separately. I now proceed to define a smaller set of occupational categories that will allow me to test for differences among the occupational categories that are the most relevant to hypothesis **H1**: Skilled and unskilled work.

The ‘Agricultural labour’ and ‘Rickshaw’ categories are largely populated with Dalits and often considered to be unskilled occupations. Both occupations have daily wages that with few exceptions fall below 400 NR, the threshold that divides unskilled and skilled labour (Table A4, Appendix). I include ‘Agricultural labour’, ‘Rickshaw pulling’ and ‘Unskilled wage’ in the ‘Unskilled’ category, signifying unskilled wage labour.

Overseas migrants tend to be engaged in similar kinds of work as individuals in the ‘Skilled worker’ category (Table A6, Appendix). I therefore merge ‘Skilled wage’ and ‘Migrant’ into

the ‘Skilled’ category, signifying skilled wage labour. One might argue that the work of individuals in the ‘Office’ category is also skilled, but their work tends to be very different in nature from those in the ‘Skilled wage’ or ‘Migrant’ categories. There are probably different mechanics that decide whether a Dalit becomes a government teacher, which would be included in the ‘Office’ category, than whether he becomes a carpenter, which would be included in the ‘Skilled worker’ category. I therefore exclude ‘Office’ from the ‘Skilled’ category.

All occupations that are excerpt from the ‘Skilled’ and ‘Unskilled’ categories are included in the ‘Other’ category. ‘Other’ is thus highly heterogeneous in terms of both income and type of work.

**Table 6.1 – Occupational categories**

<b>Occupation</b>	Occupational categories of Table 5.2
<b>Unskilled (1)</b>	Agri-labour, Rickshaw, Unskilled labour
<b>Skilled (2)</b>	Skilled labour, Migrant
<b>Other (3)</b>	Farmer, Inactive, Office, Business

From table 6.1 I observe that occupation is a discrete variable, i.e. it can only take on a limited set of values. I assume that ‘Skilled’ because of the higher wage level is preferred over ‘Unskilled’. It is however difficult to conclude on the direction of preference between these two categories and the ‘Other’ category, as it consists of a heterogeneous group of occupations. There is thus no clear ordering between the three categories.

### 6.2.2 Physical capital – Landlessness

In rural Nepal, land ownership is the most important form of physical capital ownership. Over 70 percent of Nepali households own agricultural land (NLSS, 2012), and landless households in South Asia tend to be worse off than land owning ones (Mendelsohn and Vicziany, 1998).

In Table 6.2 I observe that the Dalits of my sample own land in a much smaller proportion than non-Dalits. The large majority of Dalit households are in fact landless. I therefore use landlessness as a proxy for ownership of physical capital. By using this binary proxy variable I assume that land owning households have higher levels of physical than landless ones.

**Table 6.2 – Landlessness among households**

<b>Sub-sample</b>	<b>Dalit</b>	<b>Non-Dalit</b>
<b>Land owner</b>	8 (13.1)	27 (55.1)
<b>Landless</b>	53 (86.9)	22 (44.9)
<b>Total</b>	61 (100.0)	49 (100.0)

The survey provides information on the land ownership of three household generations. The land ownership of the current generation was measured at the time of the survey. Land ownership of the previous household generations was meanwhile measured at 40 years of the father and grandfather of the household head.

When testing **H1** by estimating (6.1), I estimate the relationship between present landlessness and occupational outcomes. I expect landlessness to decrease the chance of an individual ending up in ‘Other’ compared to ‘Skilled’ or ‘Unskilled’ because the category contains farmers, many of whom are directly dependent on land ownership.<sup>5</sup> The expected direction of landlessness’ effect on whether a worker becomes ‘Skilled’ or ‘Unskilled’ is ambiguous as it depends on how land ownership was used to finance educational investment. Agricultural land can finance education both through being a productive asset and as an asset for sale. If land was sold off to finance educational investment, I could expect it to increase the

<sup>5</sup> Some farmers also rent land.

probability of an individual becoming ‘Skilled’. If agricultural produce was used to finance education without selling land, I might expect present landlessness to increase the chance of an individual becoming ‘Unskilled’.

When testing **H2** by estimating (6.3), I estimate the relationship between landlessness in the previous generation and illiteracy today. Households that owned land in the previous generation should other things being equal have been more able to invest in the education of the current generation. I therefore expect landlessness of the previous generation to increase the chance of illiteracy in the current generation.

Applying the last argument requires me to carefully evaluate when I measure land ownership. Land ownership in the previous household generation is measured at 40 years of age of the father of the household head. At that time the household has probably made a part or whole of its decision of whether or not to invest in the present household generation’s education. According to my argument, one way to finance education is to sell land. Thus landlessness at the father’s time could also mean that the household already sold off land to invest in the education of the next generation. Within the theoretical model we might picture that land ownership at this point in time is actually measured in the current generation, after investment in education. Land ownership at 40 years of the grandfather’s age is however more likely to be measured after the household made a decision on whether or not to invest in the education of the father’s generation, but before it decides whether to invest in educating the previous generation. I therefore use land ownership at the grandfather’s time when estimating the effect of the previous generation’s landlessness upon illiteracy today.



### 6.2.3 Human capital – Illiteracy

The sample contains information on the education of three household generations: The education of current household members as well as for the household head's father and grandfather. Most Dalits in the sample have no education: In Table 6.3, we see that four out of five Musahar and three out of five Bantar lack any schooling. I therefore choose illiteracy, meaning lack of education, as the proxy for human capital. By using this binary proxy, I assume that illiterates have lower levels of human capital than individuals with education.

When testing **H1** I estimate the relationship between illiteracy and occupation. **H1** predicts that skilled workers are more likely to be educated than unskilled workers. I therefore expect illiteracy to decrease the chances of an individual becoming a 'Skilled' worker compared to 'Unskilled'. As the 'Other' category includes high-salaried private and government employees that depend on education, I expect illiteracy to make an individual more likely to become 'Unskilled' when compared to the 'Other'. Both 'Skilled' and 'Other' include occupations which are likely to require education. I therefore do not have any clear prediction of the direction of the effect when comparing the effect of illiteracy on these occupational categories.

When testing **H2** I estimate the relationship between illiteracy over different generations. The model predicts that lack of education decreases income and thus the amount of capital available to invest in the education of the next generation. I therefore expect illiteracy in the previous generation to increase the chance of illiteracy in the present generation for both castes.

According to **H2**, Dalits should due to low social capital however be *more likely* to experience persistently low levels of education than non-Dalits. I therefore expect the illiteracy of the previous generation to predict illiteracy in this generation more strongly for Dalits than non-Dalits.

**Table 6.3 – Individual education sorted by castes**

<b>Category</b>	<b>Musahar</b>	<b>Bantar</b>	<b>Non-Dalits</b>	<b>Total</b>
<b>Illiterate</b>	49 (79.0)	83 (58.0)	34 (19.2)	166 (43.4)
<b>Grade 1</b>	8 (12.9)	25 (17.5)	28 (15.8)	61 (16.0)
<b>Grade 5</b>	4 (6.5)	28 (19.6)	49 (27.7)	81 (21.2)
<b>Grade 9</b>	1 (1.6)	3 (2.1)	28 (15.8)	32 (8.4)
<b>SLC</b>	0 (0.0)	1 (0.7)	27 (15.3)	28 (7.3)
<b>Intermediate</b>	0 (0.0)	3 (2.1)	11 (6.2)	14 (3.7)
<b>Higher level</b>	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Total</b>	62 (100.0)	143 (100.0)	177 (100.0)	382 (100.0)

#### 6.2.4 Caste

Due to a small sample size I need a smaller number of subsamples than displayed in Table 5.2 to estimate the empirical model. This in turn requires me to merge some of the castes. I include both the Musahar and the Bantar in a Dalit subsample. The rest of the castes are merged into a non-Dalit subsample.

Hypothesis **H1** rests on qualitative information on the economic status of the Dalit community: Transitions between skilled and unskilled work as a main channel of economic mobility. This anecdotal evidence is further backed by the descriptive evidence of table 5.2. Transitions between skilled and unskilled work does however not seem to be a central feature of economic mobility among non-Dalit groups. They are better represented in high income occupational categories such as office work and migration as well as farming and business. Furthermore, they are almost absent in low income unskilled occupations such as agricultural wage labour and rickshaw pulling. Equation (6.1) is therefore estimated only for the Dalit subsample.

Hypothesis **H2** states that Dalits due to poverty and low levels of social capital should suffer persistently lower levels of education than other groups. In order to compare, I estimate equation (6.3) separately for the Dalit and non-Dalit subsamples.

#### **6.2.5 Family size**

When testing **H2**, there might be factors outside the theoretical model that affect educational investment. A variable that is not included in the model, but likely to affect educational investment is family size. I therefore create a dummy variable for being born into a large family. In 1983, the earliest year of birth of any household head, the average number of child births was 5.7 (World Bank, 2013b). I set the threshold for belonging to a large family to having more than two brothers.

Sons born in large families might be less likely to get education, as more sons could increase competition for scarce resources. However, more sons could also increase the income of the household if they are put to work. It is therefore hard to predict what direction the effect of family size could have upon educational investment.

### **6.3 Chapter summary**

The empirical specification of the theoretical model will be used to test the hypotheses put forward in chapter 4. The empirical model however deviates from the theoretical model in two important manners: Present physical capital is predicted to have an effect separate from human capital on occupational outcomes, and family size could affect educational investment. I choose landlessness as a proxy variable for physical capital and illiteracy as a proxy variable for human capital.

## 7 Econometric methodology

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In this chapter, I aim to present the econometric models which will be used to estimate the empirical model. As pointed out, the estimation needs to handle different types of discrete dependent variables: Illiteracy and occupation. I therefore present three econometric models that will be used to do the estimation. The choice of models is based on a discussion of econometrics literature and investigation of my data.

The Ordinary Least Squares model (OLS) is one of the most important methods in econometrics and estimates parameters in a linear regression model. I therefore start this chapter by outlining the OLS model and its assumptions, as this has important implications for the discussion on which models to report. Using OLS when estimating binary outcomes, such as illiteracy, can be problematic as some of the classic assumptions are violated. It is on the other hand not obvious that other econometric model will do better (Angrist and Pischke, 2009). When handling the binary dependent variable of equation (6.3), illiteracy, it is therefore useful to report both a logit model of binary choice and OLS estimates. When estimating the occupational outcomes of equation (6.1), I choose a multinomial logit model. It is a generalized version of the logit model of binary choice and has certain desirable properties which will be outlined in the coming sections. For all models I describe underlying assumptions and interpretation of the coefficients. The presentations are based on Wooldridge (2009) and Greene (2012).

### 7.1 The ordinary least squares method of estimation

The multiple linear regression model states that a variable,  $y$ , changes when other variables,  $x_1, x_2, \dots, x_k$ , changes. The problem can mathematically be written as

$$y = f(x_1, x_2, \dots, x_k) + \varepsilon = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k + \varepsilon$$

where  $\beta_1$  shows the relationship between  $x_1$  and  $y$ .  $\beta_1$  define the marginal effect; how the dependent variable,  $y$ , changes when the independent variable,  $x$ , changes one unit. Correspondingly,  $\beta_2, \dots, \beta_k$  are the coefficients for the respective marginal effect of  $x_2, \dots, x_k$  on  $y$ .  $\beta_0$  is a constant and does not depend on the value of the independent variables.  $\varepsilon$  is the

error term and includes all omitted variables that affect  $y$ , i.e, all other variables than  $x_1, x_2, \dots, x_k$ .

Before calculating the OLS estimators, the assumptions of the model should be presented. The OLS method rests on the Classical Linear Model (CLM) set of assumptions. The descriptions are quoted from Wooldrige (2009).

**OLS Assumption 1, Linearity in Parameters:**

*The model in the population can be written as  $y = \beta_0 + \beta_1x_1 + \dots + \beta_kx_k + \varepsilon$  where  $\beta_0 + \beta_1x_1, \dots, \beta_kx_k$  are unknown parameters of interest and  $\varepsilon$  is an unobservable error or disturbance term.*

**OLS Assumption 2, Random sampling:**

*We have a random sample of  $n$  observations,  $\{(x_{i1}, \dots, x_{ik}, y_i): i = 1, \dots, n\}$ , following the population model in Assumption 1.*

**OLS Assumption 3, No Perfect Collinearity:**

*In the sample (and therefore in the population), none of the independent variables are constant, and there are no exact linear relationships among the independent variables.*

**OLS Assumption 4, Zero Conditional Mean:**

*The error  $\varepsilon$  has an expected value of zero given any values of the independent variables. In other words,  $E(\varepsilon|x_1, \dots, x_k) = 0$ .*

**OLS Assumption 5, Homoskedasticity:**

*The error  $\varepsilon$  has the same variance given any values of the explanatory variables. In other words,  $Var(\varepsilon|x_1, \dots, x_k) = \sigma^2$ .*

**OLS Assumption 6, Normality:**

*The population error  $u$  is independent of the explanatory variables  $x_1, \dots, x_k$  and is normally distributed with zero mean and variance  $\sigma^2$ :  $\varepsilon \sim Normal(0, \sigma^2)$ .*

$\hat{\beta}$  is an unbiased estimator of population parameter  $\beta$  if  $E(\hat{\beta}) = \beta$ . Under OLS Assumption 1 to 4 the OLS estimators are unbiased estimators of population parameters. If we add OLS Assumption 5 to the first four, the OLS estimator becomes the ‘best linear unbiased estimator’ (BLUE). This means that it is the estimator with lowest possible variance. Thus when OLS

Assumption 1 through 5 are fulfilled, the OLS estimator has the lowest variance of all unbiased estimators. OLS Assumption 6 is needed for statistical inference. This assumption leads to the  $t$  and  $F$  distributions, and thus the ability to draw sound statistical conclusions.

If Assumption 5 is violated the OLS estimator will lose the property of being the estimator with the smallest possible variance. If Assumption 4 is violated the estimators will become unbiased.

### 7.1.1 The OLS-estimator

The estimates of the OLS-model are calculated by minimizing the sum of squared residuals. For simplicity, I use a simple linear model with only one variable  $x_i$  affecting  $y_i$

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (7.1)$$

I solve for  $\varepsilon_i$  and obtain

$$\varepsilon_i = y_i - \beta_0 - \beta_1 x_i \quad (7.2)$$

According to OLS Assumption 4 the expected value of the  $\varepsilon_i$  is zero and the covariance between  $x_i$  and  $\varepsilon_i$  is expected are zero

$$E(\varepsilon) = 0 \quad (7.3)$$

$$Cov(x, \varepsilon) = E(x\varepsilon) = 0 \quad (7.4)$$

I substitute with the expression from (7.2) and (7.4) to get get

$$E(y - \beta_0 - \beta_1 x) = 0 \quad (7.5)$$

$$E[x(y - \beta_0 - \beta_1 x)] = 0 \quad (7.6)$$

Because the true values of the parameters  $\beta_0$  and  $\beta_1$  are unknown, these are substituted with  $\hat{\beta}_0$  and  $\hat{\beta}_1$  which estimate the parameter-values, which indicates that the coefficients are estimates of the true parameter-values. A sample of the population has a selection of  $n$  respondents. The population parameters are estimated according to:

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{\beta}_0 - \hat{\beta}_1 x_i) = 0 \quad (7.7)$$

$$\frac{1}{n} \sum_{i=1}^n [x(y_i - \hat{\beta}_0 - \hat{\beta}_1 x_i)] = 0 \quad (7.8)$$

I have an expression for estimator  $\hat{\beta}_0$  in equation (7.8). I rearrange and define means

$$\hat{\beta}_0 = \frac{1}{n} \sum_{i=1}^n y_i - \hat{\beta}_1 \frac{1}{n} \sum_{i=1}^n x_i = \bar{y} - \hat{\beta}_1 \bar{x} \quad (7.9)$$

I substitute (7.9) into (7.8) and rearrange

$$\frac{1}{n} \sum_{i=1}^n [x(y_i - \bar{y} + \hat{\beta}_1 \bar{x} - \hat{\beta}_1 x_i)] = 0 \quad (7.10)$$

$$\frac{1}{n} \sum_{i=1}^n x(y_i - \bar{y}) = \frac{1}{n} \hat{\beta}_1 \sum_{i=1}^n x_i(x_i - \bar{x}) \quad (7.11)$$

As long as  $\sum_{i=1}^n (x_i - \bar{x})^2 > 0$ , equation (7.11) can be written as

$$\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y}) = \hat{\beta}_1 \sum_{i=1}^n (x_i - \bar{x})(x_i - \bar{x}) \quad (7.12)$$

I solve for  $\hat{\beta}_1$  obtain and obtain the estimator

$$\hat{\beta}_1 = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (7.13)$$

Coefficients produced by the OLS method estimate marginal effects, i.e. the change in the dependent variable that follows from a one unit change in the independent variable, if all

other independent variables are fixed. The calculations of this sub-chapter are from Wooldridge (2009). After presenting the classical assumptions of the OLS model, I will now argue whether or not it is suitable to handle binary variables.

## 7.2 Binary dependent variable

The dependent variable in equation (6.3) of my empirical model, illiteracy, is a binary variable, i.e. it only takes two values. If a multiple linear regression uses a binary dependent variable, the model is called a linear probability model (LPM), which is a special case of the OLS method. The main advantage of using LPM is that the coefficients are easy to interpret. If both dependent and independent variable are dummy variables, such as in my analysis, coefficients equal the change in the mean value of the dependent variable when the independent variable is changed from 0 to 1, at given levels for the other variables. The coefficient can therefore be interpreted as the difference in probability of illiteracy among different groups of the sample. The intercept equals the mean value of the dependent variable when all independent variables are set to 0.

Though it gives rise to easily interpretable coefficients, the LPM model has some important limitations. First, estimated probabilities can become negative or larger than one. Furthermore, while the assumption of normally distributed error terms is straightforward if the dependent variable is continuous and can take on all values, this is not the case for variables with only two outcomes, like illiteracy. Binary variables are not normally distributed and neither are the error terms,  $\varepsilon_i$ , as they can only take on a limited number of values. Moreover, because the error term is limited, it will not be constant or independent of explanatory variables,  $x_i$ . This violates the assumption homoscedasticity. When applying OLS to binary dependent variables, Assumption 5 and 6 are thus violated. The estimator is still unbiased, but no longer BLUE. This makes statistical inference from the regression results less exact.

Opinions differ on whether linear regressions should be used when estimating binary variables. Some econometric textbooks claim that OLS is not suitable for handling binary dependent variables and opt for the use of other techniques such as the logit or probit models (Greene, 2012, p. 727). The logit and probit model of binary choice addresses the problems of linear estimation of limited dependent variables, and are commonly applied. They provide estimated probabilities between 0 and 1, and tend to yield very similar results.



Angrist and Pischke (2009) however argue that the OLS method functions just as well. According to Wooldridge (2009), the usual OLS statistics are not far off when dealing with a binary dependent variable and therefore acceptable to use. The logit model also poses specific issues to this estimation, i.e. through being unable to estimate coefficients in cases of separation. This issue is further detailed in the coming sections.

I conclude that whether OLS or other models of binary choice are the best alternative when dealing with binary dependent variables is still an ongoing discussion in the literature. I therefore present both OLS and logit model results when estimating equation (6.3). Due to issues of separation, as well as easiness of interpretation, I will rest my main analysis on the OLS estimates. I do on the other hand compare the OLS coefficients to the approximations of the logit model as a check of statistical inference. In the next sections I will therefore outline the logit model of binary choice, before proceeding to discuss the case of limited dependent variables with more than two choices.

### 7.2.1 The logit model of binary choice

Binary dependent variables do not violate the assumptions of the logit model as it does not assume normality, linearity, or homoscedasticity. The logit model of binary choice describes the probability that  $y_i = 1$ , conditional on a vector of independent variables,  $x_i$ . It assumes a standard logistic distribution of the dependent variable. The model is specified by

$$\delta(x_i) = P(y_i = 1|x_i) = \frac{\exp(\beta_j x_i)}{1 + \exp(\beta_j x_i)} \quad (7.14)$$

which is estimated by using the maximum likelihood method. A central transformation of  $\delta(x_i)$ , the logit transformation, takes the shape

$$g(x) = \ln \left[ \frac{\delta(x_i)}{1 - \delta(x_i)} \right] = \beta_j x_i \quad (7.15)$$

$g(x)$  is commonly called the log-odds and share some of the properties of the linear regression model: It is continuous, linear in parameters and able to take values from  $-\infty$  to  $\infty$ . The estimated coefficients,  $\beta_j$ , are mostly made use of to estimate the sign or significance of effects. They are interpreted as the change in the log-odds that is produced by a one-unit increase in the independent variable. If the independent variable is a dummy variable it

measures the change in the log-odds that is produced if the dummy variable equals one compared to if it equals zero. To interpret the size of the effects, we study the marginal change in probability. It is defined by the partial derivative of  $\delta(x_i)$  with respects to  $x_i$

$$\frac{\partial \delta(x_i)}{\partial x_i} = \frac{\exp(\beta_j x_i)}{(1 + \exp(\beta_j x_i))^2} \beta_j \quad (7.16)$$

One technique is to obtain the marginal effect of  $x_i$  for an average observation in the sample by fixing all other independent variables at their average. This approach does however not make sense when dealing with binary independent variables, as the average person might be for instance have a value of for instance 0.5 illiteracy and 0.3 landlessness. I therefore use an alternative technique: For each observation we plug in the two possible values of  $x_i$ , and the actual values of the other variables. Then we calculate the average value of the difference in obtained probabilities over the whole sample. Results using the logit model to estimate equation (6.3) are presented in chapter 8, and are calculated by using the logit procedure in STATA.

Like the OLS model, the logit model assumes collinearity to be relatively low. This can be problematic when estimating heavily correlated variables.

### 7.2.2 Separation

The logit model suffers certain numerical issues. If an independent variable separates the outcome groups completely, estimates of the logit do not exist (Hosmer and Lemeshow, 2000, p.136). The issue of complete separation occurs when estimating the relationship of illiteracy over generations for the Dalit sub-sample of equation (6.3). In Table 7.1 I observe that literate Dalit fathers of household heads do not have any illiterate sons.

Standard logit estimation will therefore not able to estimate coefficients of the correlation of illiteracy over generations in the case of Dalits, and STATA will not provide any output. For comparison, I will however present the logit model estimates for the non-Dalit sub-sample.

Table 7.1 – Illiteracy over generations

	Dalits		Non-Dalits	
	Literate father	Illiterate father	Literate father	Illiterate father
<b>Literate son</b>	7 (100.0)	16 (14.0)	14 (93.3)	55 (70.5)
<b>Illiterate son</b>	0 (0.0)	98 (86.0)	1 (6.7)	23 (29.5)
<b>Total</b>	7 (100.0)	114 (100.0)	15 (100.0)	78 (100.0)

### 7.2.3 Interaction terms

**H2** predicts that Dalits should experience more persistent illiteracy over generations than non-Dalits. After estimating equation (6.3), I therefore need to test whether generational illiteracy between the Dalit and non-Dalit sub-samples is significantly different. Dummy variables for different groups can be interacted to test for slope differences. The model I run is the following:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 D + \beta_3 (x_1 * D) + \varepsilon \quad (7.17)$$

where  $D$  is the Dalit group-dummy which is set to one for Dalits and zero for non-Dalits,  $x_1$  is father's illiteracy and  $y_i$  represents illiteracy. If  $\beta_3 = 0$ , Dalits and non-Dalits share the same coefficient for  $x_1$ . If  $\beta_3 \neq 0$ , Dalits and non-Dalits do not share the same coefficient.

### 7.3 Categorical dependent variables

The dependent variable of equation (6.1) of the empirical model is occupation. The dependent variable is in this case not binary, but indicates whether one of three possible occupational choices has occurred. There is no intrinsic ordering between the different categories: ‘Skilled’ is expected to be preferred over ‘Unskilled’, but there is no predicted preference between these categories and the ‘Other’ category. Occupation is thus a categorical variable, i.e. a variable with two or more categories, but with no clear ordering. As previously explained, OLS is not necessarily the best estimation method in cases of limited dependent variables as Assumption 5 and 6 are not fulfilled when the dependent variable can only take on a limited set of values.

As in the case of binary outcomes, the logit and probit model addresses these issues. When estimating categorical outcomes these models are referred to as the *multinomial* logit and probit model. The multinomial logit model is the most commonly applied as it has certain desirable properties: The probability of choosing among any binary set of categories, for instance ‘Skilled’ and ‘Unskilled’, is assumed to be independent from the addition or subtraction of any other alternative. This assumption is called the Independence of Irrelevant Alternatives (IIA) and greatly simplifies model estimation, but as we shall see, it can at times be a stringent assumption of behaviour. The multinomial probit model or other alternatives to the multinomial logit model are usually considered if the IIA assumption is violated (Greene 2012, p.810). After outlining the multinomial logit model, I will therefore discuss whether my estimation of equation (6.1) violates the IIA assumption.

#### 7.3.1 The multinomial logit model

The multinomial logit model is a generalization of the logit model of binary choice. Suppose that a dependent variable consists of several unordered categories,  $y_{ij} = (y_{i1}, y_{i2} \dots y_{ir})$ , with corresponding probabilities,  $\delta_{ij} = (\delta_{i1}, \delta_{i2}, \dots, \delta_{ir})$ .  $\delta_{i1}$  equals the probability of outcome  $y_{i1}$ ,  $\delta_{i2}$  equals the probability of outcome  $y_{i2}$ , and so on.

The standard way of relating  $\delta_{ij}$  to independent variables when using a multinomial logit model, is estimate a set of  $r - 1$  log-odds, and set the coefficients of one base category to zero. We set outcome  $k$  as a baseline category. The coefficient is then calculated from the log-odds of probability  $\delta_{ij}$  to probability  $\delta_{ik}$ ,

$$\ln\left(\frac{\delta_{ij}}{\delta_{ik}}\right) = x_i(\beta_j - \beta_k) = \beta_j x_i \quad (7.18)$$

Coefficient  $\beta_j$  is interpreted as the as the change in the log-odds of choosing category  $j$  versus category  $k$  that is produced by a one-unit increase in the independent variable. If the independent variable is a dummy,  $\beta_j$  measures the change in the log-odds of choosing category  $j$  versus category  $k$  that is produced if the dummy variable equals one compared to if it equals zero. Notice that the log-odds do not depend on any of the other categories of the dependent variable than those directly compared. This property of the logit model is the IIA assumption, and simplifies the estimation the coefficients. This follows from an assumption of the independence of the disturbance of error variables. If odds ratios are not independent from the alternatives, the parameter estimates will become inconsistent (Greene, 2012, p. 804).

As with the case of the binary choice model, I can compute the marginal effects. They allow me to interpret the size of the probability change of ending up in one of each of the occupational categories. As the marginal effects do not depend on comparison with a base category, we obtain marginal effects for all categories.

### 7.3.2 The IIA assumption

When estimating model coefficients, it is useful that the log-odds do not depend on the other alternatives of the dependent variable. The IIA assumption might however be a problematic restriction on individual behaviour. The gravity of this issue depends on nature of the choices. For example the probability of driving your Ford car relatively to using your bicycle would probably change if you also bought a Mustang car. In the most troublesome cases, dependent variable categories thus serve as substitutes for others. Therefore it has been argued that the multinomial logit model works best if the independent variables are dissimilar and not just substitutes for each other.

Estimations of occupational choice are less disposed to such issues (Borooah, 2002, p. 73). A relevant case for the Dalits of Baijanathpur would be to consider if the probability of choosing masonry compared agricultural wage labour would change if becoming a teacher is added as an occupational alternative. There does not seem to be any obvious reasons why the addition of another alternative should alter the choice between masonry and agriculture labour. As the 'Skilled' occupations are generally better paid, I expect them to be preferred over 'Unskilled'

occupations no matter what other categories are included (Table A4, Appendix). I therefore conclude that the IIA-assumption does not seem to pose trouble for the estimation of equation (6.1). Results using the multinomial logit model are presented in chapter 8 and are calculated by using the mlogit procedure in STATA.

### 7.3.3 Occupational outcomes and causality

It is difficult to draw firm conclusions of causality when modelling occupational outcomes. Very many factors affect an individual's occupational choice and some of them are likely to be unobservable or not included because of limited data. Omission of such variables will lead to biased estimates if they are correlated with any of the independent variables of the estimated model.

I cannot exclude the possibility that any relationship between education and occupation is spurious, caused by an unobserved variable which is correlated with both. In my case, a variable such as individual ability is hard to measure, but might be correlated with illiteracy, which in my model means lack of education. Dalits that advance to 'Skilled' labour could do so because they have greater individual ability, which again could be correlated to illiteracy. The descriptive evidence in Table 6.3 however shows that four out of five of the Musahar and three out of five Bantar in the sample lack any formal education, a much higher rate than for non-Dalit groups. The higher illiteracy rates imply that many Dalits do not invest in education, no matter ability level. Thus I do not expect illiteracy to be highly correlated with individual ability. The argument is further supported by anecdotal evidence from the qualitative interviews, which stated literacy and calculation skills as important to become a skilled worker in the construction sector.

Furthermore, the relationship between contemporary endowments and occupational choice is simultaneous (Dolton, Makepeace and Van Der Klaaw, 1989, p. 573). Occupation could be affected by education, but occupational outcomes could also affect the accumulation of education. There could also be varying degrees of simultaneity for different capital stocks: The effect of occupational choice upon illiteracy could be different than its effect on landlessness. However, most educated Dalits only have low levels of education, which is usually completed at young age. It therefore seems unlikely that many Dalits take education after their occupational choice.

#### **7.4 Clustering standard errors**

When estimating the empirical model, landlessness is measured at the household level. Because these observations are identical for individuals that belong to the same family, their standard errors will be correlated. If this correlation is not taken into account, the number of independent observation will be exaggerated, and the estimated standard errors will become too small. The underestimation of standard errors will in turn make statistical inference from regressions less exact. I therefore cluster standard errors to households.

An added advantage of clustering standard errors to household is the large number of households in the sample. Clustering standard errors are only justified when the number of clusters becomes large, as small numbers of clusters can cause issues with statistical inference (Rogers, 1993).

#### **7.5 Chapter summary**

The OLS model is not necessarily the best option when estimating limited dependent variables. I therefore report logit model approximations in addition to OLS estimates when handling illiteracy as a dependent variable. Due to desirable properties deriving from the IIA-assumption, I opt for the multinomial logit model when estimating occupational choice.

I now proceed to present the regression results from the estimation of the empirical model.

## 8 Regression results

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In this chapter, I present regression results based on the empirical model. The analysis is centred on explaining occupational outcomes and present illiteracy, following two hypotheses that were formulated on the basis of theory and anecdotal evidence from the fieldwork. All calculations are obtained from STATA.

I start out by investigating **H1**, which states that skilled workers are more likely to be educated than unskilled workers. The hypothesis is tested by estimating the occupational choice of equation (6.1) for the Dalit subsample. Observations consist of the individuals for whom I have information on present education and land ownership; household heads as well as their sons and brothers that are currently in the household.

**H2** states that Dalits invest less in education over the generations than non-Dalits. In order to investigate this hypothesis I first estimate the correlation of illiteracy over two household generations for both subsamples. I then proceed to estimate equation (6.3) by including variables for family size and grandfather's landlessness.

As shown in table 7.1, the logit model suffers issues of separation when estimating the effect of father's illiteracy for the Dalit subsample. I therefore report logit model estimates only for the non-Dalit subsample, while the OLS estimates are presented for both. The main analysis is done with the OLS estimates, which are compared to the logit approximations as a check of statistical inference and direction of effects.



## 8.1 Regression tables

**Table 8.1 – Results from the multinomial logit model with occupation as dependent variable**

Dependent variable Occupation	<i>Dalit sub-sample</i>		
	(1) Unskilled	(2) Skilled	(3) Other
<b><i>Coefficients</i></b>			
Illiterate		-2.185*** (0.613)	-0.948** (0.391)
Landless		0.863 (1.382)	-1.245* (0.659)
Constant		-0.550 (1.318)	1.675*** (0.630)
Pseudo R-squared		0.0973	
<b><i>Marginal effects</i></b>			
Illiterate	0.275*** (0.0588)	-0.224*** (0.0666)	-0.0505 (0.0805)
Landless	0.136 (0.164)	0.210 (0.156)	-0.346*** (0.0920)
Observations <sup>6</sup>		122	

Standard errors clustered on family

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>6</sup>Includes household heads as well as brothers and sons that are currently in the household

**Table 8.2 – Results from the OLS and binary logit model with present illiteracy as dependent variable**

	<i>Non-Dalit sub-sample</i>		<i>Dalit sub-sample</i>	
	(1)	(2)	(1)	(2)
<b><i>Linear probability model</i></b>				
Illiterate father	0.228** (0.0888)	0.244** (0.101)	0.860*** (0.0414)	0.844*** (0.0991)
Landless grandfather		0.0533 (0.147)		0.0767 (0.110)
Large family		-0.199* (0.106)		0.136* (0.0697)
Constant	0.0667 (0.0643)	0.0667 (0.0650)	-0*** (0)	-0.0778 (0.0581)
R-squared	0.037	0.058	0.262	0.290
<b><i>Logit model: Coefficients</i></b>				
Illiterate father	1.767* (1.064)	1.841* (1.073)		
Landless grandfather		0.239 (0.688)		
Large family		-1.281 (1.098)		
Constant	-2.639** (1.035)	-2.639** (1.035)		
R-squared	0.043	0.059		
<b><i>Marginal effects</i></b>				
Illiterate father	0.326* (0.191)	0.332* (0.188)		
Landless grandfather		0.0431 (0.124)		
Large family		-0.231 (0.195)		
Observations <sup>7</sup>		93		121

Standard errors clustered on family  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>7</sup>Includes household heads and their brothers

## 8.2 H1 – Endowments and occupation

As stated in subsection 7.3.1, the coefficients of the multinomial logit model are commonly used to interpret the direction and significance of effects. To interpret the size I rather study the marginal effects, which yield percentage probability interpretations.

According to **H1**, education increases the likelihood of skilled work. The coefficient of illiteracy estimates that illiteracy makes it significantly less likely for Dalit individuals to become ‘Skilled’ when compared to ‘Unskilled’. The marginal effects meanwhile indicate that illiteracy makes it significantly 27.5 percent more likely for Dalits to become ‘Unskilled’, and 22.4 percent less likely to become ‘Skilled’.

My data thus lends support to hypothesis **H1**: Unskilled workers are more probable to be illiterate than skilled workers. This finding backs up a notion that skilled workers resemble the entrepreneurs of the theoretical model in the sense that an investment in education is necessary to become skilled. As I observed in chapter 5, the large majority of Dalit skilled workers are construction workers, often related to specific vocational skills. Anecdotal evidence suggests that investing in basic education is an advantage when learning such skills, as they might require calculation or reading. Education was also reported as being an advantage to become a factory worker, the second largest group among skilled workers (Table A5, Appendix). Such investment does in turn not seem to be required for Dalits that enter unskilled occupations, which can be seen as the equivalent of workers or subsistence in the theoretical model. On the other hand, I cannot completely exclude the possibility that the effect is spurious, i.e. that illiteracy is correlated to an unobserved variable which decides occupational outcomes.

Unsurprisingly, the marginal effects indicate that present landlessness decreases the probability of ending up in the ‘Other’ category significantly by 34.6 percent. This result was expected as the ‘Other’ category contains farmers. The directions of landlessness’ marginal effects on becoming ‘Skilled’ or ‘Unskilled’ are both positive, but not significant.

### 8.3 H2 – Illiteracy over generations

According to **H2**, Dalits should invest less in education over the generations than non-Dalits. To discuss this hypothesis, I start out with a bivariate analysis of the effect of father's illiteracy on present illiteracy. I then proceed to include variables for family size and grandfather's landlessness in a multiple regression.

#### 8.3.1 Father's illiteracy

The coefficients of the OLS model equal the change in the mean value of illiteracy when the binary independent variable is set from 0 to 1. As present illiteracy is a binary dependent variable, the coefficient can be interpreted as the difference in illiteracy rates among different groups in the sample. The intercept is equal to the mean value of the dependent variable when independent variables are set to 0.

The intercepts of the bivariate regression are thus equal to the proportion of illiterates with literate fathers. For non-Dalits this share is 6.67 percent. The coefficient of father's illiteracy tells us that the illiteracy-rate increases significantly by 22.8 percent for non-Dalits with illiterate fathers. For the Dalit subsample, the intercept is 0 as literate Dalit fathers have no illiterate sons. The probability of illiteracy increases significantly by 86 percent with father's illiteracy, i.e. the share of illiterates among Dalits with illiterate fathers. As the coefficients differ significantly at the 1 percent level (Table B1, Appendix), I conclude that father's illiteracy has a stronger effect on present illiteracy for Dalits than non-Dalits. I also observe that illiteracy is more persistent in Dalit than non-Dalit households. This result supports **H2**, and is a main finding of this thesis.

As I learned from the intercepts, Dalit literacy is persistent as well: Literate Dalit fathers have no illiterate sons. In comparison, 6.67 percent of non-Dalit sons of literate fathers are themselves illiterate. There is however only seven such Dalit observations (Table 7.1), so I do not conclude that this result is a strong indication of a general trend in the Dalit population.

Furthermore, father's illiteracy explains a much greater share of the variance in present illiteracy for the Dalit subsample. The R-squared tells me that 26.2 percent of the variation in illiteracy is explained in the Dalit sub-sample, while merely 3.7 percent of the variation is explained in the non-Dalit data.

The theoretical model predicts that Dalits due to low social capital could become trapped in poverty. So does my data indicate the presence of a Dalit poverty trap? To discuss this, I would like to draw on the intuitions of the poverty trap in figure 4.1. This multi-equilibrium trap has one high wealth equilibrium and one low wealth equilibrium. Without the poverty trap, households would simply converge towards the high wealth equilibrium, as shown in figure 4.2, each generation doing better than the next.

The binary measure of human capital assets in my analysis (literacy and illiteracy) could serve as a proxy of the high and low equilibrium wealth levels of the figure. If Dalit households are more concentrated than other groups at the low asset level (illiteracy) over several generations, this would indicate the presence of a poverty trap. Non-Dalits should on the other hand converge towards the high asset equilibrium (literacy), independently of the asset levels of the previous generation.

As I have seen, illiteracy in the previous generation is far more correlated with present illiteracy for the Dalit households of my data. Dalit households are thus more likely to be stuck at low levels of human capital over two generations than non-Dalit households. Furthermore, the large difference in goodness of fit indicates that the education of the previous generation explains more of present education for Dalits than non-Dalits. I conclude that my findings could be interpreted as an indication of a poverty trap in the Dalit community.

This test however says nothing about what mechanisms could enforce persistent Dalit illiteracy. Before discussing this, I want to investigate the robustness of my results. I therefore proceed to include variables for grandfather's landlessness and family size in a multiple regression<sup>8</sup>, before comparing the OLS estimates to logit model approximations.

### 8.3.2 Grandfather's landlessness and family size

The new estimation display the same main finding as the bivariate regression: Dalit households suffer more persistent illiteracy than non-Dalit households. The estimated effect of father's illiteracy change only slightly to 84.4 percent for Dalits and 24.4 percent for non-Dalits. Both variables retain their significance and remain significantly different (Table B1, Appendix).

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<sup>8</sup> I.e. estimate the full equation (6.3) of the empirical model

The estimated effect of previous household landlessness are in line with expectations, as grandfather's landlessness is estimated to increase the likelihood of present illiteracy by 5.33 percent for the Dalits and 7.67 percent for the non-Dalits. Land ownership could finance educational investment both through being a productive asset and as an asset for sale. The coefficients are however not significant and large standard errors make it difficult to conclude that this is the true direction of effect.

The family size coefficients leave us with a somewhat unclear picture as family size is estimated to have opposite effects for Dalits and non-Dalits. Having a large family<sup>9</sup> is estimated to increase the probability of Dalit illiteracy by 19.9 percent, but to decrease the probability of illiteracy among non-Dalits by 13.6 percent. These effects are, however, not very precisely estimated as they are only significant at the 10 percent level. The explanation might lie in the economic status of the Dalit community. Wealthy non-Dalit families could choose to get more children than poor non-Dalit families because they can afford to invest money in more children. Such an effect might not be strongly present among Dalits because few households are wealthy enough to invest in the education of more than two sons. The birth of another son into a most Dalit families would rather increase competition for scarce financial resources available for human capital investment, and thus increase the probability of illiteracy.

Including more variables reveals a shortcoming of the OLS model when dealing with binary outcomes: The intercept of the Dalit subsample is negative. The predicted probability of illiteracy among observations with 0-values for all independent variables, i.e. Dalits with small families and land owning as well as literate fathers, is in other words negative. Negative probabilities of illiteracy are of course impossible. Fortunately, this estimate is not of great consequence to the discussion surrounding hypothesis **H2** and poverty traps.

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<sup>9</sup> More than two brothers

### 8.3.3 The logit model of binary choice

The coefficients of the logit model retain the same directions as the OLS estimates. Father's illiteracy is estimated to significantly increase the probability of illiteracy among non-Dalits. The effect is however less precisely estimated than its OLS counterpart, as it is significant only at the 10 percent level. The coefficient of family size has the same direction, but loses its significance.

The size of the marginal effects can be directly compared to the OLS estimates. Father's illiteracy is in the multiple regression estimated increase the likelihood of present illiteracy by 33.2 percent, approximately 9 percent more than the OLS estimate. The size of the marginal effects of landlessness and family size are at 4.3 and -23.1 percent more similar to their corresponding OLS coefficients.

I conclude that the approximations of the logit model seem fairly consistent with the OLS estimates: All estimated effects retain their directions, and father's illiteracy remains significant, if only weakly so.

### 8.3.4 Why do Dalits suffer more persistent illiteracy?

Higher correlation of illiteracy over the generations for Dalit households conforms to the prediction of hypothesis **H2**. The test does however not provide any indication of what kind of discrimination is causing persistent Dalit illiteracy. A quantitative investigation is beyond the scope of this thesis, but a discussion of theory and actual circumstances will hopefully provide some insight.

I first return to the framework of the extended Ghatak and Jiang (2002) model. In my application of the model, groups who start out poorer are more likely to become capital constrained and less likely to invest in education. In other words, Dalit households with illiterate fathers could simply have been poorer than comparable non-Dalit households at the time of educational investment, and therefore less able to afford it.<sup>10</sup>

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<sup>10</sup> Greater poverty could besides scarcity of financial capital also have other adverse effects on educational investment. As discussed in chapter 2, poverty could induce a high marginal utility of present consumption. Higher utility of consumption could again increase the opportunity cost of educational investment. Lower levels of other forms of human capital, such as poor health/nutrition, could also follow from greater poverty, and possibly reduce the learning capacity of Dalit children at school.

There are several reasons to suspect that discrimination of Dalits could have induced greater poverty. For starters, Dalits have traditionally been excluded from segments of the labour market. Many Dalits of eastern Tarai have been engaged in feudal principal-agent relations with landlords as low-paid agricultural labourers. Some of these contracts have been contingent on restriction of other labour contracts, or the landlords could have colluded with other potential employers in order to restrict outside options. Discrimination of Dalits in the labour market might also have taken other forms: Dalits earn lower wages than higher castes both in the non-agricultural and agricultural sector (Das and Hatlebakk, 2009). Anticipation of continued labour market discrimination could also have made Dalit households choose to invest less in education because they anticipated smaller returns in terms of higher income than other castes.

Hatlebakk (2009) furthermore finds caste-based price discrimination in informal rural credit markets. As Dalits are at the bottom of the caste system, they could be liable to suffer such discrimination. Higher interest rates or demands for collateral might thus have hindered Dalit households from performing profitable investments or from financing education with borrowed capital. As illustrated by the theoretical model, discrimination in the product market could also have hindered Dalits from engaging in entrepreneurship. In subchapter 4.3.4, I summarized two studies that found positive correlations between entrepreneur income and measures of social capital.

Moreover, Tarai Dalits have historically been subject to judicial discrimination: Individuals of the Musahar caste have been denied Nepali citizenship, which is a legal requirement for land ownership. Land ownership could in turn have helped finance educational investment through land sale or agricultural produce. In my data, I found a positive, yet not significant effect, of previous household landlessness on present illiteracy.

Discrimination within the schooling system could be another explaining factor. One respondent of the qualitative interviews stated that Musahar children were discriminated by being denied handouts of school material offered to children of higher castes. Dalit



households could thus be required to compensate their lack of social capital by substituting with more financial capital.<sup>11</sup>

To sum up, Dalits could in the previous generation have suffered greater poverty than non-Dalits due to several kinds of market-discrimination, and therefore have been less able or willing to finance the education of their sons. Anticipation of more discrimination in the future could also have contributed to the persistence of illiteracy by further reducing the willingness to spend resources on education.

#### **8.4 Summary of findings**

In the analysis, illiteracy is found to be strongly correlated with poor occupational performance. Illiterate Dalits are significantly more likely to end up in poor unskilled occupations than in better paid skilled occupations. My data thus supports hypothesis **H1**, which states that education should increase the likelihood of skilled compared to unskilled work for Dalits.

Even so, I cannot exclude the possibility that the effect is spurious, i.e. that illiteracy is correlated to an unobserved variable which in turn decides occupational outcomes. Anecdotal evidence on the largest groups of skilled workers, construction workers with vocational skills and factory employees, however suggest that education is an advantage for advancing from unskilled to skilled work.

**H2** states that Dalit households should invest less in education over generations than other groups. Illiteracy is in my data found to be more correlated over generations for Dalits than non-Dalits, a result that supports the hypothesis. On the other hand, literacy is also found to be persistent among the few Dalit individuals with literate fathers.

The strong generational persistence of Dalit illiteracy could be interpreted as evidence to support a notion that the Dalit community are suffering a poverty trap induced by low social capital. This test does however not provide any indication of what types of discrimination could have caused stronger correlation in Dalit illiteracy.

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<sup>11</sup> Such discrimination could be represented in the theoretical model by raising the Dalit investment cost of education to  $I^d$ , thereby making Dalit households more probable to become capital constrained. Dalit households in wealth interval  $I^h < a < I^d$  would, as opposed to non-Dalit households, be unable to invest in education.

A discussion of theory and actual circumstances suggest that Dalit households in the previous generation could have suffered greater poverty due to several forms of market-discrimination, and therefore have been less able or willing to finance education than households of higher castes. Anticipation of future discrimination could also have contributed to the persistence of illiteracy by reducing the willingness of Dalit households to perform educational investment.

## 9 Discussion and policy analysis

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The literature suggests that links between social identity and economic outcomes can induce greater poverty among groups with low social status. This seems to hold true in Nepal where Dalits, the group at the bottom of the caste system, is also the group with the highest poverty rates. The aim of my thesis has been to investigate what factors make some Dalit households escape poverty and others stay behind.

A main finding is that illiteracy is more likely to persist over generations for Dalits than non-Dalits. In turn, present illiteracy is strongly correlated with poor occupational performance among Dalits. Anecdotal evidence furthermore indicates that education is an advantage to advance from unskilled to skilled labour, which seems to be the main channel of economic mobility for the Dalits of my data. The persistence of low levels of education could therefore have induced greater poverty among Dalits today.

Increasing the Dalit participation rate in basic education could thus be an efficient means of alleviating poverty. This could be done through demand side incentives such as subsidizing the costs of basic schooling or through launching information campaigns on the advantages of enrolling children in school. The large majority of Dalit skilled workers are furthermore employed in the construction sectors, frequently with vocational skills such as masonry or carpentry. Teaching vocational skills for which there is sufficient demand could therefore empower more Dalit households to climb out of poverty.

More research is needed to decide exactly how discrimination enforces persistent Dalit illiteracy. Knowledge of local conditions may however provide some pinpoints. Providing citizenship to the Musahar Dalits, and thus the possibility of owning land, might be a means of improving their educational status, as land ownership could empower Musahar households to invest in the education of their children. This argument might also provide a rationale for redistributing land-reform, as the majority of Tarai Dalits are landless (Das and Hatlebakk, 2009).

Further economic growth in Nepal and eastern Tarai could also improve on the economic and educational status of Dalit households. Growth could first and foremost spur more demand for

both skilled and unskilled workers in the modern sector of the economy, and possibly put upwards pressure on their wage levels. A general increase in demand of unskilled labour might in turn have spill-over effects into the agricultural economy. As mentioned, many Tarai Dalits have traditionally been engaged in different forms of feudal principal-agent relations with landlords as low-income agricultural wage labourers. More demand for unskilled labour in the modern sector could improve on the bargaining position of the Dalits who are still working in agricultural labour by strengthening their outside options, both in terms of wage and variety.

The thesis has investigated determinants of Dalit poverty, but an important factor has not been commented upon: The willingness of local and national authority to commit to poverty alleviation among Dalits of Tarai. This together with knowledge of the economic and cultural context of eastern Tarai is crucial if one is to successfully reduce poverty among Dalits.

# 10 Appendix

## 10.1 Tables

**Table A1 – Median and mean daily and monthly wage**

Category	Daily wage (NR)	Monthly wage (NR)
<b>Mean</b>	373.6	8443.7
<b>Median</b>	350.0	8000.0

**Table A2 –Monthly wage in sample**

Monthly wage (NR)	Unskilled worker	Skilled worker	Office	Migrant
<b>Under 8000</b>	25 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>8000-11999</b>	0 (0.0)	13 (86.7)	6 (40.0)	1 (12.5)
<b>12000-15999</b>	0 (0.0)	1 (6.7)	6 (40.0)	1 (12.5)
<b>16000-19999</b>	0 (0.0)	1 (6.7)	3 (20.0)	0 (0.0)
<b>20000-23999</b>	0 (0.0)	0 (0.0)	0 (0.0)	3 (37.5)
<b>24000-28000</b>	0 (0.0)	0 (0.0)	0 (0.0)	3 (37.5)
<b>Total</b>	25 (100.0)	15 (100.0)	15 (100.0)	8 (100.0)

**Table A3 – Vocational skills and daily wage among construction workers**

<b>Daily wage (NR)</b>	No description <sup>12</sup>	Marble worker	Mason	Carpenter	Total
<b>200-299</b>	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.00)
<b>300-399</b>	23 (74.2)	2 (28.6)	0 (0.0)	0 (0.0)	25 (37.9)
<b>400-499</b>	4 (12.9)	5 (71.4)	7 (36.8)	2 (22.2)	18 (27.3)
<b>500 or more</b>	4 (12.9)	(0.0)	12 (63.2)	7 (77.8)	23 (34.8)
<b>Total</b>	31 (100.0)	7 (100.0)	19 (100.0)	9 (100.0)	66 (100.0)

**Table A4 – Daily wage in sample**

<b>Daily wage (NR)</b>	Agricultural labour	Rickshaw	Unskilled wage	Skilled wage	Total
<b>200-299</b>	7 (22.6)	0 (0.0)	5 (12.2)	0 (0.0)	12 (8.8)
<b>300-399</b>	24 (77.4)	15 (88.2)	36 (87.8)	0 (0.0)	75 (54.8)
<b>400-499</b>	0 (0.0)	2 (11.8)	0 (0.0)	23 (47.9)	25 (18.2)
<b>500 or more</b>	0 (0.0)	0 (0.0)	0 (0.0)	25 (52.1)	25 (18.2)
<b>Total</b>	31 (100.0)	17 (100.0)	41 (100.0)	48 (100.0)	137 (100.0)

<sup>12</sup> I suspect that individuals over 400 NR daily wage in the ‘No description’ category have vocational skills, as the vocational skills of construction workers were not recorded at the start of the fieldwork.

**Table A5 – Work among Dalits and non-Dalits in the ‘Skilled work’ category**

<b>Occupation</b>	<b>Skilled worker Dalit</b>	<b>Skilled worker Non-Dalit</b>
<b>Factory</b>	5 (13.5)	8 (28.6)
<b>Construction</b>	28 (75.7)	14 (50.0)
<b>Wage labour other</b>	1 (2.7)	1 (3.6)
<b>Employee, restaurant/hotel</b>	0 (0.0)	0 (0.0)
<b>Employee, shop</b>	0 (0.0)	0 (0.0)
<b>Employee, private office</b>	0 (0.0)	3 (10.7)
<b>Employee, private other</b>	2 (5.4)	2 (7.1)
<b>Employee, government</b>	0 (0.0)	0 (0.0)
<b>Other</b>	1 (2.7) <sup>13</sup>	0 (0.0)
<b>Total</b>	37 (100.0)	28 (100.0)

<sup>13</sup> Farming cooperative.

**Table A6 – Work descriptions among individuals in ‘Skilled work’, ‘Migrant’ and ‘Office’**

<b>Occupation</b>	<b>Skilled worker</b>	<b>Migrant</b>	<b>Office</b>
<b>Factory</b>	13 (20.0)	3 (37.5)	0 (0.0)
<b>Construction</b>	42 (64.6)	1 (12.5)	0 (0.0)
<b>Wage labour other</b>	2 (3.1)	0 (0.0)	0 (0.0)
<b>Employee, restaurant/hotel</b>	0 (0.0)	1 (12.5)	0 (0.0)
<b>Employee, shop</b>	0 (0.0)	1 (12.5)	0 (0.0)
<b>Employee, private office</b>	3 (4.6)	0 (0.0)	0 (0.0)
<b>Employee, private other</b>	4 (6.2)	2 (25.0)	4 (25.0)
<b>Employee, government</b>	0 (0.00)	0 (0.00)	10 (62.50)
<b>Other</b>	1 (1.5)	0 (0.0)	2 (12.50)
<b>Total</b>	65 (100.0)	8 (100.0)	16 (100.0)



**Table A7 – Household heads and brothers**

Categories	Household heads	Brothers	Total
<b>Total</b>	100 (48.1)	108 (51.9)	208 (100.00)

## 10.2 Regression

**Table B1 –Results from OLS estimation and interaction effect with present illiteracy as dependent variable**

	(1)	(2)
Dependent variable	Illiteracy	Illiteracy
Illiterate father	0.228** (0.0885)	0.212** (0.0906)
Landless grandfather		0.0760 (0.0900)
Big family		0.0517 (0.0693)
Dalit	-0.0667 (0.0641)	-0.0962 (0.0756)
<i>Dalit*Illiterate father</i>	0.631*** (0.103)	0.606*** (0.120)
Constant	0.0667 (0.0641)	0.0667 (0.0644)
Observations	214	214
R-squared	0.411	0.415

Standard errors in parentheses  
Standard errors clustered on family  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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