Intergenerational Income Mobility

and Family Dissolution

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Preface

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Abstract

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This study examines the intergenerational income mobility between intact families and families disrupted due to divorce or parental death. The data samples consist of children born in 1960 and 1970 along with their biological fathers and mothers. The income mobility is explored between sons and fathers, sons and mothers, daughters and fathers and daughters and mothers. The results of the analyses show that the income mobility differs between intact and disrupted families where the deviations and magnitude are dependent upon the child-parent mobility pair. The offspring in disrupted families seem to be socioeconomic disadvantaged relatively to offspring in intact families, regardless of type of disruption, something that can be explained by differences in transmission of human capital between generations. Finally, the study investigates whether the results are due to causal effects or a consequence of selection, using a difference-in-difference model. The results do not unconditionally support the causal effect interpretation, but there are too many weaknesses attached to the data samples to conclude on this matter.

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1. Introduction

The family structure in Norway has experience great alterations from the post-war era and up to now. The main characteristic is the dramatic increase in numbers of divorces where the annual divorce rate has risen from 7.7 % to 47 % between 1950 and 2005, making Norway among the countries in Europe with the highest number of marital dissolutions per inhabitant (Tjøtta and Vaage, 2008; Statistics Norway, 2008a). These changes in marital status have subsequently been followed by transitions from intact two-parent families to alternative family structures like single parenthood and step parent families. In addition, other forms of cohabitations have grown rapidly, for instance cohabiting unions and partnership. If we consider offspring, the share of children between 0 and 17 years old living with both biological parents has dropped from 82 % to 75 % from 1989 to 2008. Of the 25 % who only resided with one biological parent, 14.5 % was living merely with their mother, 7 % with their mother and a step father and 2.7 % was living merely with their father by January 2008 (Statistics Norway, 2008b).

These new transformations from intact families to multiple family constellations bring into question whether the associations and connections between parents and children alter with the family type. Especially, with children as the main focus, does the dissolution of intact two-parent families cause significant differences in the importance of family background and family environment on children's socioeconomic outcome between family types? Furthermore, are there deviations between sons and daughters their relations to fathers and mothers? One way to assess the association between parents' and children's socioeconomic outcome is by studying the income mobility between the generations. The amount of income mobility across generations quantifies the importance of family background in determining children's earnings or socioeconomic status, and the measure can be applied across gender and family structure to reply the displayed questions. In relation to the measure, a high degree of income mobility between offspring and parents implies that the earnings of parents are not that important in the shaping of children's earnings, i.e. that family background and environment are inferior to other sources that possess influential force on the outcome of children. Furthermore, the answers to the questions can be of great value to social policy reforms and distributional programs of welfare goods. If offspring and parents in certain families are worse off than others on grounds of family structure, it may call for social policy interventions to direct welfare goods and benefits towards the disadvantaged family types.

Since Norway is a welfare state with high notions of equality, redistributional policies between individuals with different income are important instruments.

The existing literature on intergenerational income mobility and family dissolution is scarce and the results are overall non-conclusive. Of the main contributors on the field, Biblarz and Raftery (1993), Couch and Lillard (1997) and Fertig (2004) display significant and comparable results from estimations. While Biblarz and Raftery's (1993) and Fertig's (2004) estimations suggest that the earnings mobility between biological fathers and offspring are higher in alternative families, Couch and Lillard's (1997) results display the opposite pattern. The studies which show no significant patterns are Peters (1992) and Bjorklund and Chadwick (2003).

This study sets out to explore the association between the earnings of parents and offspring between intact families and families disrupted due to divorce and parental death. Of the disrupted families the divorced ones will be the primary focus. The data material consists of offspring born in 1960 and 1970 and their respective families who are followed during the children's adolescence in two separate data sets attained from Statistics Norway. During the children's adolescence the family members are observed multiple times and the family structure is identified. In addition, I observe the earnings of offspring and parents, which allow us to explore the income mobility between the family types. The regression model which will be utilized to investigate the income mobility is a reduced form model pioneered by Solon (1992) and Zimmerman (1992). In addition, to distinguish the income mobility across the distribution of income, matrices with computed transition probabilities will be presented. In this way, I contribute to the scarce existing literature on earnings mobility and family dissolution.

Another important aspect is whether differences in income mobility between family types are due to causal effects or selection into divorce. That is, is it the family dissolution itself that cause the differences or are there underlying factors that influence both the intergenerational income mobility and affects the probability for family disruption. Of the quoted studies it is only Fertig (2004) who addresses this issue, and results indicate that selection is partly the source of the observed differences in her study. To contribute to the knowledge on this field, the issue of causality and selection will be investigated if the preceding results display differences in earnings mobility across family types. In that respect, two approaches will be utilized, namely difference-in-difference and instrumental variable regressions.

The thesis first gives a broad overview of the intergenerational earnings mobility model and transmission of human capital between generations in chapter 2. In addition, transition matrices and selection approaches are presented and reviewed. In chapter 3 a thorough discussion of the consequences of family dissolution regarding parents and children are presented followed by a detailed review of the existing literature on income mobility across family types in chapter 4. Further, in chapter 5 the utilized methods are presented along with a discussion of the design of the data. The data samples which are concentrated around the 1960 and 1970 birth cohorts are presented in chapter 6 while the results of all estimations are reviewed in chapter 7. In chapter 8 I discuss and interpret the results from chapter 7 in addition to interpreting them in the light of the theoretical framework presented in chapter 2. Finally, in chapter 9 I sum up the discussion with concluding remarks.

2. Theoretical framework

In this chapter I first present a theoretical model outlined by Becker and Tomes (1979) and some theoretical extensions presented in Becker and Tomes (1986).[1] The model presents ideas concerning the underlying mechanism of intergenerational mobility. Then, I explore the statistical model of intergenerational transmission of labour earnings outlined in Solon (1992) and Zimmerman (1992). I look at the foundation of the model, estimation problems and possible solutions to the problems. This is followed by an expansion of the statistical model to include different family types, and a review of transition matrices. Finally, I introduce the notion of selection and present two approaches that address this issue.

2.1 Theoretical model

Becker and Tomes' model is an overlapping-generation model where each person in the economy lives for two periods. The first period can be described as the adolescence where the person in question accumulates human and non-human capital. In the second period the person enters the economic life whereas he or she works, consumes and breathes his or her own children.[2] To simplify, I limit the presentation of the model to two generations; one cohort of parents and one cohort of offspring. The parents are born in the *t-2* period and enter the economic life in the *t-1* period. Their children are born in the *t-1* period and enter their economic life in the *t* period. The periods are denoted by subscripts.

Assume that a parent only cares about her own consumption C_{t-1} and the total wealth of her offspring. In addition, the parent only has one child, and that the wealth of that child can be expressed by the expected lifetime earnings y_t. Assuming utility-maximizing behaviour, we can write the parent's utility function U_{t-1} as

$$U_{t-1} = U(C_{t-1}, y_t) \qquad (2.1)$$

or as a Cobb-Douglas utility function

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[1] In addition to the papers of Becker & Tomes (1979, 1986) I make use of Peters (1992), Solon (1999) and Fertig (2004) in the presentation of the model.
[2] It is possible to accumulate human capital in the second period as well, e.g. on-the-job-training or work courses, but the amount is proportional compared to the human capital that is raised during childhood.

$$U = (1 - \alpha) \ln C_{t-1} + \alpha \ln y_t, \tag{2.2}$$

where the parameter α, $0 \leq \alpha \leq 1$, describes the parent's preferences for child's total wealth relative to own consumption.

The parent is able to affect the child's lifetime earnings by investing in its human capital I_{t-1}.[3] The investment is made during the child's adolescence, i.e. in the *t-1* period, and it affects the child's earnings capacity in its working life, i.e. in the *t* period. Beside the investment made by the parent, the child's lifetime earnings y_t is determined by the his endowments of capital e_t and "capital gain" from his market luck u_t. This leaves us with the following equation for the child's lifetime earnings:

$$y_t = (1 + r)I_{t-1} + w_t e_t + w_t u_t, \tag{2.3}$$

The parameter r is the rate of return on human capital investments and the parameter w_t depicts the value of the child's endowments and "market luck" on his or her lifetime earnings. It is assumed that $r > 0$ and $w > 0$ which implies that both the investment in human capital and the endowments of capital are increasing in child's earnings.

Returning to the parent's allocation problem, the optimal level of investment in human capital is found by maximizing the utility function with regard to a budget constraint. Since the parent only cares about own consumption and the wealth of its child, the budget constraint equals

$$y_{t-1} = C_{t-1} + I_{t-1}. \tag{2.4}$$

Performing the utility maximization subject to this budget constraint, which is shown in Appendix A, yields first order conditions that imply that the optimal level of investment equals

$$I_{t-1} = \alpha y_{t-1} - (1 - \alpha)\frac{w_t e_t + w_t u_t}{(1 + r)}. \tag{2.5}$$

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[3] Becker and Tomes (1986) divides between non-human capital and assets. To simplify, I do not make this distinction and follow Becker and Tomes (1979) instead.

The equation shows that the level of investment is positively correlated to the parent's income through the preference parameter α. As long as she has some concerns regarding her child's wealth, i.e. α > 0, she will allocate income towards the child. The second term of the equation shows that the level of investment is increasing with the rate of return of the investment, and negatively related to the child's endowments and market luck.

Substituting the optimal level of investment in the child's lifetime earnings equation (2.3) yields:

$$y_t = \beta y_{t-1} + \alpha w_t e_t + \alpha w_t u_t, \tag{2.6}$$

where $\beta = \alpha(1 + r)$. The parameter β measures *the marginal propensity to invest*. It establishes a correlation between lifetime earnings of the parent and the child, and hence, it is a fundamental part of the analysis of intergenerational income mobility. We assume that the correlation is non-negative, but it is reasonable to expect that it is positive, i.e. $\beta > 0$, in most families. This implies that an exogenous increase in the parents' income by δy_{t-1} would raise the child's income by $\beta \delta y_{t-1}$. Furthermore, the propensity to invest is non-negatively related to the rate of the investment r and the parent's preferences α. Finally, the variables and parameters are measured as deviations from their means. Considering the association between the earnings of a parent and a child, i.e. β, regression towards the mean implies decreasing intergenerational inequality in income over time. This entails that children of parents whom earnings deviate greatly from the mean of income, will find themselves above, but closer to the mean than their parents. Accordingly, regression away from the mean implies the opposite tendency, and hence, the intergenerational inequality in earnings will increase over time.

Another essential part of the analysis is the concept of *endowments* e_t. In the words of Becker and Tomes (1979), children's endowments are "determined by the reputation and 'connections' of their families, the contribution to the ability, race, and other characteristics of children from commodities' acquired through belonging to a particular family culture. Obviously, endowments depend on many characteristics of parents, grandparents, and other family members and may also be culturally influenced by other families" (p. 1158). In other words, endowments are not only influenced by the attributes of one's parents and other family members, but also from the surrounding families, friends, society and culture. This implies that endowments of capital are produced through both nature and nurture.

The child's endowments can be decomposed into a simple Markov model:

$$e_t = \gamma e_{t-1} + v_t, \tag{2.7}$$

where e_{t-1} is the endowments of the parent and γ measures the fraction of the parent's endowments that are transmitted to or inherited by the child. v_t is the fraction of endowments that are exogenous of the parent, and it is described as "endowment luck". It is assumed that endowments are only partially inherited, i.e. $0 < \gamma < 1$, which implies that endowments regress towards the mean.

The parent's endowments influence the child's lifetime earnings both directly and indirectly. Through the transmission of endowments γ the child *directly* inherits a portion of the parent's endowments, which in turn influence the child's lifetime earnings. In addition, the parent's endowments influences her own lifetime earnings y_{t-1}, and as we have seen, the parent invests some of her capital in the child's human capital which further influences the child's lifetime earnings. Thus, through parental investment in human capital, the endowments of the parent *indirectly* affect the child's earnings.

Finally, the fact that the parent to a large extent is able to anticipate her child's endowments prior to most of the investments can cause alterations in the amount of investment. If the parent has more than one child, the direction of a possible adjustment and the subsequent effects on earnings mobility depends uttermost on the parent's philosophy regarding the division of capital between the children. Whether she divides the total investment equally between the children or chooses to maximize or minimize the investment in one well-endowed child leads to different consequences regarding the earnings mobility between each child and the parent.

As a summary, we can recapitulate the essentials of the model regarding the income mobility. The intergenerational mobility evidently depends on parents' interest to invest in the children's human capital. The higher the propensity to invest is, i.e. when $\beta \rightarrow 1$, the higher the earnings of children reflects parents' earnings. This implies that the correlation between parents' and children's earning becomes greater, and hence, the income mobility between the generations decreases.

Because the transmission of endowments from generation to generation always takes place, i.e. $\gamma > 0$, the intergenerational mobility of earnings depends also on the inheritability of endowments. If the degree of inheritability is eminent, i.e. if $\gamma \rightarrow 1$, children inherit much

of parents' endowments. This implies, holding the level of investment constant, that human capital and lifetime earnings of parents and children are closely related. Accordingly, the income mobility between the generations is small.

2.2 Statistical model

When it comes to empirical research, the main problem with Becker and Tomes' model is to measure a person's endowments and to estimate the transmission of endowments between generations. So far econometricians have not been able to develop an adequate measure of endowments. One possible solution is to obtain one or more proxy variables for the omitted variable where commonly used proxies abilities are IQ scores and test scores from educational institutes. Since I have neither the data to measure these variables, nor is it certain that they satisfy the assumptions for a good proxy, these solutions are not feasible. The solution that has evolved in the literature is to analyze the association between the socioeconomic status of parents and offspring without any direct measure of endowments. Then, the statistical model display the relations between the long-run economic statuses and it can be formulated as

$$y_{1i} = \beta y_{0i} + \varepsilon_i, \qquad (2.8)$$

where y_{1i} and y_{0i} denote the long-run economic status, e.g. log of lifetime earnings or permanent income, for a child and a parent in family i, respectively. The regression coefficient β represents the *elasticity* of the child's long-run economic status with regard to the parent's long-run economic status. The error term ε_i measures the part of offspring's income that is not connected to the parent in question, and it is assumed that $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$. All variables are measured as deviations from their population means.

Even though this model fails to include a direct measure of endowments, one might claim that it to some extent measures the transmission of endowments. As the theoretical model outlined, parents' endowments work partially through the investment in children. Thus, the elasticity between lifetime earnings of parents and children picks up some of the inheritability of endowments, but unfortunately, it is not possible to test whether this hypothesis holds or not.

The amount if intergenerational *immobility* in the long-run socioeconomic status is measured by the earnings elasticity β. I.e. it depicts the fraction of children's lifetime earnings that can be attributed to the family background. The fraction of children's earnings that is not attributed to the earnings of the peers is the extent of earnings *mobility* between the generations. Furthermore, the earnings elasticity is often loosely referred to as the correlation between parents' and children's lifetime earnings. This is, however, not always the case. By multiplying the OLS formula for β with $1/n$, the lifetime earnings elasticity can be formulated as

$$\beta = \frac{\sum_1^n (y_{0i} - \bar{y}_{0i}) y_{1i}}{\sum_1^n (y_{0i} - \bar{y}_{0i})^2} \cdot \frac{\frac{1}{n}}{\frac{1}{n}} \approx \frac{corr(y_{1i}, y_{0i}) \cdot \sqrt{var(y_{1i})} \cdot \sqrt{var(y_{0i})}}{var(y_{0i})} = \rho \frac{\sqrt{var(y_{1i})}}{\sqrt{var(y_{0i})}}, \tag{2.9}$$

where $\rho = corr(y_{1i}, y_{0i})$. If the variance in lifetime earnings is similar across generations, the elasticity equals the correlation coefficient between the long-run economic status of children and parents. If the variance in *y* differs across generations, the correlation coefficient deviates from the elasticity measure. The direction and magnitude of the deviation are determined by the ratio of variance in lifetime earnings;

$$var(y_{1i}) > var(y_{0i}) \quad \Rightarrow \quad \beta > \rho \tag{2.10}$$

and

$$var(y_{1i}) < var(y_{0i}) \quad \Rightarrow \quad \beta < \rho. \tag{2.11}$$

As a result, if the correlation ρ is not weighted by the dispersion in variance between the generations when *y* differs, it would be inaccurate to describe the earnings elasticity as the correlation in earnings between parents and children. When the earnings elasticity is estimated, the actual correlation coefficient can be easily computed;

$$\rho = \beta \frac{\sqrt{var(y_{0i})}}{\sqrt{var(y_{1i})}}. \tag{2.12}$$

Note also that the direction of the income mobility between generations is depicted in the opposite direction of earnings correlation and earnings elasticity. If the elasticity between a child's and a parent's long run economic status is small, e.g. $\beta = 0,1$, then the belonging correlation in long run status is negligible, and accordingly, the income mobility between the generations is high.

2.2.1. Estimation problems

Several problems can arise when the elasticity between children's and parents' lifetime earnings is estimated. In the absence of data series on lifetime earnings researchers make use of short-run proxies for earnings, where the first studies on the subject used single-year income. In addition, scarcity of available data caused earlier researchers to use homogeneous samples rather than random samples. The consequences were biased and inconsistent estimators, and thus unreliable results. We can explore the different sources of bias, starting with short-run proxies. Assume that the available income for a child in family *i* is his or her log earnings in year *t*, y_{1it}. If the available income serves as a short-run proxy for lifetime earnings the following model can be formulated;

$$y_{1it} = \lambda_t \, y_{1i} + v_{1it}, \tag{2.13}$$

where the error term v_{1it} is transitory fluctuations caused by random measurement error or actual deviation from lifetime earnings in period *t* (Solon, 1989; Solon, 1992). It is assumed that $v_{1it} \sim N(0, \sigma_{v1}^2)$ and $\text{corr}(\varepsilon_i, v_{1it}) = 0$. For now, let the slope coefficient λ_t in period *t* be equal to 1. By expressing the model through y_{1i}, we can write the statistical model as

$$y_{1it} = \beta y_{0i} + (\varepsilon_i - v_{1it}). \tag{2.14}$$

If the transitory fluctuations are uncorrelated with the permanent income of the parent, then

$$cov(y_{0i}, v_{1it}) = 0 \tag{2.15}$$

which implies that OLS estimation of β is unbiased and consistent. Thus, measurement error in the proxy for the child's long-run economic status, i.e. the dependent variable, causes no estimation problems except some loss in efficiency.

On the other hand, when a parent's long-run economic status, i.e. the independent variable, is proxied by applying single-year earnings in the model, the proxy causes error-in-variables bias in the coefficient estimate. Similar to the child, the short-run proxy for the parent's lifetime earnings is her log earnings in year s,

$$y_{0is} = \lambda_s y_{0i} + v_{0is}, \tag{2.16}$$

where the error term v_{0is} is transitory fluctuations. It is assumed that $v_{0is} \sim N(0, \sigma_{v0}^2)$ and $\text{corr}(y_{0is}, \varepsilon_i) = 0$. Again, let the slope coefficient λ_s in period s equal 1. By expressing the equation through y_{0i}, we can write the statistic model as

$$y_{1i} = \beta y_{0is} + \varepsilon_{is}, \tag{2.17}$$

where $\varepsilon_{is} = \varepsilon_i - \beta v_{0is}$.[4] Contrary to the case of the child, the new error term ε_{is} is correlated to the single-year proxy y_{0is}, which implies that $\text{cov}(y_{0is}, \varepsilon_{is}) \neq 0$, or more specific,

$$cov(y_{0is}, \varepsilon_{is}) = -\beta v_{0is}. \tag{2.18}$$

This correlation entails that the expected value of the error term is not zero given any value of y_{0is}, i.e. the zero conditional mean assumption is violated. This implies that the estimated correlation coefficient $\hat{\beta}$ becomes biased and inconsistent when the statistical model is estimated by OLS regression. Examining the probability limit of the estimate $\hat{\beta}$, the error-in-variables bias causes an *underestimating* of the true earnings elasticity, i.e. an attenuation bias in intergenerational income mobility:

$$plim\ \hat{\beta} = \beta + \frac{cov(y_{0is}, \varepsilon_{is})}{var(y_{0is})} = \beta \frac{var(y_{0is})}{var(y_{0is}) + var(v_{0is})} < \beta \tag{2.19}$$

Solon (1992) reports that the earnings elasticity tends to be underestimated by about 30% in a representative sample while Solon (1999) reports a negative bias of 30-50%.

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[4] I ignore the proxy for the child's lifetime earnings in the statistical model since the proxy causes no bias in the OLS estimations.

The other source of inconsistency erodes from utilization of homogeneous samples. Assume that lifetime earnings of children and parents are known, but that the data sample of parents is selected from a homogeneous subpopulation;

$$y_{1i} = \beta^* y_{0subi} + \varepsilon_i, \tag{2.20}$$

where the sample has lower variance in permanent income than a representative sample of parents, i.e. $\text{var}(y_{0subi}) < \text{var}(y_{0i})$. If OLS regression is applied to this model, the estimated correlation coefficient $\hat{\rho}^*$ is consistent. However, if the permanent income of parents is proxied by single-year earnings in addition to a homogeneous sample, the sample selection causes inconsistency and attenuation bias in the estimated earnings elasticity $\hat{\beta}^*$. Consequently, if both of the estimation problems are present in the same model, the association between long-run economic status between children and parents are underestimated by more than 30-50 %, which implies an even larger attenuation bias in the intergenerational earnings mobility (Solon, 1992).

2.2.3. Treating the errors-in-variables bias

Solon (1992) outlines two strategies to reduce the attenuation bias in the estimates. The first approach is to expand the parent's short-run proxy from single-year earnings to an average of several years. If the average is over T years, the statistical model, including the short-run proxy of the children, is modified to

$$y_{1it} = \beta \bar{y}_{0is} + (\varepsilon_i - v_{1it} - \rho v_{0is}), \tag{2.21}$$

where

$$\bar{y}_{0is} = \sum_{k=s}^{s+T} \frac{y_{0ik}}{T}. \tag{2.22}$$

If we assume that the transitory fluctuations v_{0is} is serially uncorrelated over time, the probability limit of $\hat{\beta}$ becomes

$$plim\ \hat{\beta} = \beta + \frac{cov(y_{0is}, \varepsilon_{is})}{var(y_{0is})} = \beta\frac{var(y_{0is})}{var(y_{0is}) + \frac{var(v_{0is})}{T}} > \beta\frac{var(y_{0is})}{var(y_{0is}) + var(v_{0is})}. \tag{2.23}$$

As we see, the multi-year proxy attenuates the "noise" component, i.e. the variance of the measurement error, and consequently, the error-in-variables bias is *reduced* when the short-run proxy is expanded over several years. Nevertheless, the downward bias is still present, it is merely the magnitude of the bias that is reduced. Now, researchers with a few exceptions are aware of the error-in-variables bias. Consequently, most of the studies on the topic attend the estimation problem by expanding the short-run proxy over several years.

The second approach involves the use of instrument variables, e.g. by applying a parent's education E_{0i} as an instrument for the single-year measure of earnings. To be an adequate instrument the education of the parent must be correlated with the single-year variable and uncorrelated with the error term:

$$corr(E_{0i}, y_{0is}) \neq 0 \tag{2.24}$$

$$corr(E_{0i}, \varepsilon_i - v_{1it} - \beta v_{0is}) = 0 \tag{2.25}$$

If these assumptions are satisfied the probability limit of the IV estimator of β is

$$plim\ \hat{\beta}_{IV} = \beta + \frac{corr(E_{0i}, \varepsilon_{is})}{corr(E_{0i}, y_{0is})} \cdot \frac{\sqrt{var(\varepsilon_{is})}}{\sqrt{var(y_{0is})}} > \beta, \tag{2.26}$$

which implies that $\hat{\beta}_{IV}$ becomes inconsistent and biased. The entailed bias is an amplification, and hence it causes an *overestimation* of the true earnings elasticity. From a theoretical point of view, if the amplification bias matches the attenuation bias caused by the errors-in-variables, the estimated earnings elasticity equals the true earnings elasticity. However, from an empirical standpoint, this would be considered to be pure luck. If the earnings elasticity is estimated by both OLS and the IV approach, the estimates represents lower and upper bound for β, respectively.

2.2.4 Life cycle bias

A problem of applying current earnings as short-run proxy for lifetime earnings is that it assumes a constant relationship between current and lifetime earnings over the life cycle (Grawe, 2006; Haider and Solon, 2006; Böhlmark and Lindquist, 2006), i.e. that

$$\lambda_t = \lambda_s = 1, \tag{2.27}$$

in the models that depict the short run proxies for children's and parents' lifetime earnings in equation (2.13) and (2.16), respectively. Haider and Solon (2006) state that the association between current and lifetime earnings λ changes over the lifetime cycle because of heterogeneity in lifecycle income profiles. Generally, the slope coefficient is lower than 1 when a person enters the working life and monotonically increases over the life cycle. Eventually, at the end of the carrier, it might again become lower than 1.

The variation in λ across the life cycle causes the quoted models to be wrongly specified when current earnings are applied as short-run proxy for lifetime earnings, which in turn causes bias in the estimated earnings elasticities. This so called life-cycle bias does not only arise in the right hand side variable, as in the classical case of errors-in-variables, but also on the left hand side. Thus, contrary to the former belief that measurement error in the children's income causes no distorting effects when applying current earnings as short-run proxy for lifetime earnings, life cycle bias applies for both parents' and children's earnings. To treat or minimize the bias that arises, one has to find the age at which the association between current and lifetime earnings λ is close to 1, i.e. the optimal age at time of measure. This is however a demanding task as several parameters must be empirically estimated and extensively analyzed separately for each generation, each cohort and for each sex. In addition, the literature on life cycle bias is still at an early stage so no concluding remarks can be drawn at this time.

2.2.5 Extensions of the model

As in the case of parents, it is common to proxy child's earnings over several years.[5] The expansion reduces the noise from using a short-run proxy, and hence makes the earnings measure a better depiction of lifetime earnings. When the short-run proxy of both parent and

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[5] Note that expanding the short-run proxy to encompass earnings years does neither eliminate life cycle bias for parents or children, nor does it eliminate attenuation bias for parents.

child is expanded from single-year earnings to an average of T years, the statistical model becomes

$$\bar{y}_{1it} = \beta \bar{y}_{0is} + (\varepsilon_i - v_{1it} - \rho v_{0is}), \tag{2.28}$$

where

$$\bar{y}_{1it} = \sum_{k=t}^{t+T} \frac{y_{1ik}}{T}, \tag{2.29}$$

and $\bar{y}_{0is}$ is defined in equation (2.22).

During the development of the literature is has become common to add age profiles in earnings to adjust for stage-of-life cycle.[6] For the parent this entails that earnings are regressed on age and age squared, and then the constant term and residual from the regression are used as the measure of his or her earnings. The performed regression is

$$\bar{y}_{0is} = \bar{y}_{0is} + \alpha + \delta_0 \bar{A}_{0is} + \delta_1 \bar{A}_{0is}^2 + v_{0is}, \tag{2.30}$$

where

$$\bar{A}_{0is} = \sum_{k=s}^{s+T} A_{0ik}. \tag{2.31}$$

The similar can be shown for children where the new short run proxy equals $\bar{y}_{0it}$.

2.3 Expanding the statistical model

The model outlined by Solon (1992) can be expanded to include different family structures which make it possible to explore whether parents and children in different family types exhibit dissimilar income mobility. One approach is to encompass binary variables in the statistical model where each variable represents one type of family composition. If we denote the possible structures that family i can undertake with a vector of binary variables $\vec{D}_i$, $\vec{D}_i = \{0,1\}$, we can write the statistical model as

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[6] It should be noted that the age-adjustment does not remove life cycle bias.

$$\bar{y}_{1it} = \beta_i \bar{y}_{0is} + \vec{\alpha}\vec{D}_i + \vec{\delta}\vec{D}_i\bar{y}_{0is} + u_i, \tag{2.32}$$

where $u_i = \varepsilon_i - v_{1it} - \rho v_{0is}$.[7] The parameter α describes the difference in interception between the included family types while the parameter δ depicts the difference in earnings elasticity between the family types. One limitation regarding the dummy approach is that it imposes a common error term over the entire sample. That is, when the subsamples are pooled into one model the error terms are not able to fluctuate between the family types but enforced into a joint structure.

Another way of investigating dissimilarities in earnings elasticity across different family types is by estimating over the subsamples rather than the pooled model. Thus, instead of encompassing family dummy variables into the statistical model, the model is applied separately for each family type;

$$\bar{y}_{1it}^{fam\_type} = \beta_i^{fam\_type} \bar{y}_{0is}^{fam\_type} + u_i^{fam\_type}. \tag{2.33}$$

The main advantage of the group approach is that the error terms can fluctuate over the family structure. As the model is divided by the family types, it is only assumed a common error term within each family type rather than over the entire sample as in the case of the pooled model. In this sense, one can state that the dummy approach is somewhat more restrictive that the group approach.

2.4 Transition matrices

An alternative approach to describe the association between parents' and children's long-run economic status is to compute transition matrices instead of estimating the earnings elasticity through regressions on the statistical model. A transition matrix displays the probability of observing a child in a specific position in his or her cohort's earnings distribution, conditional upon a parent's position in his or her cohort's income distribution. Normally, the income distribution of children and parents is divided into q equal-sized percentiles, and transition probabilities are computed for the portion of children in the m

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[7] Both parent's and child's short-run proxy is included in the model.

percentile of the group's income distribution, given that the parents belong to the *n* percentile in their group's income distribution. The probabilities are calculated for all (*m*, *n*) pairs, and the results are displayed in transition matrices.

The main advantage of transition matrices is that they display the intergenerational income mobility within the income distribution of children and parents. While regressions on the statistical model only show the overall earnings elasticity between children and parents, transition matrices display associations in income between generations across socioeconomic classes. Among others, one is able to study whether the income mobility differs between poor and wealthy child-parent pairs, and the probability that a child's earnings deviates from the parent's earnings in either direction. Furthermore, by separating the transition matrices by family type one is able to depict whether the mobility patterns over the income distribution is different for intact and disrupted families.

The main problem with the approach is similar to that of the statistical model, i.e. how to observe the long-run socioeconomic status of parents and children. Consequently, the short-run proxies of lifetime earnings are deployed here as well, and to increase the validness of the proxies the earnings are measured over several years. In addition, the parents' and children's measures should be conducted at approximately the same stage in their life cycle to reduce life cycle bias in the short run proxies.

The transition approach normally brings about multiple matrices which can be difficult to grasp when comparing the results across family types, across time or between cohorts. In that respect, an immobility index is computed for each transition matrix where the index is the sum of the diagonal and the adjacent transition probability cells. This technique follows Dearden et al. (1997), Blanden et al. (2002) and Bratberg et al. (2005). If the matrices are divided into quartiles "perfect" intergenerational income mobility implies that each transition probability equals 0,25 which results in a immobility index of 2,5. In this case the position of the offspring in the income distribution is independent of the parents' position. The other extreme point of the scale is when the intergenerational income mobility is "imperfect" in the sense that all offspring are situated in the same quartile as their parents. This situation would yield transition probabilities of 1 on the diagonal and 0 elsewhere, implying an immobility index of 4.

2.5 Causation or selection

A question that arises if one discovers divergence in outcome of offspring and parents across family types, and consequently differences in intergenerational income mobility, is whether the observed differences are due to causal relations or selection. Causal effects imply that the family dissolution itself causes the differences, while selection, in a pure sense, rather suggests that there are systematic dissimilarities between intact and disrupted families that both affect the probability of disruption and cause the offspring's and parents' outcome to deviate between the family types. If causation is the main source to the observed differences, then estimations of (2.32) will provide consistent estimates. But if selection it assumed to prevail, then the short run proxy for parents' earnings will no longer be exogenous due to the systematic selection into divorce. This causes the variable $\bar{y}_{0is}$ to be correlated with the error term u_i, which results in biased and inconsistent estimates.

In the case of parental death, the issue of selection is trivial. Overall, death is considered to be an exogenous occurrence even though there are factors that influence the probability of death in the long run, e.g. a person's life style, diet and health. In the case of divorce, selection is an essential issue, and therefore I consider two strategies to investigate whether selection may be present; an instrument variable model and a difference-in-difference model. The two approaches will be presented separately.

2.5.1 Difference-in-difference model

This strategy explores the effects of marital dissolution on income mobility by attempting to remove the systematic components that cause the selection to occur. The components are a part of the offspring's family background, or more specific, the individual characteristics of the parents that bring about higher probability for divorce and cause the income mobility to differ between intact and non-intact families. To accomplish this objective two identifying assumptions are made. First, the earnings of siblings are approximately equal if the siblings grew up with the same family environment, i.e. the same family structure. This allows us to utilize siblings' earnings in place of offspring's earnings. Secondly, the difference in earnings between siblings in intact and disrupted families is equal if the disruption was absent. This assumption is presented in equation (2.37).

The point of departure is the difference

$$E(y_i|D_i = 1) - E(y_i|D_i = 0), \tag{2.34}$$

where y_i denotes lifetime earnings to the offspring. The binary variable D_i denotes parental divorce where the variable takes on the value 1 if the parents are divorced and 0 if the parents are not divorced during the children's adolescence. If there are differences between the terms in (2.34), the marital dissolution is believed to impose causal effects on offspring's earnings. For now, assume that it is possible to observe the income of offspring as expressed in (2.34).

To improve the preciseness of the difference-measure the expected earnings of offspring can be differentiated with the expected earnings of elderly siblings. We would like to differentiate the offspring's earnings with his or her own earnings before the disruption took place, i.e. so the earnings difference becomes a before-after divorce comparison for each individual, but this is not achievable. Instead, we make use of siblings' earnings where the main notion behind is the fact that siblings who grow up together share the same parents, the same family, the same neighbourhood and the same society. Of most importance is the fact that they are exposed to the same family environment and share the same family background that is decisive to ambitions and achievements of educational attainment, occupational success and thus the long-run socioeconomic status. If the elderly siblings grew up when the family was still intact while the younger siblings experienced the separation during the adolescence, a difference in expected earnings between the siblings is only believed to persist if the alteration in the family structure from intact to non-intact has causal effects on the younger siblings' earnings. The expanded model with siblings-differences equals

$$E\big(y_{iy} - y_{ie}\big|D_i = 1\big) - E\big(y_{iy} - y_{ie}\big|D_i = 0\big), \tag{2.35}$$

where y_{iy} and y_{ie} denote the earnings of the younger and elderly sibling, respectively. If the divorce has causal effects on the offspring's earnings then the difference in the first term will differ from the second term in (2.35).

A problem with the difference-measure is that the second term in (2.35) is counter factual, i.e. it is not possible to observe the earnings of younger and elderly siblings in divorced families if the parents never got divorced.[8] One solution is to utilize a group of comparison which in this case is younger and elderly siblings in ever-intact families. If we

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[8] One can think of marital dissolution as a treatment where the divorced families constitute the treatment group. If the parents are divorced and hence participants of the treatment group, then we are not able to observe the parents if they did not take part in the treatment, i.e. did not end up with a divorce. That is the counter factual element.

replace the second term in (2.35) with siblings in intact families the difference-in-difference effect we wish to measure becomes

$$E\left(y_{iy}^{div} - y_{ie}^{div} \middle| D_i = 1\right) - E\left(y_{iy}^{int} - y_{ie}^{int} \middle| D_i = 0\right), \tag{2.36}$$

where the raised notations *div* and *int* describes the family structure of the siblings' families. The identifying assumption is

$$E\left(y_{iy}^{div} - y_{ie}^{div} \middle| D_i = 0\right) = E\left(y_{iy}^{int} - y_{ie}^{int} \middle| D_i = 0\right), \tag{2.37}$$

i.e. we assume that the expected sibling-difference in disrupted families in absence of disruption would be the same as the difference in intact families. To perform the regressions on the difference-measure an econometric model must be constructed. The point of departure is the statistical model expanded with a divorce dummy variable, i.e.

$$y_i^{child} = \alpha_i + \beta_i y_i^{par} + \delta_i D_i + \varepsilon_i, \tag{2.38}$$

which applies for all four types of siblings. The children's earnings are denoted y_i^{child} and the parents' earnings are denoted y_i^{par}. Note that the divorce dummy equals zero for the elderly siblings of the divorced parents and for both the younger and elderly siblings in the intact families. It only equals one for the younger siblings with divorced parents as they are the only ones who actually experienced the marital disruption during the childhood. Now, if we assume that selection into divorce can be described by the fixed effect α_i, a transformation between the younger and elderly siblings will remove the fixed effect component.[9] With the transformation the model equals

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = (\alpha_i - \alpha_i) + \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i + \left(\varepsilon_{iy} - \varepsilon_{ie}\right). \tag{2.39}$$

Finally, since we are interested in the income mobility, i.e. the slope coefficient, we include an interaction variable;

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[9] See chapter A.2 in Appendix A for a detailed deduction of the econometric model.

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i \ + \gamma_i D_i \ y_{iy}^{par} + \left(\varepsilon_{iy} - \varepsilon_{ie}\right). \qquad (2.40)$$

When estimating this regression model the parameter γ_i indicates if the observed deviations in intergenerational income mobility between intact and divorced families are due to causal relations or results from selection. Stylized, if the marital dissolution is believed to possess causal effects on parents' and offspring's earnings the parameter γ_i should be significant different from zero.

Finally, some notations about the difference-in-difference model and the issue of selection should be mentioned. First and foremost, the identifying assumptions are restrictive and may be too harsh. Especially, one may call into question the assumed equality between siblings. The model also imposes severe requirements on the data material due to the required age difference between siblings and siblings' parents. Even if one in theory is concerned with the issue of selection it can be difficult to assess the issue empirically as the requirements to data material can be hard to overcome. Furthermore, chains of actions are normally a mixture of both selection and causality, in which the two effects may interfere with each other, work through the same channels and influence each other. As a consequence, it is complicated to detect and separate both effects. In addition, there are observable and unobservable factors that affect both the magnitude of a person's income and the probability of marital dissolution. Even if the factors are known it can be a problem to quantify them. For instance it is reasonable to expect that a person's abilities and endowments affect the educational attainment and success, but it is problematic to measure a person's abilities.

2.5.2 Instrument variable regressions

Another approach to investigate the issue of selection is by utilizing instrument variables. This entails that the endogenous variable in the regression model, i.e. the binary variable which indicates whether or not a family is disrupted by marital dissolution in (2.34), is replaced with a linear combination of the exogenous variables along with one or more instrumental variables that are correlated with the endogenous variable, but not with the error term.

Two instruments for marital dissolution that have been used in several studies on earnings, education and family structure are sex of the first born child and divorce laws. The former strategy is based on the fact that the sex of the first child is random and that several studies have discovered that married parents face a higher probability for divorce if their first

child is a girl. Amongst others Morgan and Pollard (2002), Lundberg and Rose (2003), Dahl and Moretti (2004), Ananat and Michaels (2007) and Bedard and Deschenes (2005) confirm this notion. The hypotheses that explain the empirical relationship are investigated extensively by Dahl and Moretti, of which three are presented; the gender bias, the role model and the differential cost hypothesis. The first hypothesis suggests that parents have preferences for sons above daughters. Whatever the cause may be they prefer to have sons, and consequently, if their first child is a daughter it can create instability in the marriage. Secondly, the parents acknowledge that the presence of the father in the household is more important to sons than daughters. So, if their first child is a boy it will counteract a decision regard divorce because the parents recognize the damage the divorce and the following absence of the father will possess on the son. Finally, if the cost of raising a daughter is higher than for raising a boy, the expenses which follow the girl may increase the probability of divorce. Dahl and Moretti emphasize that the three hypotheses are not mutually exclusive.

The second strategy is based on the introduction of new laws on marital dissolution. Especially, no-fault divorce laws were passed on state by state in the US over the period 1950-1980. Since the state governments were in charge of the implementation, i.e. as opposed to the federal governments, and the laws caused increasing divorce rates in several states, the laws serve as an exogenous variation in the parents' probability of divorce (Fertig 2004). Consequently, the requirements of a satisfactory instrument are fulfilled, and hence, they have been used as instruments for divorce in several studies that utilize data samples from the US.

3. Consequences of family dissolution

Motivations for exploring associations between income of parents and offspring across family structures stem from the hypothesis stating that family dissolution brings about causal changes in lifetime income of parents, children or both of the generations. Alteration in parents' income is generally a direct consequence of the disruption while changes in lifetime earnings of children is associated with changes in parental investment in children's human capital and in environmental factors that influence the children during the adolescence, i.e. "nurture" components. If the hypothesis is not rejected, we would expect the variations in earnings to cause divergence in intergenerational income mobility between intact and disrupted families. The direction and magnitude of the differences are dependent on several relations, where amongst others, the distribution of family types across the income distribution will affect the direction of deviation, and the nature of and circumstances around the disruption will affect both the direction and the magnitude. In this chapter I present the causal consequences of family dissolution on parents and children separately. Finally, I investigate the issue of selection.

3.1. Consequences of dissolution regarding the parents

The main socioeconomic distress regarding disruption is the drop in financial resources. A divorce or separation entails that one parent leaves the household and that the household budget is reduced by the magnitude of that parent's income. The parent remaining in the household, who becomes the sole provider of the children, is usually the mother. In Norway, about 85 % of all single parents in the period of 2005-2007 were mothers (Statistics Norway, 2008b). In addition, the non-custodial parent, who is usually the father, is often the breadwinner of the family. This implies that the household is not only reduced by the income of one parent, but in most cases it is the main contributor to the family economy who leaves the household. This pattern is supported by the fact that single Norwegian parents are substantially overrepresented in both the lower quartile of the income distribution and beneath the poverty line (Statistics Norway, 2008b). In the case of parental death, the remaining parent automatically becomes a sole provider. It is obviously not possible to identify whether it is the breadwinner of the family who is likely to pass away. The main point is rather that parental death also causes a downfall in the household's economic resources.

A consequence of becoming a sole provider, regardless of the type of disruption, is foregone economics of scale in consumption. A two-parent household enjoys advantages on grounds of larger family size because the cost per person of attaining a given standard of living decreases as the household size increases. Nelson (1988) highlights three important sources where the first acknowledges that some goods are to some extent considered public within the household, e.g. shelter, household equipment and electric light. Secondly, the household experiences an increasing return in production of goods and services. And finally, as the family income in general is higher in two-parent households, these families are able to enjoy discounts on bulk purchases.

Another effect of the disruption and the subsequent fall in family resources is that the single parent often increases the supply of labour. When he or she increases the hours of employment it provides additional capital to the family household and in that way offsets some of the downfall in resources caused by the divorce or death. In addition, the total income of the one-parent household is supported by other sources of income such as welfare receipts. Single providers are entitled to family transition support, increased child benefits and other types of payment from the government. In the case of divorce, the income is supported by custody transfers and child support from the non-custodial parent. All these benefits and contributions boost the household income considerably and may have impact on the labour supply decision.

Finally, a possibility is that the custodial parent remarries or enters into a cohabiting union with another partner. The new household will experience an increase in the financial resources by the size of the spouse's income, and the family will undergo economics of scale as any other two-parent family. As a result, in the case of step families the main concern regarding the consequences of disruption is not the economic element but rather the psychological and emotional impacts the altered family structures may possess on the children involved.

3.2. Consequences of dissolution regarding the children

3.2.1. Economic considerations

From a theoretical point of view in terms of Becker and Tomes (1979, 1986), a family disruption affects the children's lifetime earnings y_t through the parental investment made in

their human capital during the adolescence I_{t-1}.[10] As noted in the former section, divorce as well as parental death leads to a drop in the household's economic resources and imposes capital restrictions on the custodial parent. In the case of parental death, it is most likely that the financial restrictions cause a downfall in the investment in human capital. A complicating factor is that the death may change the widow's or widower's preferences for investment, i.e. shifts in α, which will affect the investment positively or negatively. If we explore the human capital investment in detail, we expect financial support to educational attainment to be lower in the disrupted family since education is the main source of human capital. In addition to financial support, the remaining parent must assist his or her children in homework and after-school activities, and guide and supervise them in their educational aims and ambitions. These tasks require time and attention, and might be difficult for the remaining parent to fulfil if he or she faces time constraints after increasing the labour supply. Apparently, there is a trade off between increasing the labour supply and thereby contributing to the household's finances and devoting time and attention to the children. Overall, it is likely that children in families who have experienced parental death will one way or the other possess lower human capital and thus lower educational attainment than children from two-parent families when entering the economic life. Furthermore, as the correlation between education and occupation is considered to be substantial, the educational disadvantages from the adolescence bring about lower occupational attainment and status than children from two-parent families. As a result, we can expect a divergence in lifetime earnings between family types where children who experienced parental death are worse off than children from two-parent families.

In the case of divorce, the consequences are less certain. Even though the economic resources of the household are diminished when one parent leaves the family, it is not certain that the non-custodial parent ends his or her investment in the children's human capital. If the parent in question chooses to do so, we can expect the children to experience the same educational and occupational disadvantages and attain lower lifetime earnings than children from intact families, as in the case of children who experience death of one parent. This notion is partly supported by several studies on children's educational attainment where the the common finding is that children who experience divorce are educational inferior to children from intact families (e.g. Jonsson and Gähler, 1997; Ginther and Pollak, 2004; McLanahan and Sandefur, 1994; Bjorklund and Sundstrom, 2006; Bjorklund et al., 2007). Amongst others, the discovered disadvantages are a higher rate of dropout from high school,

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[10] See chapter 2.1, page 4.

lower college attendance and on average lower high school grades. Furthermore, after the divorce the custodial parent will face time constraints and must choose between increasing the labour supply and spending time with his or her children. Yet, in the case of divorce, the non-custodial parent may still spend time with the children without investing in their human capital, and thus ease the time constraints facing the custodial parent. This would make it possible for the sole provider to increase the labour supply without reducing the time spent with the children, which would also ease the reduction in the investment.

In the case where the abandoning parent chooses to maintain the investment in human capital, the children may not be worse off at all. Even though the household is dissolved both parents keep investing in their children's human capital as any intact family. What become important to the children's outcome are the circumstances around the divorce and the psychological and emotional upheaval attached to the disruption. In addition, the alterations in the parent's earnings with the divorce are important. As described earlier, the single parent will no longer benefit from economies of scale, which may increase the expenditures on consumption goods and thus lower the investments. If the abandoning parent maintains the investment after the disruption, the change in his or her income will also be of influence on the total investment. Finally, the divorce might cause changes in the preference parameter α or the rate of return on human capital r.

Children in step families may not experience the same extent of educational and occupational disadvantages as children of single parents. As the household is increased with a step parent who most likely has a positive income, the investment may increase both in time and financially. Evidently, the course of action depends on the preferences of the stepparent and his or her wish to contribute to the investment in the spouse's children. In addition, the time between the disruption of the first relationship and the entering of the other is of importance. If the period of single parenthood is extensive and the investment in human capital has been reduced during a critical time in the children's childhood, their outcome may not be any different from offspring with single parents.

3.2.2. Sociological considerations

In addition to investments in human capital, alterations in environmental factors due to the disruption may have great impact on the children's outcome. These so called "nurture" components of a child's adolescence are complex and encompass characteristics of the

environment and surroundings that contribute to the shaping of the child.[11] Examples of such factors are family background, school, neighbourhood, friends, parental guidance, parental supervision and psychological aspects such as aims, ambitions and expectations for the future. It is obvious that these elements possess great influence on the outcome of children considering educational attainment, occupational choice and status, and lifetime income. Consequently, if family dissolution affects any of the components we would expect the outcome of children to deviate between family structures.

In the sociological literature, one of the explanations to why family disruption may affect the children's educational attainment is known as the crises model of divorce or family-stress hypothesis (McLanahan, 1985; Jonsson and Gähler, 1997). The hypothesis focuses on the emotional upheaval and unbalance in family relations that arise during a divorce. Since it may not only be disturbing for the parents but the children as well, the disruption can cause psychological problems with the offspring. In relation to educational attainment, these problems can manifest themselves in behavioural problems at school and create poorer overall academic performance. Poorer performance in school may further imply that the children of divorced parents are more exposed to lower occupational attainment and status, and hence lower socioeconomic status than offspring in intact families.

Other hypotheses emphasize the absence of one of the parents during the children's adolescence. The parent absence perspective states that, ceteris paribus, two parents should be better than one parent (Amato and Keith, 1991). This entails that families disrupted due to death and divorce should in principle be affected similar by the disruption. Furthermore, the father absence hypothesis emphasizes merely the absence of the father. The father is an important role-model to the emotional and cognitive development of the children, and has great influential force when it comes to educational and occupational attainment. In McLahanan's (1985) own words, "the hypothesis proposes that the absence of a father decreases motivation for achievement and interferes with normal psychosexual development, resulting in poorer academic performance and premature termination of schooling" (p. 879). Furthermore, because parents are important role-models the children's aims and ambitions regarding education and occupation may be reduced if the custodial parent is the one with the lowest education or occupation. Also, if the sole provider has low academic skills the availability and quality of guidance may be lowered when it comes to homework. Since it normally is the fathers who leave the household and that they in general possess the highest

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[11] Components not considered as "nurture" are a person's genetics and innate qualities, i.e. "nature" components.

educational and occupational status of the parents, the described relations are commonly experienced among disrupted families. Thus, the overall consequences for the children can be lower educational attainment and lower occupational status (Jonnson and Gähler, 1997).

3.3. Selection

With regards to the introduced theoretical framework and the hypotheses stating that offspring in divorced families are socioeconomic disadvantaged to offspring in intact families, selection implies that it is not the divorce itself that causes the outcome of offspring in divorced families to be inferior, but rather that exogenous factors exist that both decrease the preferences for parental investment and increase the probability for marital dissolution. A possible and highlighted explanation is that parents with lower abilities, low life time earnings or low degrees of educational attainment and success are exposed to both of the quoted factors.[12] As we have seen, low preferences for human capital mainly imply that the parents invest few amounts of capital and time in their children's education. Hence, their children will on average receive low degrees of educational attainment and success which bring about occupational and socioeconomic disadvantages later in life. For these families the offspring would be worse off compared to families with high preferences for human capital, regardless of the structure of the family. But as the probability is higher for divorce among these families, on average, they tend to be overrepresented among divorced families. As a result, it appears as it is the disruption that brings about the differences in children's outcome while it really is due to underlying differences between the families.

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[12] Another possibility is that the parents have high preferences for human capital, but that they face credit constraints even as an intact family.

4. Literature review

The main contributions to the literature on intergenerational income mobility and parental separation are Couch and Lillard (1997), Peters (1992), Bjorklund and Chadwick (2003) and Fertig (2004). Biblarz and Raftery (1993) have also contributed on the topic, but their study is more related to intergenerational mobility across occupational categories rather than transmission of earnings itself. Yet, their study has been included in the literature review because of great association between occupational status and income, and scare amount of literature on income mobility and parental separation.

In this chapter I first present the authors' hypotheses and what findings they expect to discover. Then, I outline the theoretical framework and methods of regressions utilized in the studies. Finally, I present the results and some of the authors' interpretations and implications of their findings regarding family dissolution and intergenerational mobility.

4.1 Hypotheses and priors

Fertig (2004) investigates the relationship between intergenerational income mobility and parental separation by looking for support for the father-absence hypothesis. The hypothesis states that families which experience divorce will undergo weaker transmission of capital between generations, which implies higher income mobility in families beneath the mean of income and lower income mobility in families above the mean. The non-appearance of the father will negatively affect the investment in the child, both through capital restrictions in the family income and through restrictions in human capital transmission. In addition, the time spent with one parent is reduced, it is less supervision and guidance and the level of stress in the child's household increases (Popenoe, 1996, and Murray, 1995, in Fertig, 2004). The consequences are disadvantages when it comes to educational attainment and performance in school, and outcome in long run will be lower occupational attainment, and hence, lower socioeconomic status (Sigle-Rushton and McLanahan, 2002). The author investigates whether the hypothesis holds by first examining whether the intergenerational transmission of human capital – proxied by intergenerational income mobility – is weaker in divorced households and then addressing the issue of selection.

Biblarz and Raftery (1993) look for support for the hypothesis that states that the association between the socioeconomic origins and destination of sons is stronger for

offspring from intact families than from disrupted families, i.e. that the intergenerational occupational mobility is higher in disrupted families. The main assumption behind this hypothesis is the fact that the mechanisms behind the socioeconomic inheritance between fathers and sons are more effective in intact families. The reason is that the absence of the father in a disrupted family will diminish his importance both as a role model, socialization figure and as a value transmitter to the offspring. The authors also expect the transmission process between the remaining custodial household head, i.e. the mother or a stepfather, and the offspring to be less effective and more problematic compared with the process in intact families. Furthermore, the authors separate between family disruption stemming from separation or divorce and from death of a parent. It is believed that a family break-up caused by separation or divorce will have stronger effect on the transmission process, i.e. lower intergenerational mobility, than family disruption caused by death of a parent.

Couch and Lillard (1997) investigates the correlation of earnings between sons and fathers in intact and disrupted families. The authors examine whether there exist a difference in earnings correlation, and if there is, whether it can be explained by differences in educational attainment. The empirical background for such a statement is that several studies confirm that children from disrupted families attain fewer years of education and receive on average lower grades than children from intact families. Theoretically, this implies that children from divorced families accumulate lower human capital during their education, and hence enters working life with lower human capital. This in turn negatively affects the socioeconomic status of the acquired occupations and thereby lowers their lifetime earnings. Furthermore, this implies that offspring from disrupted families in lower socioeconomic classes would be lower upwardly mobile, i.e. higher income mobility, and offspring from disrupted families in upper socioeconomic classes would be more downwardly mobile, i.e. lower income mobility, compared to sons from intact families.

Bjorklund and Chadwick (2003) and Peters (1992) examine intergenerational income mobility patterns without any clear hypotheses and without describing what they expect to discover. Bjorklund and Chadwick choose to focus on the definition of father, a topic they consider is a neglected problem in literature. They are able to diversify the definition of the father by examining the extent to which the male offspring lived with their biological or non-biological father during the adolescence, and the subsequent effect on the intergenerational income mobility. Peters examines whether the intergenerational mobility is influenced by

family background characteristics. In the study she distinguishes between income and social classes and incorporates different characteristics of the parents. One of the included characteristics of the parents is whether a family is intact or dissolved.

4.2 Theoretical framework and methods of regression

Peters (1992) and Fertig (2004) utilize the theoretical framework of Becker and Tomes (1979) by expanding the model to incorporate divergence in family structure.[13] Peters moves forth by including a vector of dummy variables where the variable "broken home" indicates whether the child lived with both parents at the age of 14. The author offers no detailed explanation regarding the non-intact families so most probably it is included families disrupted due to parental death and divorce. Finally, Peters allows for gender differences in offspring by running separate regressions for sons and daughters.

Fertig does greater modifications to the Becker and Tomes' framework than Peters. First and foremost, she changes the parents' utility function so the investment in human capital may differ between family types. Also, a parameter in the child's earnings equation is included which measures the extent the children are able to inherit non-genetic or social endowments from the parents. This allows children from alternative families to differ from offspring in intact families in genetic endowments as well as social endowments. Furthermore, Fertig separates between single and step families where she allows for non-linearity by including a variable specifying how many years a family have been a single or step family. Finally, as Peters, Fertig runs separate regressions for sons and daughters. Both authors apply the method of ordinary least squares to estimate the coefficients.

Bjorklund and Chadwick (2003) utilize the estimation strategy of Solon in their study.[14] The authors do not offer an explicit review of their contribution to the statistical framework regarding the incorporation of different family structures. What they do report, is dividing the offspring into six groups according to the extent they have lived with their biological father and a non-biological father; (1) always lived with biological father, (2) sometimes lived with biological father and never lived with a non-biological father, (3)

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[13] It should be stressed that none of the authors have managed to measure endowments and hence failed to estimate the transmission of endowments between generations.

[14] See chapter 2.2, page 8 for a detailed review of the statistical framework outlined by Solon (1992).

sometimes lived with biological father and sometimes lived with non-biological father, (4) never lived with either biological or non-biological father, (5) never lived with biological father and sometimes lived with non-biological father, (6) never lived with biological father and always lived with non-biological father. This kind of specification is only deployed for sons as the authors are only interested in the son-father income mobility. To test for nonlinearities in the income mobility they run separate regressions where the square of father's income is included. To estimate the coefficients the authors apply ordinary least squares.

Couch and Lillard (1997) also make use of the statistical framework outlined by Solon. They include dummy variables describing the family structure in the model and run separate regressions for each family type, where the explored family types are intact and divorced families. Since education is the focal point in the study, they have also expanded the regression model to include sons' and parents' education. This is a new kind of expansion, and the new regressions are run separately for intact and disrupted families and pooled with dummy variables. Both sets of regressions, i.e. with and without education, are estimated by the use of ordinary least squares. The third way the authors examine differences in income mobility is by use of transition matrices. Transition matrices provide insights to whether the intergenerational mobility differs across the income distribution, and the authors have divided the groups' income distributions into thirds. In the study the focus is on male offspring, stating that it is too difficult to compare daughters with parents because the income of female offspring is measured in a period with high rates of pregnancy. For the male offspring the intergenerational income mobility is examined in relations to both fathers and mothers.

Biblarz and Raftery (1993) choose a completely different method than the other studies by making use of a status, autonomy and training (SAT) model by Hout from 1984. The SAT model calculates cell frequencies in mobility tables between parents' and children's occupations, and hence, it captures variables that give rise to the association between fathers' and sons' occupations (Biblarz and Raftery, 1993). The procedure is first to measure the status, autonomy, training and socioeconomic status for each occupational group by making average group scores. Thereafter, the different measures are included as separate variables along with father's and sons' occupations, and interaction variables between the measures and occupations, in cell frequency equations. The cell frequency equations are then used to display transition matrices or parameters of interest. The authors extend Hout's general SAT-

model to incorporate the effect of family disruption. The incorporation is made by including family variables as dummy variables and interactions variables in the cell frequency equations. The authors have not been able to split between different types of disrupted families, i.e. single family, step family or death of a parent, so the family dummies only indicate if a family is intact or non-intact. Furthermore, the regressions have only been deployed for male offspring.

Table 4.1 gives a brief overview of some of the characteristics of the main papers. The table shows that all papers except Biblarz and Raftery utilize personal earnings as the measure of income while Biblarz and Raftery make use of occupational attainment. When it comes to measure family composition there is a great deal of divergence among the papers. All authors except Peters utilize multiple indicators to measure the family structure, but the periods of measurement fluctuate from the children are 0 to 24 years of age. Peters only makes use of one measure that occurs when the child's age is 14 years. Moreover, surprisingly few of the authors apply multiple years as proxy for permanent income. Only Peters and Fertig use more than two income years to measure the parents' income, and only Peters, Fertig and Bjorklund and Chadwick use more than one year to measure the children's income. The shortcoming in parents' earnings measure can cause significant errors-in-variables attenuation bias.[15] The sixth column in the table summarises the mean age of individuals in the data samples while column seven displays the investigated child-parent mobility pairs. All authors have measured the mobility between sons and fathers, whereas Bjorklund and Chadwick are the only ones who have not measured the income mobility between sons and mothers. Furthermore, only Peters and Fertig have been able to distinguish gender and measure the income mobility for both male and female offspring. Peters also performs analyses on the family income, and Fertig has managed to include the mobility between daughters and mothers. Finally, the last column in the table displays the main results of the studies, which will be commentated later in the chapter.

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[15] See chapter 2.2.1, page 10, for a detailed description of estimation problems.

Table 4.1: Characteristics of main papers on intergenerational income mobility and family dissolution.

Authors	Origin of data	Measure of outcome	Observation of family structure	Years of income observation	Mean age	Mobility pair of interest	Main results
Peters (1992)	USA	Family income and personal earnings	1 measure where the child's age is 14.	Children: 5 years Parents: 5 years	Sons: 29 Daughters: 30 Parents: 46-47	Son-father Son-mother Daughter-father Daughter-mother	Non-significant difference for none of the mobility pairs.
Biblarz and Raftery (1993)	USA	Occupation	Did or did not live with both parents most of the time up to the age of 16.*	Sons: 1 year Fathers: 1 year	Sons: 20-64 Parents: 20-64	Son-father	*Higher* mobility in disrupted families.
Couch and Lillard (1997)	USA	Wage and salary earnings	5 measures where the child's age ranges from about 14 to 24.	Sons: 1 year Parents: 1 year	Sons: 31 Fathers: 49 Mothers: 39	Son-father Son-mother	*Lower* mobility in divorced families. *Lower* mobility in divorced families.
Bjorklund and Chadwick (2003)	Sweden	Total income and labour income	4 measures where the child's age ranges from 0 to 18 years.	Sons: 1 year Fathers: 2 years	Sons: 36 Fathers: 40	Son-father	Non-conclusive results.
Fertig (2004)	USA	Earnings, hourly wage and education	Number of years out of the 18 first years in intact, single or step family.	Children: 3-9 years Parents: 6-9 years	Sons: 29 Daughters: 28 Parents: 39	Son-father Son-mother Daughter-father Daughter-mother	*Higher* mobility in divorced families. Non-significant difference. *Higher* mobility in divorced families. Non-comparable across families.

Notes: * number of measures not quoted in the study.

4.3 Results

Peters' (1992) estimates regarding the "broken home" variable are not significantly different from zero. Consequently, she finds none statistically differences in earnings mobility between generations. This result applies for both sons and daughters, and for personal income as well as family income.

In the case of Couch and Lillard (1997), the income mobility estimates between fathers and sons show that sons from disrupted families are far less mobile compared to sons from intact families. This applies both to the separate and the pooled regressions. The estimates between mothers and sons are less significant, but the ones that are significant show the same patterns as between father and son, i.e. sons from disrupted families are less mobile than sons from intact families. When attained education is added as an explanatory variable, the mobility estimates are not significant different from zero. On the basis of these patterns the authors claim to provide evidence that reduced educational attainment is an important contributor to the high intergenerational mobility between parents and male offspring in divorced families. The overall results from the third type of analyses explored in the paper, i.e. transition matrices, confirm the theoretical predictions outlined in the paper; sons from divorced families whose fathers are from the lower third of the earnings distribution are less upwardly mobile than sons from intact families. Furthermore, sons from divorced families whose fathers are from the middle and upper third of the earnings distribution are more downwardly mobile compared to sons from intact families. Unfortunately these results are incomparable since none of the other papers address the issues of transitions matrices.

Fertig (2004) examines the intergenerational mobility with earnings, hourly wage and education as proxies for permanent income.[16] As far as earnings are concerned, the results indicate that the son-father and daughter-father income mobility is higher in disrupted than in intact families. When it comes to mothers, the estimations are not significantly different from zero regarding the son-mother income mobility. For daughters and mothers, the results are non-comparable between the family types because the estimates are not significant different

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[16] When applying hourly wage as proxy for permanent earnings, there is no statistically difference in income mobility between sons and fathers and sons and mothers in disrupted and intact families. Looking at education as the proxy, i.e. years of schooling, only a couple of the coefficients are significant. The results from these estimations give only some support to the quoted findings regarding the son-father mobility where earnings serve as the proxy.

from zero in intact families. When Fertig controls for the number of years spent in a disrupted family, the estimations reveal that the father-son, father-daughter and mother-daughter mobility are non-linear. Again, the mother-son mobility is insignificant. These estimations imply that the marginal effect of spending another year in an alternative family is diminishing on the mobility between sons and fathers, daughters and fathers, and daughters and mothers. In the regressions Fertig also separates between different types of disrupted families children grow up in. Estimates from these regressions show that sons with step family background are significantly more mobile with respect to both mothers and fathers as opposed to sons with single parenthood experience. The father-daughter income mobility increases significantly for daughters with step parent background as was the case for sons, but the effect is insignificant when it comes to the mother-daughter mobility.

Moving forward to Bjorklund and Chadwick (2003), they find divergence in the intergenerational income mobility when it comes to sons and fathers, but the results are overall non-conclusive. Estimations of the earnings elasticity show that the earnings mobility between sons and fathers in which the sons always lived with the biological father is slightly lower in relation to sons who only sometimes lived with the biological father. However, when investigating the differences between these groups, i.e. between (1), (2) and (3), the authors discover that the estimates are not statistically significantly different from each other. For sons who have never lived with their biological fathers, the estimates are generally insignificant. Furthermore, the authors have estimated the income mobility between sons and their non-biological fathers. The estimations show that the income mobility in general is much lower compared to the mobility between sons and biological fathers. Finally, the authors have allowed for non-linearity in the estimations by adding the square of father's average log earnings as an explanatory variable. The general pattern remains the same with the new variable although the sizes of the estimates vary.

Turning to Biblarz and Raftery (1993) the results from regressions on the extended SAT-model show that the socioeconomic status of the son's first destination for offspring from non-intact families is strongly reduced proportionately to the father's current occupation in comparison to sons from intact families. Furthermore, the association between the son's origin and first occupational destination weakens when sons come from disrupted families. When it comes to comparing the sons' origin and current occupational destination, the trends are similar; coming from a broken home reduces the socioeconomic status of the occupational

destination and weakens the interaction between the origin and destination. All the regressions are performed on sons with different origins and of different races and the results reveal no significant divergence between either origins or races. Generally these results imply that the intergenerational occupational mobility between fathers and sons is higher in disrupted families than in intact families. Consequently, the authors have been able to collect support for their hypothesis, i.e. that the association between socioeconomic origins and destination of sons is stronger for offspring of intact two-parent families than of disrupted families.

The last column in table 4.1 sums up the main findings of the studies. Considering the income mobility between sons and parents, the significant results are ambiguous. Only two of the studies have significant estimations regarding the son-mother mobility, whereas one report lower income mobility in disrupted families and the other report higher income mobility. However, examining the son-father mobility we see a clearer tendency in the results. Only Couch and Lillard depict lower income mobility in disrupted families while both Biblarz and Raftery, Bjorklund and Chadwick and Fertig uncover higher son-father mobility. When it comes to daughters and parents, only Fertig has investigated the income mobility. The results depict higher daughter-father mobility while the daughter-mother mobility is incomparable between the family types. Considering the mobility between children and parents as one unit, Peters' estimations are non-significant, and hence, the results regarding the family income are non-conclusive.

5. Design and methods

5.1 Design of the data samples

5.1.1 Information regarding the data material

The two data samples I have utilized consist of the 1960 and the 1970 birth cohorts and their respective mothers, fathers and siblings. The birth cohorts have been identified by censuses from 1960 and 1970 while the family compositions have partly been collected from the censuses and partly from family and demographics data. Administrative data concerning the family members were tracked by annual data series from 1986 to 2005. The amount of information available includes earnings, education type and length, labour market interactions etc. Information on earnings is based on tax records and is available from 1967 in separate annual series. All individuals can be traced across the different databases by a unique personal identification number which is encrypted by Statistics Norway. All information has been collected by Statistics Norway.

5.1.2 The children observed and their respective families

To analyze the effects of family dissolution during the children's adolescence on the intergenerational income mobility, the families need to be intact when the children are born. An intact family is defined as a family unit where the parents and children are recorded with the same family identification number, all family members reside in the same household and the parents are recorded as the children's biological mother and father.

This definition has both advantages and disadvantages. The primary advantage is that it does not limit the data to married parents with children, but include cohabiting parents with children. The main disadvantage with the definition is that non-biological children are excluded from the study. This is a shortcoming, but it is also necessary to apply such strict requirements to secure the reliability of the data since it is not possible to detect whether a child is adopted or if somebody is the guardian to a child. A child may also be living with another family temporarily and mistakenly be recorded as a son or daughter in that family. Consequently, including such individuals would deter the reliability of the data.

After the children's birth, the families are observed and their structure is identified at when the children are 10 and 20 years of age, respectively. This is mainly due to limitations in the data material between 1960 and 1980. More specifically, during this period only censuses

from 1960, 1970 and 1980 are available. This implies for the 1960 cohort, that the observation of the families is determined by the data material, i.e in the years 1970 and 1980. For the 1970 cohort, I am able to identify the families in year 1980 and from the year 1987, i.e. when the children are 10 years old and from the age of 17. However, in order to perform comparative statistics between the cohorts it is suitable to identify the family structure at the same time as for the 1960 cohort, i.e. in the years 1980 and 1990, respectively.

At the time of observation, the families are split into three types: (1) Intact families, (2) families disrupted due to divorce or separation and (3) families disrupted due to death of a parent. Of primary interest are the relations between intact and divorced families, but the disrupted families have been separated by the type of dissolution. The main reason for this is that it enables me to highlight the divorced families and reduce "noise" around the mobility measure. More specifically, in light of the theoretical framework on transmission of human capital, offspring of families which experience parental death may on average be worse off than divorced families because they only have one parent who can invest in their human capital as opposed to two parents in divorced families. As a consequence, the offspring's outcome and the intergenerational income mobility may differ between the disrupted families. If the family types are not split, the earnings mobility estimates would be an average of all disrupted families, and thus, the measure of divorced families would be lower precise. However, I do not exclude the families who have experienced parental death. Few economic studies have investigated the earnings mobility in these families so they are included to shed light on the results from divorced families and on the effect of family dissolution on the intergenerational income mobility.

The non-intact families have been divided further into (1) single parents and (2) step families. For the 1960 cohort, the stepfamilies include cohabiting parents when the intact families were disrupted due to divorce. When the disruption was caused by parental death the step families only include married couples. This applies for both the 1970 and 1980 family structure identification. As regards the 1970 cohort, the family structure identification in 1980 only consists of remarried couples, but when the family structure is observed in 1990 both remarried and cohabiting parents are included for both types of disrupted families. The motif for the separation between single parents and step families is the fact that offspring in step families may experience fewer changes in parental investment in human capital than single parent families due to the introduction of a new parent in the household. As a consequence, the outcome of the offspring and the income mobility may differ between single parents and step families. In addition, it is interesting to study whether the income mobility between the

biological parent and the offspring in step families is more equal to the earnings mobility in intact families than to single parent families.

Finally, the divorced families have been split according to the custodial status of the parents. The reason for doing so is to investigate whether offspring becomes more attached to the custodial parents, i.e. if the associations between offspring and parents deviate between custodial and non-custodial parents.

The reported limitations in the available data sets cause two shortcomings in the data samples. Firstly, because the family structure is measured late in the children's adolescence, i.e. when they are 20 years of age, a fraction of the children have most likely left the family residence.[17] Then, if the residence of the children during the dissolution of the family has effect on the children's outcome, that is, if the disruption of the family affects the offspring differently if they have left the family residence or are still living at home, it could create noise in the estimations of the intergenerational income mobility.

Secondly, it is not possible to pinpoint the exact year of dissolution. Wolf et al. (1996) find that single-year "window" variables may lead to biases and misleading results. Especially short-run proxies are vulnerable when it comes to measuring family structure and disruption. Based on these findings, the results of the analyses conducted in this study may to some extent be biased and distorted. However, it should be stressed that the family structure in this study has been measured three times during the child's adolescence. This is a substantial improvement compared to studies where the families' status is only measured once, and may improve the quality of the results.

5.2 Earnings

5.1.1 Information regarding observed earnings

Personal income is available in annual data series from 1967 to 2002. The income is total pensionable income, which is personal income reported in the Norwegian tax register. More specific, income that qualifies for pension consists of labour income, earnings from self-employment, benefits such as sick-leave payments and sickness benefit, rehabilitation benefits, benefits from birth and adoption, benefits when children are sick and unemployment

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[17] Norwegian children usually leave their family residence when they finish upper secondary school / high school at the age of 18 or 19.

benefits. Income that is not considered to qualify for pension is life annuity, support received after passing on one's estate and property to one's successor, undeclared labour income and capital income (National Insurance Act, 1997). The personal income is measured in log, and has been adjusted using the consumer price index with the year 2000 as base year.

5.2.1 Short run proxy

Following Solon (1992) I apply an average of parents' log income over several years to reduce the errors-in-variables bias which follows from the use of single-year income as proxy for lifetime earnings. In addition, I average the log income of the children over several years as proxy for their lifetime income to reduce the noise around the proxy and to improve the description of lifetime earnings.

The number of years to include in the short-run proxy is a trade-off between the desire to observe income for as many years as possible and the wish to analyze the generations at the same stage of their life cycle. Osterberg (2000) suggests that stabilization has elevated at a window of three years, but a survey of recent literature on the subject does not show convergence to such a universal measure. I follow Bratberg et al. (2005, 2007) and apply income from five subsequent years as the short-run proxy to reduce the noise around the proxy and make the depiction of lifetime income as superior as possible.

In all earning averages observations of zero income and missing observations are excluded. Some studies have revealed that the variation within estimations on earnings elasticity between parents and children are higher when zero income observations are included in the data sample (Bjorklund and Chadwick, 2003). Therefore, instead of including observation of missing or zero income, the observations are replaced by the average of the remaining non-zero observations in the five-year average. This is applied if either one, two or three out of the five years are missing or equals zero. If either four or all years of the observations are missing or equal zero, the person in question is excluded from the study. This approach is the line with previous research containing similar data, e.g. Osterberg (2000) and Bratberg et al. (2005). Finally, note that income of parents who have passed away is not included in the study. This sounds trivial, but it is in fact possible in some cases to observe their income, e.g. parents of the 1970 cohort who died between 1980 and 1990.

While there is no lower limit on the observation of earnings, the upper limit for parents is the age of 65. This implies that individuals older than 56 years for the 1960 cohort and older than 68 for the 1970 cohort when their children were born are excluded from the

study.[18] The official retirement age is 67 years, but a significant portion of the total labour force has the opportunity to retire earlier. Around the age of 65 there is a significant increase in the retirement age, and thus 65 is selected as the upper age limit.

5.2.2 Age at time of earnings observation

The optimal time to observe current earnings is the years in which current income equals lifetime earnings, implying that there is no life-cycle bias in the short run proxies.[19] However, the main purpose of this study is to depict *intra*-cohort and not *inter*-cohort differences in intergenerational income mobility between family types. The main concern is not the bias in itself, but rather the divergence in bias between family members across family types. Consequently, existing insights into the association between current and lifetime earnings and difference between gender and cohorts will only work as guidance when choosing the age interval at time of earnings observations for all family members. Table 5.1 displays the average of the selected age interval.

For sons and daughters born in 1970, the earnings of both sexes are observed at age 31 to 35. As the income series in the data samples end in 2005 the chosen years are the latest available. For the 1960 cohort, sons' earnings are observed at age 34 to 38 while daughters' earnings are observed at age 39 to 43. These years are selected on grounds of the discovered insights in literature on life cycle bias. In the case of sons, both Haider and Solon (2006) and Böhlmark and Lindquist (2006) suggest on grounds of estimates on the association between current and lifetime earnings, that life-cycle bias may not lead to inconsistent estimates of the earnings elasticity if sons' earnings are measured between the early thirties and mid forties. For daughters, analyses conducted by Böhlmark and Lindquist (2006) display significant life-cycle bias in all observed years and across cohorts of women. The main explanation behind this is that current income is an insufficient proxy for lifetime income when females are in the child-rearing phase of their lives. As a result, it is very complex to suggest any specific year interval where the life cycle bias is small for daughters.

For fathers, the average age in which the earnings are observed is 47.59 for the 1960 cohort and 47.29 for the 1970 cohort. For mothers, the average year of observation is 45.49 and 45.73 for the 1960 and 1970 cohort, respectively.

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[18] These specific age restrictions are applied since the annual income series starts in 1967.
[19] See chapter 2.2.4, page 14, for a survey of life-cycle bias.

Table 5.1: Average age at time of earnings observation.

	1960 birth cohort				1970 birth cohort			
	Intact families	Divorced families	Disrupted families	All families	Intact families	Divorced families	Disrupted families	All families
Sons	36.00	36.00	36.00	36.00	33.00	33.00	33.00	33.00
Daughters	41.00	41.00	41.00	41.00	33.00	33.00	33.00	33.00
Fathers	47.32	49.62	53.51	47.59	45.14	47.40	50.97	45.49
Mothers	47.05	47.04	51.23	47.29	45.59	45.85	49.03	45.73
Siblings	41.00	41.00	41.00	41.00	38.00	38.00	38.00	38.00
Fathers*	49.79	47.86	-	48.83	41.24	44.98	-	43.11
Mothers*	47.15	45.14	-	46.14	43.04	42.55	-	42.79

Notes: Earnings are observed over five consecutive years. The presented numbers are the averages of the five-year average for each family member. Offspring and siblings have the same biological parents, but the parents' earnings are observed at different ages. For parents who are marked with * the earnings observations are for the siblings' parents. The family structure is observed in 1980 for the 1960 birth cohort and in 1990 for the 1970 birth cohort for all family members except the siblings' parents when the families are divorced. For these specific families the family structure is observed in 1970 for the 1960 cohort and in 1980 for the 1970 cohort.

When separating the parents according to the family structure and when the disruption occurred, the average age in each family type deviates from 45 to 53 when rounded off. The explanation for this is that since the aim of the study is to analyze the effects of family dissolution on the intergenerational earnings mobility, the income of parents from disrupted families is observed after the dissolution has occurred.

In the case of parents to brothers and sisters of the 1960 cohort, the average year in which earnings is observed is 48.83 for fathers and 46.14 for mothers. For the 1970 cohort, the averages are 43.11 for fathers and 42.79 for mothers. Accordingly, the average age of earnings' observation is not that different from the averages from the observation belonging to the sons and daughters born in 1960 and 1970. Furthermore, studies by Böhlmark and Lindquist (2006) have investigated life cycle bias among women and men born approximately the same years as in my study. Their results suggest that life cycle bias for men are minimal at least up to the age of 55 years of age, and that for women the life cycle bias is minimized between the ages of 45 to 50 for all examined cohorts. Accordingly, it appears as the age of earnings observation is somewhat in line with the suggestions by Böhlmark and Lindquist.

Finally, for brothers and sisters of the 1960 cohort the age interval in which earnings are observed is 39 to 43. For siblings of the 1970 cohort the earnings are observed at age 36 to 40. These years are selected to ensure that the earnings of siblings, who are sisters and brothers to offspring which have experienced parental divorce, are observed before the year which the divorce took place.

5.3 Utilized methods

5.3.1 OLS regressions

To assess the intergenerational income mobility offspring's earnings are regressed on the parents' earnings as described by the statistical model pioneered by Solon (1992) and Zimmerman (1992).[20] Since lifetime earnings of either of the generations are available short run proxies equal to current income are utilized. The proxies are averaged over five consecutive years to reduce the amount of noise around the proxies, which apply to both offspring and parents. Furthermore, for parents, age profiles are added in the mobility equations because there are large age variations within each group, i.e. the parents' ages at time of income observation vary. In the case of children, there are no age variations within the cohorts as they are all born in the same year.

Both offspring and parents are separated by gender, which entails that there are four mobility "pairs" that are investigated in this study; the son-father income mobility, the son-mother income mobility, the daughter-father income mobility and the daughter-mother income mobility. For each mobility pair the earnings elasticity is estimated and the correlation coefficients are computed from the elasticities. To separate between the different families types the regressions are estimated over subsamples rather than pooling the model and using binary variables. The samples are divided into three groups; intact families, families disrupted due to divorce or separation and families disrupted due to death of one parent. Furthermore, both types of non-intact families have been split into single parents and step families, and the divorced families have been separated according to the custodial of the parents. The regressions are estimated over subsamples for these as well.

5.3.2 Transition matrices

In addition to the OLS regressions transition probabilities are computed and assembled in matrices to explore the intergenerational income mobility within the distribution of income. The income distribution of parents and offspring are divided into quartiles following Bratberg et al. (2005). Furthermore, the matrices are divided after child-parent mobility pair, family type, birth cohort and after time of family structure observation. For intact families this implies that that there are two transition matrices for each mobility pair per birth cohort; (1) families intact when the children are 0 to 10 years of age and (2) families intact when the

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[20] See chapter 2.2, page 8 for a detailed review of the statistical model.

children are 0 to 20 years of age. For disrupted families, there are three matrices for each mobility pair per birth cohort; (1) families are disrupted when the children are 0 to 10 years of age, (2) families are disrupted when the children are 10 to 20 years of age and (3) families are disrupted when the children are 0 to 20 years of age. For the divorced families, transition matrices are also computed when the households are separated between single and step families. Also here, three matrices per mobility pair are presented.

This form of splitting up the data samples lead to a large amount of matrices. In that respect an immobility index is calculated for each matrix to illustrate the amount of immobility or mobility. The index is merely a number that equals the sum of the diagonal and the adjutant transitions cells where a low number indicates a high degree of income mobility and vice versa.

5.3.3 Difference-in-difference regressions

If estimations on the statistical model indicate deviations in the intergenerational income mobility across family structure, estimations of the difference-in-difference model described in (2.42) will be performed. As in the case of OLS regressions, current earnings off all family members are utilized as short run proxy for lifetime earnings where the proxies are averaged over several consecutive years. In addition, the earnings of parents are age adjusted. Finally, the regressions are only performed between siblings and fathers and siblings and mothers because of the low number of siblings. Splitting the siblings into brothers and sisters may cause the samples to be excessively small.

An essential assessment is how many years the age difference between the siblings should encompass. The primary aspect is that the elderly sibling has moved out of the family residence and in principle made up his or her academic or occupational aims and ambitions. This is necessary to ensure that the elderly sibling is not affected by the divorce in the same manner as the younger sibling. It is reasonable to assume that if we observe the elderly sibling when he or she is in the 18th year the requirements should be met. To illustrate, this means that if a divorce occurs when the younger sibling is 1 years of age the age difference should be 17 years while if the younger sibling is 15 years of age an age difference of 3 years should be enough. However, in the data samples utilized in this study we are not able to observe the specific years in which the separations take place. We are only able to observe the family structure when the children are born, when they are 10 years of age and when they are 20 years of age. If one is to be curtain that the elderly sibling has moved out of the family

residence or made up his aims and ambitions for academic or occupational attainment the age difference should be 17 years if the separation is observed when the younger sibling is 10 years of age and 7 years when the separation is observed when the younger sibling is 20 years of age.[21] In relation to the year of birth, the elderly sibling of offspring born in 1960 must be born in 1943 when the divorce occurred between 1960 and 1970, and in 1953 when the divorce took place between 1970 and 1980. For siblings of offspring born in 1970, the figures are 1953 an 1963, respectively. These age restrictions will be utilized in the approach conditioned upon the number of siblings who satisfy the age restrictions.

It is possible to relax the requirements to some extent. In light of the human capital investment model the vital difference between the siblings is the fact that the younger sibling experience a downfall in human capital investment as a result of the divorce while the elderly sibling enjoys no downfall as the family is intact when he or she grows up. Hence, the elderly sibling may still be living at home at the time of divorce as long as the investment in his or her human capital has to a large extent been completed. In relations to the Norwegian school system, this entails when the children are enrolled in upper secondary school at the age of 15 or 16 years. When enrolled the children have already taken important decisions regarding their future as well as they in principal do not face any financial restrictions as they are in title of student loan from the government. On the basis of these arguments, the age difference could be relaxed to 15 years if the younger sibling is 10 years of age when the divorce is observed and 5 years if the divorce is observed when the younger sibling is 20 years of age. In relation to the year of birth, elderly siblings of offspring born in 1960 the year of birth must be 1945 when the divorce occurred between 1960 and 1970, and 1955 when the divorce took place between 1970 and 1980. For the siblings of offspring born in 1970, the figures equal 1955 and 1965, respectively. To assess whether or not the age difference has effect on the estimates the relaxation will be employed in addition to the strict requirements. Also here, the estimations are condition upon the number of siblings fulfilling the requirements.

5.3.4 Instrumental variables

The instrumental variables approach will not be utilized in this study because of unsatisfactory instruments. Regarding divorce laws, there are not recorded any regional law

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[21] For instance, if a divorce occurs when the younger sibling is 1 year of age the family structure is not observed before when the sibling is 10 years of age. At the time of observation one naturally thinks that an age difference of 8 years should be enough so the elder sibling is 18 years of age at time of observation. However, since the divorce took place 9 years before the time of observation, the elder sibling is only 11 years at the time of divorce. This leaves us with sever noise, and hence, the difference-measure may be imprecise.

implementations on marital dissolution in the post-war period in Norway as in the US. As this study utilize data samples from Norway this instrument is not possible to implement. For the sex of the first child, the data samples in my study display the opposite pattern to the discovered relationship in other studies, i.e. married parents face a higher probability for divorce if their first child is a boy. The results from the regressions of both cohorts are shown in table B.1 in Appendix B. In accordance with the hypothesis outlaid by Dahl and Moretti (2004), (1) Norwegian parents must either possess higher preferences for daughters than sons, which are the opposite to parents in other countries, (2) there must be more expensive to raise sons than daughters in Norway than in other countries or (3) fathers are more important to daughters than to sons during the childhood to the offspring relative to other countries to explain the prevailed results. However, I find no good arguments for either of the hypothesis. On an intuitive level, it is most unlikely that it is more expensive to raise sons than daughters in Norway. On average, it is most likely that the costs are dependent upon each individual and not the sex of the children itself. Furthermore, to suspect that fathers are more important to daughters than sons during the childhood would be pure speculative, and is therefore not of interest. Finally, there are no cultural or religious patterns in the Norwegian culture or society that indicates that Norwegian parents prefer daughters to sons. If we look upon the issue historically, we find that sons were preferred to daughters because of their high status in the society. However, in the postmodern society, Norway is a country with high degrees of equal opportunities for both sexes where it is more likely that the preferences are equally distributed and at least not in favour of daughters. As a result, I do not find on a scientific or intuitive level any satisfactory explanations to the discovered pattern, and the sex of the first child cannot serve as an instrument.

6. Description of data

The main variables in this study are individual earnings to all family members, age variables and variables depicting the family structure during the children's adolescence. In this chapter they will be presented by first exploring the families observed. I will scrutinize the offspring, the identification and observation of their families and at last the sex of the mothers' first born child. Then, I explain how the earnings are observed and display earnings averages of all family members. For a complete description of utilized variables in the analyses for both birth cohorts, see table B.2 in the Appendix B.

6.1 Observation of families

6.1.1 Children

The 1960 cohort consists of 50 633 children and the 1970 cohort consist of 53 773 children. Nearly 40 % and 30 % of the children were excluded during the preparation of the data samples, and thus the final size of the cohorts is 28 023 and 38 691 children, respectively. Table 6.1 sums up the sources of exclusion. As the table displays, the main reason for exclusion from the data sets is caused by missing income of the children or either of their parents. Problems during the identification of family structure also caused a large reduction in the size of the cohorts. Regarding differences between sons and daughters, we see that the number of offspring missing personal income is largest among daughters.

Table 6.1: Summary statistics of the birth cohorts' size.

	1960 birth cohort		1970 birth cohort	
	Sons	Daughters	Sons	Daughters
Total cohort size	25 939	24 694	27 777	25 996
Excluded due to missing vital information	821	748	342	352
Excluded due to problems with family structure identification	2 167	2 186	3 560	3 237
Excluded due to missing personal income	818	1 488	954	1 103
Excluded due to missing income of mothers and fathers	7 523	6 859	2 820	2 714
Final cohort size	14 579	13 497	20 101	18 590
Total cohort size	28 076		38 691	

Notes: Vital information includes variables such as personal identification number, mothers and fathers personal ID, birth date etc.

6.1.2 Families

After the children's birth, the families are observed and their structure is identified when the children are 10 and 20 years of age. The families of the 1960 birth cohort are identified using the 1970 and 1980 censuses while the families of the 1970 birth cohort is identified using the 1980 census and family and demographics data from 1990. At the times of observation the families are split into intact families, divorced families and families disrupted to death of one parent. Table 6.2 and 6.3 depict the distribution of the families at the time of observations after family type. We see that for both cohorts the family dissolution increase over time, which applies to both types of dissolution, and that the number of disrupted families is relatively larger for the 1970 cohort than for the 1960 cohort. Also, the number of disrupted families due to divorce or separation is larger than the number of families disrupted due to parental death. This is however most prominent for the 1970 cohort. Finally, the fraction of single parents is substantially higher than the fraction of step families, which applies for both cohorts at every point of family structure identification.

Table 6.2: 1960 birth cohort. Distribution of families during children's adolescence.

	Family structure observed in 1960	Family structure observed in 1970	Family structure observed in 1980
Intact families	27 847	26 690	23 924
Families disrupted due to divorce or separation		585	1 886
Single parents		441	1 505
Step families		144	381
Families disrupted due to death of a parent		572	2 037
Single parents		572	1 965
Step families		-	72
Total number of families	27 847	27 847	27 847

Notes: The displayed number of disrupted families includes parents that are cohabiting with the children. Parents that are not cohabiting with the children are not included in the table.

Table 6.3: 1970 birth cohort. Distribution of families during children's adolescence.

	Family structure observed in 1970	Family structure observed in 1980	Family structure observed in 1990
Intact families	38 373	35 474	31 851
Families disrupted due to divorce or separation		2 386	4 978
Single parents		1 949	3 902
Step families		437	1 076
Families disrupted due to death of a parent		513	1 544
Single parents		513	1 517
Step families		-	27
Total number of families	38 373	38 373	38 373

Notes: The displayed number of disrupted families includes custodial parents. Non-custodial parents are not included in the table.

Parents who have experienced marital dissolution are also separated by their custodial status. The distribution of custody is displayed in table 6.4 and 6.5 where the custody of all divorced families is identified except for the observation in 1980 of the 1960 cohort. The tables show that mothers are overrepresented as the custodial parent, and that this is most striking for the 1960 cohort. For both cohorts it appears as fathers in families where the divorce occurred when the children was between 10 and 20 years are more frequently the custodial parent than in families where the divorce took place when the children were between 0 and 10 years.

Table 6.4: 1960 birth cohort. Distribution of custodial parents.

	Family structure observed in 1970			Family structure observed in 1980		
	Fathers	Mothers	*N*	Fathers	Mothers	*N*
Families disrupted due to divorce or separation						
Single parents	36	405	441	323	892	1 215
Step families	11	133	144	83	262	345
Families disrupted due to divorce or separation						
Single parents	0.08	0.92	441	0.27	0.73	1 215
Step families	0.08	0.92	144	0.24	0.76	345

Notes: The distribution is displayed both in absolute size and in percent.

Table 6.5: 1970 birth cohort. Distribution of custodial parents.

	Family structure observed in 1980			Family structure observed in 1990		
	Fathers	Mothers	*N*	Fathers	Mothers	*N*
Families disrupted due to divorce or separation						
Single parents	209	1 740	1 949	978	2 924	3 902
Step families	49	388	437	221	855	1 076
Families disrupted due to divorce or separation						
Single parents	0.11	0.89	1 949	0.25	0.75	3 902
Step families	0.11	0.89	437	0.21	0.79	1 076

Notes: The distribution is displayed both in total size and in percent.

The process of identifying the family types resulted in delimitations in the number of observed families because of limitations in the data material. The main problem is that it is only in the censuses from 1960 and 1970 that there exist a unique family number. The numbers are comprehensive to identify intact families at time of birth, i.e. in 1960 for the 1960 cohort and 1970 for the 1970 cohort, but they are too imprecise to follow the development of the family structure unaccompanied by other variables. Therefore, to identify the family structure in 1970 for the 1960 cohort variables such as marital status and marital length of the parents were utilized. In the other years of observation, i.e. 1980 and 1990, only a household identification number exist so even more variables were necessary. Variables utilized to assemble families in 1980 were the number of individuals in a family, the municipality of residence, a variable indicating whether the residence was in an urban or rural community, the contact person in family, the marital status of the parents, a personal status code, a variable indicating the type of family and two self constructed variables indicating if a person was dead by 1980 and a cohabit variable indicating if a child in a disrupted family was living with the mother or the father. The variables used in 1990 were a personal identification number of spouse, a personal status code, the marital status of the parents, a personal identification number of reference person in the family, a couple identification number and the equivalent self constructed variables for 1990. Consequently, the high amount of variables used to sort the families, lead to delimitations in the data sample. If the information regarding one of the family members was too insufficient related to the listed variables, i.e. information that made it impossible to determine the development of the family structure, not only the family member with the inadequate information was excluded from the study, but the *entire* family. This is necessary since the intergenerational mobility analysis is based on pairs across the two generations. There is one exception; if not all children or siblings in one family are

missing vital information, it is still possible to perform the analysis between the remaining family pairs.

6.1.3 Siblings to birth cohorts

The number of elderly siblings that fulfil the age requirements imposed by the difference-in-difference model is considerable low in the divorced families.[22] When the families were divorced during the first ten years of the offspring's lives, the total number of siblings for the 1960 cohort equals 1 when the strict constraint is applied and 0 when the relaxed constraint is applied. For the 1970 cohort the numbers are 10 and 24, respectively. When the divorce occurred between the age of 10 and 20, the number of siblings to offspring born in 1960 is 119 with the strict constraint and 263 with the relaxed constraint, and 285 and 564 for the 1970 cohort, respectively. In percentage, approximately only 4 % of the siblings are not situated in the always-intact families, which apply to both sets of constraints. Table B.3 and B.4 in Appendix B display the total amounts according to the siblings' birth year.

6.2 Earnings

6.2.1 Observed earnings

Statistics of the short run proxy for lifetime earnings, i.e. the average earnings of five consecutive years, are displayed in table 6.6. The table shows that sons have the highest mean of average followed by fathers, daughters and mothers in that order. Across the cohorts, the mean is approximately similar for all family members where the deviation between the cohorts is most prominent for mothers. There are also some gender differences where mothers have considerably lower mean of earnings average than fathers. This applies also for sons and daughters, but it is less prominent among the offspring. Furthermore, there are some differences between the generations within the same sexes. Most noteworthy is the fact that sons earn more than their fathers, while daughters' earnings are even more superior to the mothers' earnings. Finally, we note that the earnings of mothers are considerable more scattered across the earnings distribution than the other family members.

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[22] See chapter 5.3.3, page 45 for the discussion around the age difference between siblings.

Table 6.6: Descriptive statistics of earnings. All observed families.

	1960 birth cohort				1970 birth cohort			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons								
Five-year earnings average	12.44	0.67	6.22	15.80	12.57	0.61	7.21	15.17
Age interval	36.00	1.41	34.00	38.00	33.00	1.41	31.00	35.00
N		*14 579*				*20 101*		
Daughters								
Five-year earnings average	12.15	0.74	6.69	15.34	12.10	0.73	3.56	14.56
Age interval	42.00	1.41	40.00	44.00	33.00	1.41	31.00	35.00
N		*13 497*				*18 590*		
Fathers								
Five-year earnings average	12.30	0.56	6.11	14.24	12.39	0.62	5.57	14.88
Average age interval	47.59	2.12	40.00	63.00	45.49	1.89	33.00	63.00
Year of birth	1929.56	5.66	1912	1943	1940.90	5.93	1912	1953
N		*26 235*				*37 781*		
Mothers								
Five-year earnings average	11.20	1.09	5.30	13.41	11.61	0.94	5.32	13.85
Average age interval	47.29	2.26	35.00	63.00	45.73	1.67	38.00	63.00
Year of birth	1932.90	5.19	1914	1944	1943.77	4.96	1922	1954
N		*27 422*				*38 643*		

Notes: All earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is measured.

6.2.2 Earnings across family types

Table 6.7 displays the five-year earnings average divided into quartiles and after family type. Table B.5 to B.10 in Appendix B display statistics of sons' and daughters' five-year earnings average for both cohorts along with their fathers' and mothers' five-year average of log earnings, average age interval and year of birth separated by family type. Regarding the divorced families, the tables show that for all members except the mothers possess on average lower earnings than members of intact families. The pattern is most prominent for the 1970 cohort when the mean of the five-year earnings average are compared between the family types. The quartile earnings table also depict that sons, daughters and fathers seem to cluster in the lower quartile in divorced families as opposed to the highly equal distribution of family members in intact families. In the case of mothers, divorced women earn on average noticeable more than married women. The difference is exceptionally prominent when the earnings are observed within the distribution of income where divorced women tend to cluster substantially more in the upper quartile than married women. Contrary to the other family members this tendency is stronger for the 1960 cohort. Finally, it seems as

the time of disruption has some effect on the earnings of all family members. The differences are most striking for parents, in which of the five-year earnings average is lowest when the marital dissolution occurred before the offspring where 10 years of age. This applies to both birth cohorts.

Exploring the families disrupted due to parental death we see the same tendencies as for the divorced families; family members who have experienced death of one parent earn on average less than member of intact families. This does not only apply for sons, daughters and fathers, but mothers as well. The quartile earnings table shows that all family members seem to cluster in the lower quartile compared to members of intact family where the pattern is most prominent for mothers. This is a significant divergence to divorced mothers who are overrepresented in the other end of the distribution, i.e. in the upper quartile. Furthermore, when separating the time of death to before or after the offspring are 10 years of age, the earnings average of mothers and fathers is substantially lower if the time of death occurred before the age of 10. For offspring, the earnings average seems to be independent to the time of death. This is the same trend as we discovered for divorced families. Finally, when compared the mean of the earnings average and the movements along the earnings distribution between the two disrupted families there does not seem to be any unambiguous pattern.

6.2.3 Earnings of siblings and their parents

In general, we do not observe the same difference in earnings between siblings in intact and divorced families as for the other family members. The deviation between the family types alters with the constraints and the birth cohorts. Furthermore, for both cohorts, the earnings average of sibling lies between those of sons and daughters, which is to expect as the sexes of the siblings are pooled into one group. Finally, for the parents, the earnings average lies close to those of offspring's parents.[23] Statistics of five-year earnings average, average of age interval and year of birth for full siblings and parents are displayed in tables B.11-B.14 in Appendix B.

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[23] We note that the siblings' parents are the same ones as the offspring's parents.

Table 6.7: Summary statistics of five-year earnings average across family types.

	1960 birth cohort			1970 birth cohort		
	Intact families	Disrupted due to divorce	Disrupted due to death	Intact families	Disrupted due to divorce	Disrupted due to death
Sons						
Lower quartile	0.24	0.33	0.29	0.23	0.34	0.31
Lower middle quartile	0.25	0.24	0.24	0.25	0.24	0.26
Upper middle quartile	0.25	0.23	0.24	0.26	0.21	0.25
Upper quartile	0.26	0.20	0.23	0.26	0.21	0.18
N	*12 489*	*996*	*1 039*	*16 668*	*2 645*	*788*
Daughters						
Lower quartile	0.25	0.28	0.27	0.24	0.29	0.25
Lower middle quartile	0.25	0.25	0.27	0.25	0.26	0.20
Upper middle quartile	0.25	0.21	0.24	0.25	0.23	0.16
Upper quartile	0.25	0.25	0.22	0.26	0.21	0.16
N	*11 628*	*905*	*912*	*15 445*	*2 375*	*770*
Fathers						
Lower quartile	0.24	0.32	0.31	0.24	0.33	0.38
Lower middle quartile	0.25	0.22	0.32	0.26	0.21	0.25
Upper middle quartile	0.25	0.23	0.20	0.26	0.22	0.17
Upper quartile	0.25	0.24	0.16	0.25	0.24	0.21
N	*11 466*	*1 877*	*318*	*32 113*	*4 954*	*345*
Mothers						
Lower quartile	0.25	0.11	0.35	0.26	0.17	0.41
Lower middle quartile	0.26	0.14	0.22	0.27	0.15	0.23
Upper middle quartile	0.26	0.23	0.19	0.25	0.27	0.18
Upper quartile	0.23	0.52	0.24	0.23	0.41	0.17
N	*11 466*	*1 877*	*1 603*	*15 445*	*4 954*	*1 213*

Notes: Earnings are level earnings. Family structure is observed when the children are 20 years of age, which is in 1980 for the 1960 cohort and in 1990 for the 1970 cohort.

7. Results

The presentation of the results and the following discussion and interpretation of the results are divided into two chapters. In this chapter the results are presented while the next chapter contains the discussion.

7.1 Results from OLS regressions

7.1.1 Intact families

Table 7.1 presents estimations of the income elasticity between parents and offspring in intact families. All estimates are highly significant, and they indicate that the elasticity between fathers' and children's earnings is substantially higher than the elasticity between mothers' and children's earnings. This implies that there is considerable lower income mobility between fathers and children than between mothers and children. Furthermore, comparing the estimates at different stages in the children's adolescence, the small deviations that exist suggest that the earnings mobility is somewhat smaller when the family structure is observed when the offspring are 20 years of age and not 10. Comparing the birth cohorts, we see that the elasticities with respect to fathers are higher for the 1960 cohort than for the 1970 cohort while it is opposite for the estimates concerning the mothers. This applies to both sons and daughters.

Finally, the computed correlation coefficient deviates noticeably from the estimated mobility elasticities.[24] The pattern is similar across the cohorts where the correlation coefficients are smaller than the estimated elasticities regarding offspring and fathers and larger regarding offspring and mothers. This arises because the variance of fathers' earnings is larger than the variance of offspring's earnings, i.e. $var(y_{1i}) < var(y_{0i})$, which implies that $\rho > \beta$, and the opposite in the case of mothers and offspring; $var(y_{1i}) > var(y_{0i})$, implying that $\rho < \beta$.[25]

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[24] In the further presentation of the results I will merely account for the estimated elasticities. If the correlation coefficients are commented it is on grounds of large and systematic deviations between the measures.

[25] See chapter 2.2, page 8 for a detailed review of the relationship between β and ρ.

Table 7.1: Results from OLS regressions for intact families.

	1960 birth cohort		1970 birth cohort	
	Families intact 1960-1970	Families intact 1960-1980	Families intact 1970-1980	Families intact 1970-1990
Son-father mobility				
β	0.195***	0.202***	0.125***	0.130***
ρ	0.159	0.160	0.125	0.126
sd(β)	(0.011)	(0.011)	(0.007)	(0.008)
N	13 341	12 489	18 138	16 668
Son-mother mobility				
β	0.035***	0.032***	0.046***	0.051***
ρ	0.057	0.053	0.073	0.081
sd(β)	(0.005)	(0.005)	(0.005)	(0.005)
N	13 786	12 489	16 854	16 668
Daughter-father mobility				
β	0.130***	0.138***	0.119***	0.129***
ρ	0.096	0.097	0.098	0.103
sd(β)	(0.012)	(0.013)	(0.009)	(0.010)
N	12 411	11 628	18 406	15 445
Daughter-mother mobility				
β	0.041***	0.041***	0.079***	0.080***
ρ	0.060	0.059	0.103	0.105
sd(β)	(0.006)	(0.006)	(0.006)	(0.006)
N	12 798	11 628	17 102	15 445

Notes: *** significant at 1 %, ** significant at 5%, * significant at 10%. The correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is a five-year average of log earnings. For the 1960 cohort the average of the age at time of the earnings observation is 36 for sons, 42 for daughters, 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

Table 7.2: Results from OLS regressions for disrupted families due to divorce and separation.

	1960 birth cohort			1970 birth cohort		
	Families divorced in the period 1960-1970	Families divorced in the period 1970-1980	All divorced families	Families divorced in the period 1970-1980	Families divorced in the period 1980-1990	All divorced families
Son-father mobility						
β	0.045	0.145***	0.123***	0.051**	0.098***	0.080***
ρ	0.042	0.161	0.130	0.060	0.130	0.100
$sd(\beta)$	(0.060)	(0.034)	(0.030)	(0.024)	(0.020)	(0.016)
N	*312*	*684*	*996*	*1 296*	*1 349*	*2 645*
Son-mother mobility						
β	-0.032	0.114***	0.064***	0.028	0.024	0.029**
ρ	-0.040	0.134	0.077	0.037	0.034	0.039
$sd(\beta)$	(0.044)	(0.031)	(0.025)	(0.022)	(0.018)	(0.014)
N	*312*	*684*	*996*	*1 296*	*1 349*	*2 645*
Daughter-father mobility						
β	0.081	0.082***	0.082***	0.060**	0.056**	0.063***
ρ	0.078	0.095	0.090	0.064	0.064	0.070
$sd(\beta)$	(0.063)	(0.034)	(0.030)	(0.027)	(0.025)	(0.018)
N	*278*	*627*	*905*	*1 107*	*1 268*	*2 375*
Daughter-mother mobility						
β	0.183***	0.049	0.098***	0.086***	0.100***	0.097***
ρ	0.233	0.060	0.122	0.101	0.121	0.116
$sd(\beta)$	(0.048)	(0.034)	(0.028)	(0.025)	(0.024)	(0.017)
N	*278*	*627*	*905*	*1 107*	*1 268*	*2 375*

Notes: *** significant at 1 %, ** significant at 5%, * significant at 10%. The mobility elasticity β is estimated by running separate regressions for each family type, and the correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is five-year average of log earnings. For the 1960 cohort the average of the age at the time of earnings observation is 36 for sons, 42 for daughters 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

7.1.2 Families disrupted due to divorce and separation

Regressions show considerable divergence in the intergenerational income mobility when the family structure is disrupted. Estimated elasticities between parents and offspring in divorced families are depicted in table 7.2 for both cohorts. Regarding fathers and offspring the tendency is clear; when parents separate or get divorced before the children are 20 years of age, the estimated elasticities between fathers and children indicate that the son-father and daughter-father earnings mobility are higher in divorced families than in intact families. Furthermore, the income mobility between mothers and sons deviates in the opposite direction, i.e., the displayed results indicate lower son-mother earnings mobility in divorced families than in intact families. This pattern is most obvious for the 1960 cohort while for the 1970 cohort the estimates are only significant when all divorced families are observed together, i.e. the families are not split according to the time of divorce. Finally, for mothers and daughters all estimates are highly significant and display lower daughter-mother income mobility in divorced families compared to intact families. This applies for both birth cohorts.

Deviations in the size of the estimates are ambiguous as they differ between the family pairs and with the time of the family structure observation. However, on average, it seems that the differences are smaller for mothers and offspring than for fathers and offspring born in 1960. For the 1970 cohort it is opposite, that is, the differences in elasticity between intact and divorced families are smaller for mothers and offspring than for fathers and offspring.

7.1.2.3 Separating between single parents and step families

The divorced families have been split into single parents and step families, and the results from the estimations are displayed in table C.1.1 in Appendix C. For the few significant estimates regarding the 1960 cohort, the son-father and daughter-father income mobility is higher and the son-mother and daughter-mother mobility is lower in both single parent and step families compared to intact families. Furthermore, when comparing single parent families to step families, the earnings mobility is lower in step families than in single parent families in all significant cases. This pattern is partly supported by the estimations from the 1970 cohort; when the divorce occurred between 1980 and 1990 then sons are less mobile with respect to fathers in step families than in single parent families. However, when the families are not split according to time, i.e. when the divorce occurred between 1970 and 1990, the tendency is reversed, i.e. higher son-father mobility in step families than in single parent families.

7.1.2.4 Separating according to the custody

When the divorced families are separated according to which parent who has the custody of the children, the estimated mobility elasticities deviate substantially within the divorced families. The results are displayed in table C.1.2 in Appendix C. When fathers have the custody of the children the only significant estimates are between sons and fathers where the estimations show that the son-father income mobility is higher when the male offspring are living with their fathers than with their mothers.[26] This result applies for both cohorts, but the pattern is most prominent for the 1970 cohort. When mothers are in custody of the children, the son-father income mobility is higher and the daughter-father mobility is lower in disrupted than in intact families for both cohorts, while the son-mother and daughter-father income mobility deviates between the cohorts when the family types are compared.

7.1.2.5 Families disrupted due to parental death

Results from regressions regarding families who experienced death of one parent during the children's adolescence are displayed in table 7.3. For the earnings elasticity between fathers' and sons' earnings, the findings are ambiguous for the 1960 cohort. When exploring all cases of parental death between 1960 and 1980 the mobility is marginal higher in disrupted families, but when the time intervals are split according to time the earnings mobility deviates between the family types. For the rest of the mobility pairs, i.e. son-mother, daughter-mother and daughter-father, all significant estimates indicate that the earnings mobility is lower in disrupted families than in intact families.

For the 1970 cohort, the income mobility between sons and fathers, sons and mothers and daughter and mothers are not significant different between intact families and families disrupted due to parental death. As regards the daughter-father mobility, the estimations depict ambiguous results according to the time of death, but when all disrupted families are observed the estimates indicate higher daughter-father mobility.

When the disrupted families are separated between single parents and step families, few of the estimates are significant different from zero. The estimates that are significant are fairly similar to the estimates when the disrupted families are not separated. Finally, the number of step families is severely low, especially for the 1970 cohort. The results are displayed in table C.1.3 in Appendix C.

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[26] The low number of significant estimates can be attributed to the small samples of father-headed households among divorced families.

Table 7.3: Results from OLS regressions for disrupted families due to parental death.

	1960 birth cohort			1970 birth cohort		
	Families disrupted in the period 1960-1970	Families disrupted in the period 1970-1980	All disrupted families	Families disrupted in the period 1970-1980	Families disrupted in the period 1980-1990	All disrupted families
Son-father mobility						
β	0.404**	0.177**	0.201***	-0.103	0.053	0.002
ρ	0.421	0.194	0.228	-0.149	0.066	0.003
sd(β)	(0.174)	(0.084)	(0.074)	(0.098)	(0.064)	(0.052)
N	55	168	223	41	121	162
Son-mother mobility						
β	0.112***	0.081***	0.092***	0.054	0.022	0.032
ρ	0.194	0.127	0.152	0.081	0.037	0.053
sd(β)	(0.035)	(0.024)	(0.019)	(0.043)	(0.031)	(0.024)
N	258	613	871	237	389	626
Daughter-father mobility						
β	0.266**	0.110	0.168***	0.021	0.140**	0.102*
ρ	0.267	0.113	0.173	0.031	0.144	0.117
sd(β)	(0.127)	(0.079)	(0.067)	(0.096)	(0.068)	(0.056)
N	52	156	208	42	141	183
Daughter-mother mobility						
β	0.033	0.077***	0.058***	0.083*	0.041	0.047
ρ	0.056	0.112	0.091	0.127	0.057	0.069
sd(β)	(0.039)	(0.029)	(0.023)	(0.049)	(0.039)	(0.030)
N	213	543	756	198	389	587

Notes: *** significant at 1 %, ** significant at 5%, * significant at 10%. The mobility elasticity β is estimated by running separate regressions for each family type, and the correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is five-year average of log earnings. For the 1960 cohort the average of the age at the time of earnings observation is 36 for sons, 42 for daughters 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

7.2 Results from transition matrices

7.2.1 Intact families

The results show that the earnings mobility between offspring and parents in intact families varies over the income distribution. The main tendency is that when parents are located in either of the two middle quartiles of their group's income distribution the offspring are highly mobile with respect to both mothers and fathers. When the parents are situated in either the lower or upper quartile of the income distribution, the offspring are far lower mobile with regard to their parents, especially for the wealthiest families. Finally, the transition matrices regarding the 1970 cohort show that the income mobility patterns are by far equal to those of the 1960 cohort. All of the transition matrices for intact families are displayed in tables C.2.1.1-C.2.1.16 in Appendix C.

7.2.2 Families disrupted due to divorce

The results indicate that offspring of divorced parents tend to end up lower in the income distribution than their parents compared to offspring in intact families. This implies that the income mobility between parents and offspring is higher for all divorced families not situated in the lowest quartile compared to intact families. For the families located in the lower quartile, the income mobility is lower in divorced families. Furthermore, it should be noted that the downward tendency is in most cases quite substantial. The offspring of the disrupted families do not only tend to move downwards through the income distribution, but cluster in the lowest quartile regardless of the parents' position in the distribution.

If we scrutinize the different mobility pairs, the downward pattern is most prominent for fathers and offspring. This applies to both birth cohorts. When it comes to the mothers, the son-mother income mobility follows the same trend, but in addition, we observe large deviations according to the time of divorce. Finally, for daughters and fathers, the differences between the family types are small, but when the families are split according to when the divorce occurred, i.e. before or after the offspring are 10 years of age, then there are large and unsystematic deviations between the family types. The transition matrices for the divorced families are located in Appendix C in tables C.2.2.1-2.2.24.

7.2.2.3 Separating single parents and step families

When the divorced families are separated into single parents and step families the computed transition probabilities display no decisive pattern for any of the child-parent mobility pairs across cohorts or time. However, when the two cohorts are viewed collectively there is a vague tendency for offspring in step families to be less downward mobile through the income distribution than offspring in intact families. In addition, it appears as offspring in step families are somewhat less disadvantaged than offspring in single parent families. The transition matrices are displayed in tables C.2.2.25-C.2.2.40 in Appendix C.

7.2.3 Families disrupted due to death of one parent

In general, the results regarding the 1960 cohort indicate that offspring tend to end up lower in the income distribution conditioned upon their parents' location compared to offspring of intact families, i.e. downward mobility. The pattern is prominent for all but the son-father mobility pair and when the parents are situated in all but the higher middle quartile. In the two quoted cases the results are ambiguous, and hence, no pattern can be stated. For the 1970 cohort, the results are more uniform where the main tendency is that offspring are situated lower than their parents in the income distribution. In addition, the results deviate substantially when the families are split according to whether the death occurred before or after 1980.

As regards the income mobility, the matrices indicate that the mobility between the generations is lower than in intact families whenever the parents are located in the lower quartile and higher when the parents are positioned in the upper quartile. When parents are situated in any of the middle quartiles the mobility pattern deviates substantially between the mobility pairs and between the cohorts. The transition matrices are displayed in tables C.2.3.1-C.2.3.20 in Appendix C.

7.2.4 Immobility index

The immobility indexes indicate that the average income mobility in the transition matrices is higher in divorced families than in intact families. This applies to all mobility pairs and for both birth cohorts. For families disrupted due to parental, the trend is opposite, i.e. lower income mobility than in intact families. This applies to all of the family pairs across the

cohorts, except the daughter-mother mobility for the 1960 cohort and the son-mother mobility for the 1970 cohort. Table 7.4 displays the immobility indexes for both birth cohorts.

Table 7.4: Computed immobility indexes.

	1960 birth cohort			1970 birth cohort		
	Intact families	Divorced families	Families disrupted due to death	Intact families	Divorced families	Families disrupted due to death
Son-father	2.87	2.69	2.58	2.82	2.70	2.86
Daughter-father	2.75	2.67	2.99	2.78	2.73	2.96
Son-mother	2.60	2.54	2.69	2.64	2.58	2.63
Daughter-mother	2.66	2.63	2.76	2.72	2.69	2.75

Notes: The family structure is observed in 1980. An index of 2.5 implies perfect mobility while an index of 4 implies perfect immobility.

7.3 Results from difference-in-difference regressions

Estimates of the siblings-father income mobility and the siblings-mother income mobility for intact and divorced families are displayed in table 7.5. For intact families, only three of the elasticity estimates are significant different from zero; the siblings-father mobility for the 1970 cohort for both sets of constraints and the siblings-mother mobility for the 1960 cohort when the relaxed constraint is applied.[27] All of the significant elasticity estimates are negative. Per definition, negative child-parent income mobility implies that if the parent is situated above the mean of income the child are situated somewhere beneath the mean, and vice verse. This observed pattern is not as expected nor does it make any sense. It may be a result of the identifying assumptions in the model, which will be discussed in length in chapter 8.3. The interaction terms for the divorced families are not different from zero when either of the constraints is applied for either of the cohorts. This implies that the earnings mobility of divorced families is not different from intact families. We note that the number of divorced families is substantially small compared to the number of intact families.

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[27] For a description of the difference-in-difference model and the specific constraints see chapter 2.5.1, page 18.

Table 7.5: Results from difference-in-difference regressions.

	1960 birth cohort		1970 birth cohort	
	Strict constraint	Relaxed constraint	Strict constraint	Relaxed constraint
Siblings-father mobility				
Intact families (β)	0.036	-0.004	-0.051***	-0.026**
sd (β)	(0.027)	(0.020)	(0.017)	(0.013)
Divorced families (γ)	0.067	0.071	0.066	-0.000
sd (γ)	(0.099)	(0.066)	(0.056)	(0.043)
N	*7 154*	*12 624*	*16 230*	*26 286*
Siblings-mother mobility				
Intact families (β)	-0.019	-0.022**	-0.000	-0.004
sd (β)	(0.014)	(0.022)	(0.008)	(0.006)
Divorced families (γ)	-0.051	0.066	0.088	0.057
sd (γ)	(0.208)	(0.058)	(0.074)	(0.049)
N	*7 154*	*12 624*	*16 230*	*26 286*

Notes: *** significant at 1 %, ** significant at 5%, * significant at 10%. The regressions are estimated with OLS and with the use of dummy variables for divorced families. The intact families are observed between 1960 and 1980 while the disrupted families are reported to be divorced between 1970 and 1980. The strict constraint implies that the siblings are born before 1953 for the 1960 cohort and before 1963 for the 1970 cohort. The relaxed constraint implies that the siblings are born before 1955 for the 1960 cohort and before 1965 for the1970 cohort. The numbers of divorced families that fulfil the strict restriction are 119 and 185 for the 1960 and 1970 cohort, respectively. When the relaxed constraint is applied 263 and 564 divorced families are included for the cohorts, respectively.

8. Discussion

In this chapter I discuss the results by family structure; intact families, divorced families and finally families disrupted due to death. The main interest is the divorced families, but the family types are separated to maintain a certain level of perspective and organization. Finally, I discuss whether the results can be driven by selection.

8.1 Intact families

8.1.1 OLS regressions

In general, the regressions show that the income mobility between children and fathers is lower than between children and mothers. This applies to both cohorts. In addition, sons are less mobile with respect to fathers than daughters while the opposite apply for mothers, i.e. higher son-mother income mobility than daughter-mother mobility.

Of the studies on intergenerational income mobility Bratberg et al. (2005) is one in a few that utilizes the framework adapted by Solon (1992) to assess son-father and daughter-father mobility patterns in Norway. They use the same data material collected by Statistics Norway and partly the same cohorts as in my regressions, thus the earnings characteristics are approximately similar across the studies. The main difference between the studies is the fact that Bratberg et al. do not differ between family structures, but as the size of their cohorts is most similar to those of the intact families it is most relevant to compare their results to those of the intact families. In general, the results are very similar. The estimated mobility elasticities for the 1960 cohort between daughters and fathers are almost identical. Regarding sons, my estimations reveal higher mobility than Bratberg et al. Interestingly, their elasticities do not differ between the sexes of offspring as my regressions reveal. Finally, they find the same decline in son-father and daughter-father income mobility over time as I observe. They uncover the pattern for the 1950 and 1960 cohorts while I find it for the 1960 and 1970 cohorts.

8.1.2 Transition matrices

Transmission matrices concerning intact families show that the income mobility between offspring and parents varies across the income distribution for both cohorts. The

earnings mobility appears to be lowest in each end of the distribution, i.e. in the lower and upper quartile, while it is considerably higher in the two middle quartiles.

Bratberg et el. (2005) have investigated transition probabilities between fathers and offspring. If we compare their matrices with my results we see that on the diagonal, i.e. when offspring are situated in the same quartile in the income distribution as their fathers, the studies are remarkably similar. Outside the diagonal, the transition probabilities are quite similar between sons and fathers, but deviate somewhat between daughters and fathers. For both studies the transition matrices seem to confirm the results of the OLS regressions. Finally, changes between the observed cohorts, i.e. the 1950 and 1960 cohorts for Bratberg et al. (2005) and the 1960 and 1970 cohorts in my study, follow the same patterns. That implies that for sons and fathers there is a decrease in the income mobility from the former to the latter cohort while the daughter-father income mobility strengthens slightly from the former to the latter cohort.

8.2 Disruption due to divorce

8.2.1 OLS regressions

8.2.1.1 Sons and fathers

The regressions concerning sons and fathers for both cohorts show that the estimated earnings elasticities display higher income mobility when the families are disrupted due to divorce than for intact families. This pattern is discovered for both male-headed and female-headed households when the divorced families are split according to the custody status of the parents.

The overall results are in accordance with earlier findings by Fertig (2004) and Biblarz and Raftery (1993). Fertig's estimations indicate a larger difference between the family types where the earnings mobility in divorced families is far higher than my elasticities indicate. The divergence between the studies are interesting as it suggests the opposite pattern to the well-known insight that the Scandinavian countries possess far higher income mobility than countries in the Anglo-American region (e.g. Bjorklund and Jantti, 1997; Solon, 1999; Solon, 2002). The divorced families are only a subgroup of all observed families and the estimates for intact families indicate high income mobility in Norway, which is in line with the well-known pattern, but still, it is noteworthy that the observed pattern for divorced families suggests the opposite tendency.

Furthermore, Fertig discovers a non-linear pattern where an additional year in a disrupted family decreases the son-father mobility, implying that the difference in income mobility between divorced and intact families decreases with the number of years spent in a disrupted family. This finding is not in accordance with my estimations. While the estimates for the 1960 cohort are incomparable according to the time of divorce, the regressions for the 1970 cohort indicate the opposite pattern to Fertig, i.e. the son-father earnings mobility is higher when the families were separated before rather than after 1980.

8.2.1.2 Daughters and fathers

In the case of daughters and fathers the estimations in general display higher income mobility in divorced families than in intact families for both cohorts. The tendency is somewhat weaker than for sons due to large differences according to when the family structure was observed. Of the studies on the subject it is only Fertig (2004) who addresses female offspring, and her findings suggest the same, but much stronger pattern between the family types. Furthermore, the OLS regressions are in line with Fertig's discovered decrease in daughter-father mobility over time. She finds that spending an additional year in a divorced family decreases the daughter-father mobility. This is the same result as for the 1970 cohort where the income mobility is lower when the divorce occurred before rather than after 1980. The estimations for the 1960 cohort are incomparable over time.

If we compare the results of daughters with those of sons, the estimates show that the overall income mobility with respect to divorced fathers is similar, i.e. higher intergenerational income mobility. This tendency can be explained by the fact that it is normally the father that leaves the household after a divorce and becomes the non-custodial parent. The subsequent daily absence of the father may over time cause great interference in the children's relations to the father and reduce the importance of the male role model (McLanahan 1985). As a result, we could expect fathers' earnings to become less determinative for the income of children, i.e. that children's earnings become more mobile with respect to non-custodial fathers than earnings of offspring that grow up with the fathers in the household.

Furthermore, at which age the divorce occurred seems to affect daughters differently than sons. While sons' earnings are more mobile with respect to fathers' earnings when the divorce occurred before rather than after the children were 10 years old, the daughters' earnings are less mobile to fathers' earnings. Finally, in both intact and divorced families,

sons' earnings appear to be less mobile with respect to the fathers' earnings than daughters' earnings. This trend is supported by the results from the 1970 cohort when the regressions are performed for merely female-headed divorced households.

8.2.1.3 Sons and mothers

The estimated elasticities of son's earnings with respect to mother's earnings are different across the cohorts. Sons born in 1960 appear to be less mobile with respect to mothers in divorced families than in intact families while sons born in 1970 appear to more mobile. This difference between cohorts is interesting. Since it is mothers who in general become the custodial parent it is reasonable to predict that sons get more attached to their mothers after the divorce. The mother is the main role model for the children and thus her importance in the children's lives increases considerably. If she maintains her position towards the children during the adolescence it could be an explanation to why the income mobility would be lower in divorced families. However, as shown, this trend applies only for the 1960 cohort and not the 1970 cohort. There are several factors that can interfere and drive the observed results that may explain the deviation between the cohorts. Later in the chapter we will investigate these various mechanisms.

In the literature on intergenerational income mobility and family dissolution it is only Couch and Lillard (1997) and Fertig (2004) who address the mobility between sons and mothers. Of the two works, Couch and Lillard's estimates are the only significant ones, in which the results vaguely indicate that the son-mother mobility is lower in divorced families. This is consistent with the results from the 1960 cohort. However, the absolute numbers of the estimated elasticities deviate substantially between the studies where Couch and Lillard find, regardless of family type, considerably lower income mobility between sons and mothers compared to my estimates.

8.2.1.4 Daughters and mothers

The estimated mobility elasticities concerning daughters and mothers indicate for both cohorts that daughters are less mobile with respect to divorced mothers than non-divorced mothers. This is in line with the hypothesis introduced in the chapter above, i.e. that after the divorce mothers become the main role model for the children the association between mothers and offspring increases. Different from sons, this pattern is equal for both cohorts. Furthermore, the daughter-mother income mobility deviates from the daughter-father income

mobility. While the earnings of daughters are more mobile with respect to fathers' earnings in disrupted families, the daughter-mother mobility is lower.

Fertig (2004) is the only researcher who has investigated the mobility between daughters and sons, but her results are non-comparable between intact and divorced families. Hence, no cross-study assessment can be made. On the other hand, Fertig discovers a non-linear pattern among divorced families where the marginal effect of another year in a separated household reduces the income mobility. This finding is not in line with the results from the 1970 cohort as the daughter-mother mobility is higher when the families were disrupted before rather than after the year 1980. Interestingly, this is the same pattern that we discovered for sons and fathers, but opposite to that of daughters and fathers. The results here and for sons and fathers may suggest that the type of family structure after the divorce has impact on the earnings mobility. If daughters experience large fluctuations between single parenthood and step families after the divorce, the turbulence attached to the transformations and the involvement of other parent figures might diminish the importance of the mother and cause higher earnings mobility over time (Fertig, 2004).

When comparing the size of the estimated elasticities between daughters and sons, daughters are less mobile to mothers than sons, regardless of cohort and family type. This pattern is supported by the estimates from regressions on female-headed households when the divorced families are split according to the custody status of the parents. Interestingly, the result is partly the opposite of what we discovered with respect to fathers; sons appear to be less mobile to fathers than daughters in both intact and disrupted families. This highlights the significance of the male role model to male offspring and the female role model to female offspring. Especially, even if a divorce reduces the importance of the father and increases the importance of the mother, the tendency is still present.

8.2.1.5 In relation to other studies

While my results are in accordance with findings of other studies on intergenerational income mobility and family dissolution, differences in results on the subject are extensive. This may be due to causal differences, but it should be noted that the studies differs substantially when it comes to methods utilized, type of outcome observation, time of income observation and time of family structure observation.[28] In addition, bias in the estimates may be a problem in the studies which have utilized the framework of Becker and Tomes (1979,

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[28] See chapter 4.2, page 31 for a comprehensive table with characteristics of the different studies.

1986) or the model explored by Solon (1992). [29] Of the studies that coincide most with my results, i.e. Couch and Lillard (1997) and Fertig (2004), we note that Couch and Lillard do not average sons' or parents' earnings over several years, but use current earnings from one year as proxy for lifetime earnings. In additon, Fertig measures daughters' current income at the age of 28. This age is around the peak of women's fertility and child-rearing years which implies that the current income of daughters' may deviate substantially from their lifetime earnings, and hence, cause life-cycle bias in the estimates (Haider and Solon, 2006; Böhlmark and Lindquist, 2006).

8.2.2 Transition matrices

The transition matrices display the similar pattern for all child-parent mobility pairs across the cohorts. Children of divorced parents tend to end up lower in the income distribution with respect to parents' position compared to offspring in intact families. That is, male and female offspring in divorced families are socioeconomic disadvantaged compared to offspring in intact families. This downward tendency is present for all quartiles, but it is most obvious when parents are located above the mean of income. Subsequently, for these families the income mobility between offspring and parents is higher in divorced families. When parents are situated in the lower middle quartile children tend to end up in the same or in the lower quartile, i.e. lower or higher income mobility, and when parents are situated in the lower quartile the income mobility between children and parents are lower in divorced families.

The downward tendency is stronger for male offspring. Sons seem to cluster in the lower quartile when either of the divorced parents is situated above the mean of income. Daughters in general do not cluster in the low end to the same extent, but scatters more equally across the income distribution. If we compare the cohorts rather than the genders, it appears as offspring born in 1960 are worse off than offspring born in 1970. This is indicated by the computed immobility indexes which show that the average for the cohorts are 2,63 and 2,68, respectively. [30] As a lower index number implies that a transition matrix exhibits a higher degree of income mobility between the observed generations and that the discovered tendency is downward mobility in divorced families, the offspring born in 1960 are on average situated lower in the income distribution with respect to the parents' position than

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[29] See chapter 2, page 4 for a review of the different models and sources of bias in the estimates.
[30] See chapter 2.4, page 16 for a review of immobility indexes.

offspring born in 1970. However, it should be noted that the number of divorced families observed for the 1960 cohort is substantial smaller than the number of families observed for the 1970 cohort. Few observations tend to increase the actual transition probabilities, which imply that the low number of families can be a source to the observed difference between the cohorts.

It appears as the time of divorce has an impact on the mobility across the earnings distribution. When the average of the immobility indexes for all family pairs are computed it appears that the income mobility is higher when the parents split up when the offspring were between 0 and 10 years of age rather than between 10 and 20. This applies for both cohorts, and the trends are supported by the OLS regressions from all but the son-mother mobility. As a result, the observations suggest that the earlier the disruption took place the more disadvantaged the children are.

Of the studies on intergenerational income mobility it is only Couch and Lillard (1997) who utilize transition matrices. My results are in accordance with their findings where sons of divorced parents are more disadvantaged than sons in intact families. More specifically, Couch and Lillard discover that sons of divorced fathers who are situated in the lower third of the income distribution are lower upwardly mobile, and sons of divorced fathers located in either of the upper two thirds of the income distribution are more downwardly mobile, compared to sons of intact families. The number of observations is considerably small as it only includes 66 divorced fathers. As a result, one should be careful to conclude any general patterns based on this low number of observations.

8.2.3 Interpretation

8.2.3.1 With regard to the theoretical framework

The discovered disadvantage in outcome of sons and daughters in divorced families compared to offspring in intact families may partly be explained by the theoretical model of Becker and Tomes (1979, 1986).[31] First and foremost, if we look at a household it is clear that the financial resources are diminished as one parent leaves the household after a divorce. Ceteris paribus, this implies that the household's *capital* investment in the children is nearly

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[31] This model is extensively reviewed in chapter 2.1, page 4 and the model's implications when diversifying the family structure are described in chapter 3, page 23.

reduced by the share invested by the non-custodial parent.[32] After the divorce the custodial parent, who normally is the mother, faces a time allocation problem; increase her labour supply to boost the family economy, and implicit have the opportunity to increase the capital investment in the children, or devote the available hours to support, help and guide the children. The earnings statistics over the five-year earnings average suggest that divorced mothers tend to increase the labour supply as they cluster in the upper quartile of the earnings distribution while mother in intact families to a large extent are equally scattered across the quartiles. Then, an important issue is to what extent the observed increment in the divorced household's income is directed towards the children in form of higher human capital investment. If we assume that the mothers' preferences do not decrease as a result of the divorce and that the preferences are approximately similar across the cohorts it would imply that the children are better off with the financial boost. On the other hand, the increase in labour supply implies that the children to a larger extent are left without supervision and support, and this may counter some or all of the gains from the enhancement in capital investment. There is no way of observing the trade-off between the consequences of the labour supply decision, but in general, the transition matrices show that offspring of divorced parents are disadvantaged in outcome compared to intact families. The relations described in the model may thus add to the understanding of the divergence across family structure.

Another essential aspect of the model is the investment decision made by the non-custodial parent. If the custodial parent does not decrease her share of the capital investment, which is to be expected based on the described observations, the model suggests that that the non-custodial parent reduces his capital investment after the divorce. This notion is supported by the earnings statistics which show that divorced fathers tend to earn lower than fathers in intact families. In addition, it is a common finding that non-custodial parents do not spend the same amount of time with their children after the divorce (Amato and Keith, 1991). This reduction in non-capital investment, i.e. supervision, help and guidance, also supports the quoted notion.

Finally, the model is in line whit the results when suggesting that offspring who experience parental divorce early in the childhood tend to be worse off than offspring experiencing the divorce later in the adolescence. This is explained by the fact that the earlier the divorce takes place, the lower the total investment in the children becomes, and hence, the more disadvantaged the children turn out to be.

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[32] The non-custodial parent is obligated to pay child support so the reduction in the household's finances with the divorce is countered by this amount.

The model has shortcomings when it comes to explaining the discovered sex bias within the divorced families. The OLS regressions show that sons born in 1960 and 1970 are worse off than daughters born in the same years, which implies that divorced parents favour female offspring before sons. In the context of the model, this means that the parents have preferences for daughters when investing in their children. In Norway no such favouritism is discovered. If we were to expect a tendency it would rather be directed towards male offspring which historically have been the preferred sex. Another shortcoming of the model is that we would expect children born in 1960 to be better off than those born in 1970 on grounds of the discovered difference in post-divorce earnings. The immobility index suggests rather that offspring born in 1960 are somewhat worse off than offspring born in 1970. Why the difference between the results and the model emerges is not certain. The preferences may differ between the cohorts, which can explain some of the difference, but such a fact is not observable.

8.2.3.2 Other considerations

The parental absence hypothesis, which states that the absence of one parent is detrimental to children's outcome, is in line with the observed disadvantaged outcome of children in disrupted families. The results from the transition matrices are also in accordance with the father absence hypothesis since we observe that sons are disadvantaged to daughters. The hypothesis suggests that the sex difference is caused by the importance of fathers as role model for the offspring during the childhood where sons are evidently more attached to their fathers than daughters. The divorce followed by the absence of the father is then more damaging for sons' outcome than daughters' outcome. Finally, it should be noted that even though the results coincide with the predictions of both hypotheses, it is not proven that the mechanisms behind the observed differences between family types and the sex of the offspring are the result of the absence of one parent or the father.

8.2.4 Separating single parents and step families

OLS regressions weakly show that the income mobility for sons and daughters are lower in relations to parents in step families compared to offspring in single parent families. Computed transition probabilities show a vague tendency that children of step families are less disadvantaged than children of single parents. The tendency is weak because the

differences in income mobility between the two family types deviate notably between the parent-child pairs, the cohorts and the positions of the parents in the income distribution. In addition, the number of observations is low, especially for the step families of the 1960 cohort, which causes the estimates to be imprecise. If we compare the transition matrices from step families with those of intact families, offspring of step families in general seem to end up lower in the income distribution in relation to the parents' location in the income distribution. The results deviate substantially between the cohorts where the 1970 cohort displays the most apparent pattern.

According to the theoretical model, the new parent in step families can contribute to the investment in the spouse's children with both time and capital. How large the investment becomes obviously depends on the step parent's preferences towards the step children. However, as long as it is larger than zero children in step families will benefit from the new parent. Furthermore, as the family economy is substantially improved, the custodial parent is not in the need of supplying extra hours of labour to boost the family economy. She will instead have more time to supervise, guide and assist her children, which they can benefit from. Both of these notions are in line with the difference discovered between single and step parents.

The time and length of the period between the divorce and the introduction of the new spouse, i.e. the single parent period, is also of relevance. If the time period is extensive and encompasses years which are important for the children's educational choice and aims for the future, the financial increment with the new parent may not cause great influence on the children after all. In addition, as the family stress hypothesis emphasizes, a divorce may cause an emotional upheaval for the children and unbalance in the family relations. This may cause the children to be disadvantaged in form of poorer academic performance compared to children not experiencing a divorce (McLanahan, 1985; Amato and Keith, 1991). These notions support the fact that offspring in step families are worse off than offspring in intact families.

8.3 Disruption due to parental death

8.3.1 OLS regressions

Offspring in disrupted families seem to be affected differently by the family dissolution than offspring in divorced families. For all child-parent pairs except the daughter-

mother mobility the findings indicate that offspring who have experienced parental death are less mobile in relation to their parents than offspring who have experienced parental divorce. This implies that the family background is more decisive for the socioeconomic outcome of children who lose one parent during the adolescence.

If we compare the findings between sons and daughters an interesting pattern emerges. For the 1960 cohort, sons appear to be less mobile with respect to both fathers and mothers than daughters in disrupted families. For divorced families it is the opposite, i.e. daughters are less mobile in relation to mothers than sons. What drives this finding is not certain, but it highlights the role mothers play to sons when fathers pass away as opposed to divorce since sons get more attached to the mothers than daughters in the case of death.

When we explore the elasticities according to the time of divorce only the son-father and son-mother mobility for the 1960 cohort are examinable. The findings suggest that the same pattern as we discovered between daughters and fathers in divorced families, namely that the mobility is lower when the time of death occurred before rather than after 1970. This finding strengthens the notion that the family background is more important for offspring experienced the disruption early in the childhood.

Other studies who have explored earnings mobility and parental death are Peter (1992) and Biblarz and Raftery (1993). While Peter's estimates are not significant different from zero Biblarz and Raftery find that the son-father income mobility are higher in disrupted families than in intact families. However, they have not separated the divorced families with the ones suffering from parental death, and as a result, it is not appropriate to evaluate their results to my findings.

8.3.2 Transition matrices

The overall tendency is that offspring in disrupted families tend to end up lower in the income distribution with respect to their parents' location compared to offspring in intact families. This downward mobility is most prominent for the 1970 cohort, but present for all but the son-father mobility pair for the 1960 cohort. Interestingly, the trend is similar to the predictions from the divorced families. This implies that regardless of the type of disruption, the offspring who have experiences family dissolution during the adolescence are socioeconomic disadvantaged to offspring who grew up with ever-married parents. This notion is supported by Sigle-Rushton and McLanahan (2002). They have examined the rich sociology literature on offspring and parental death where the findings suggest that children

who experience death during the childhood attain lower education, receive on average lower grades and suffer more from behavioural and psychological problem than offspring from intact families.

If we compare the two types of non-intact families with each other, the immobility indexes suggest that the earnings mobility is higher in divorced families than in disrupted families. This applies for both cohorts except the son-father income mobility for sons born in 1960. The outline is supported by the average of all significant elasticity estimates from OLS regressions. As we observe the same downward mobility in all non-intact families the fact that the earnings mobility is higher in divorced families suggests that the offspring of divorced parents tend on average to be worse off than offspring that have experienced parental death during the adolescence.

Parental death seems to affect sons and daughters different than parental divorce. Daughters in disrupted families are more disadvantages than sons compared to offspring in intact families while it is the opposite when the disruption is caused by divorce. In addition, when the families are separated according to the time of death, the transition probabilities suggest that the income mobility is higher in families where the death occurred before rather than after the children are 10 years of age. This implies that earlier the divorced took place the less disadvantages are the children. This is the opposite of what we detected for divorced families.

Finally, it should be taken into consideration the low number of disrupted families. When the families are divided into mobility pairs and separated by time of death the amounts become severely small, in which may cause estimates from OLS regressions to be imprecise and transition probabilities to be enlarged.

8.3.3 Interpretation

The theoretical model is short in explaining the divergence in outcome of offspring between the two types of non-intact families. The earnings statistics of the five-year earnings average show that widows and widowers are situated lower in the income distribution than both the custodial and non-custodial parents in divorced families. This implies that divorced parents are capable of investing more capital in their children's human capital, which indicates that offspring of divorced parents could be better off than offspring that experienced death, i.e. the opposite of what is discovered. Beside capital assets, a factor that also is important for the children's outcome and partly can explain the difference in investment is the

amount of time directed towards the children, i.e. supervision and guidance. However, if the non-custodial parent in divorced families direct some attention and supervision towards the children it would again suggest that children in divorced families could be better off than children in disrupted families who have lost one parent. Another factor which can be of great importance is the involvement of another parent figure after the family dissolution. If widows or widowers are more likely to remarry or enter cohabiting unions than divorced parents, children of disrupted families could be better off. However, the statistics favour the offspring of the divorced families also here; on average remarriages and cohabitation unions are proportionally far more common when the parents are divorced, which suggest than children of divorced parents could be better off. Finally, the last factor that can explain the observed differences is the parents' preferences for human capital investement. The preferences are not possible to measure, but we can state that the difference between the family types must be substantial to satisfactorily explain the observed divergence in children's socioeconomic outcome.

8.4 Selection

8.4.1 Difference-in-difference regressions

The estimates from the difference-in-difference regressions are overall non-conclusive. For divorced families, none of the estimates are significantly different from zero, which suggest that the observed differences in intergenerational income mobility between intact and divorced families are mainly due to selection. That is, it is not the divorce itself that drives the deviation in earnings between the family types, but rather that the parents who possess a higher probability of ending up with a divorce also possess earnings that systematically deviate from earnings of ever-married parents. On the other hand, the estimated earnings elasticities for intact families, which also apply for divorced families as their estimates are not significant different from zero, are negative when significant different from zero. This pattern is not logical as it implies that if the parents are situated above the mean of income the children are systematically situated somewhere beneath the mean, and vice verse. One can therefore question the specifics of the model and the observed results that indicate selection.

In reference to the model, the identifying assumptions should be considered, especially the assumed equality between siblings.[33] Bjorklund et al. (2002) study earnings correlations between siblings and their results show that the correlation in earnings between Norwegian brothers is quite low. This implies that the share of the variance in siblings' earnings that can be attributed to family background and other common sources is small, and that the earnings between siblings may deviate even if they possess the same family background. This entails that utilizing sibling's earnings as proxy for offspring's earnings if the divorce was absent, may not be a good indicator of the offspring's earnings. However, the equality assumption is somewhat strengthened by the fact that the earnings of siblings in intact families are also differentiated. Sources of variation in earnings that can be attributed to general patterns in the society or to the age difference between the siblings will to a certain extent be controlled for, and thus, the depiction of offspring's earnings in absence of the divorce will be enhanced.

In reference to the estimates that suggest that selection prevails, the small proportion of divorced families to the number of intact families may party explain the results. When the strict constraint is applied only 119 and 285 siblings in divorced families fulfil the restrictions for the 1960 and 1970 cohort, respectively. When the relaxed constraint is applied the numbers increase to 263 and 564 siblings for the cohorts, respectively. If we compare these numbers with those of intact families about 4 % of all the families are disrupted, which is considerable low. The consequence of these small samples is increased probability for non-significant estimates, which implies that if causal effects are present they may not to be detected. As a result, the low number of divorced families reduces the robustness of the estimates indicating spurious effects.

Even though the problem of small samples is mainly related to limitations in the data samples, it can also be associated with the identifying assumptions of the model. The model imposes severe requirements on the data material due to the required age difference between siblings. The strict constraint imposes an age difference of at least 7 years between the observed siblings. This implies that if the divorce took place when the younger sibling was 11 years of age the elderly sibling would be 18 years of age. As the requirements of the model states that the educational decisions and future aspirations of the elderly sibling should mainly be unaltered with the divorce of the parents, this age differences should be satisfactory. Furthermore, the relaxed constraint requires only a difference of 5 years. This implies that if the parental divorce occurred when the younger sibling was 11 years of age the elderly sibling

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[33] Earnings of elderly siblings are used because we cannot observe the earnings of offspring in divorced families if the divorce was absent. See more on the identifying assumption chapter 2.5, page 18.

would only be 16 years of age. In this case, it is not obvious that the elderly sibling's aspirations and aims for the future are unaffected by the divorce. Even if the sibling has chosen the type of upper secondary school, in which is detrimental to the occupational and socioeconomic outcome, he or she is still in an age where important decisions are yet to come. In addition, a divorce among the parents may well have similar effect on offspring who are 11 years of age as offspring who are 16 years of age. In that respect, the relaxed constraint could be too comfortable in depicting the sought deviation between the siblings. If the age difference is not large enough and the siblings are affected by the divorce in a similar and negative fashion this could diminish the earnings difference, and hence, fail to observe causal effects that may be present.

The time of earnings observation of the parents may also affect the results of the regressions. Preferably we would like to observe the earnings in the same way as between the siblings, i.e. before and after the divorce, but this is not possible because of limitations in the administrative data on earnings streams. The age interval at which the short run proxies are observed is close in time, primarily a distance of one to three years, which causes the difference between the earnings of parents to be small in size. This will in turn affect the significance of the estimates from the regressions, in which the probability for non-significant results increases. As a result, if causal effects of the divorce are present they may not to be detected and the estimates indicate that the effects are due to selection.

8.4.3 Other studies

In the literature on intergenerational income mobility and marital dissolution no studies have explored the difference-in-difference strategy when investigating the presence of selection. Fertig (2004) utilize siblings to assess her results by incorporating a sibling fixed effect variable in the regression model. The variable should capture time-invariant unobservable features of a family in the sense that if a family is selected into disruption based on any of these features it should be accounted for (Fertig, 2004). The sibling-difference measure deviates from that of my study as the fixed effect variable only assesses differences in year spent in disrupted families across siblings, i.e. only siblings who have experienced disruption are included in the fixed effect model. In addition to this strategy, Fertig (2004) applies children's exposure to no-fault divorce laws as instrument for the number of years a child spends in a single or step parent family during the adolescence. The results from both strategies regarding the father-child mobility, confirm weakly that the income mobility in

alternative families is higher than in intact families because of selection. I.e. the results indicate that the difference in income mobility between the family types is not attributable to the disruption itself, but rather to systematic differences between the family types. For the mother-child mobility the estimations show the opposite results, i.e. that the income mobility between children and mothers falls with each additional year in an alternative family because of causation. In other words, the results indicate that the divorce is determinative for the income mobility between mothers and children.

In the literature on children's educational attainment and marital dissolution among parents, studies show diverging results. Earlier studies like Jonsson and Gähler (1997) recognize the discovered negative cross-sectional relationship as partly causal, while recent studies conducted acknowledge selection as the primary explanatory cause (e.g. Ginther and Pollak, 2004; Winkelmann, 2006; Piketty, 2003; Bjorklund and Sundstrom, 2006; Bjorklund et al. 2007). In the light of these quoted studies, selection could be an important factor when investigating parental divorce and offspring's outcome.

9. Concluding remarks

In this study the child-parent earnings mobility is examined across family types. The data samples utilized consist of sons and daughters born in 1960 and 1970 and their biological mothers and fathers. The structure of the families is identified when the children are 10 and 20 years of age, and at time of observation the families are divided into intact, disrupted due to divorce and disrupted due to parental death. The income mobility is measured between all combinations of children and parents.

The earnings mobility in intact families is found to be high for all child-parent mobility pairs when OLS regressions are performed. This result is in line with results of other studies with Norwegian data, e.g. Bratberg et al. (2005). When the findings are compared to those of divorced families, we observe differences in income mobility for all the mobility pairs. The son-father and daughter-mother mobility is higher in divorced families, the daughter-mother mobility is lower in divorced families and the son-mother mobility deviates between the cohorts. This indicates that the outcome of the children in divorced families is more attached to the earnings of the mothers, which is to be expected as they are overrepresented as the custodial parents. The results are also is in line with findings by previous studies on the subject, e.g. Biblarz and Raftery (1993), Couch & Lillard (1997) and Fertig (2004). However, there are large differences between these studies because utilized methods and design differ in addition to potential problems with biased estimates. Finally, it appears that the type of disruption has impact on the income mobility. The estimates differ between the families who have experienced divorce and parental death where the children on average are less mobile to the parents when one of the peers has passed away than in the case of divorce.

When the earnings of children and parents are separated over the income distribution, computed transition matrices suggest that offspring in divorced families are more downwardly mobile through the income distribution than offspring in intact families. This implies that children who experience marital dissolution during the adolescence become socioeconomic disadvantaged later in life to children who grew up with ever-married parents. This also applies for children who have lost one parent, but is seems as these children are not that disadvantaged compared to children of married parents as the ones that experience divorce.

Sons and daughters are according to the findings not equally affected by the divorce of the parents. Daughters are less mobile to mothers than sons while it is opposite with respect to fathers. These patterns highlight the significance of the male role model to male offspring and

the female role model to female offspring. Sons also appear to be inferior to daughters in divorced families, but this fact is not supported by the families who are disrupted due to death.

When the divorced families are split into single parent families and step families the results indicate weakly that the income mobility is lower in step families than in single parent families for all child-parent mobility pairs. The offspring of step families are also less disadvantaged than the offspring of single parent families, but no matter what structure the divorced families undertake the offspring are still inferior to children with ever-married parents.

An important issue that emerges with the findings is whether they are due to causal connections or selection. This is investigated with a difference-in-difference model, but the results are non-conclusive. While some of the results give support to selection, the estimates overall are not logically and do not make sense. For further research the difference-in-difference model should be explored in detail with data samples that are better suited to answer the imposed questions.

Finally, it should be noted the mobility patterns and the results may in some cases be affected by the magnitude of the data samples. When the families are split into single parents and step families and after different types of disruption, the number of observed families is somewhat low. This implies that the estimates may be imprecise and that the transition probabilities may be enhanced.

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Appendix A

A.1 Optimal level of investment in children

Maximization problem:

$$\max \ U \quad \text{subject to} \quad y_{t-1} = C_{t-1} + I_{t-1}$$

$$\max \ (1 - \alpha) \ln C_{t-1} + \alpha \ln y_t \quad \text{subject to} \quad y_{t-1} = C_{t-1} + I_{t-1}$$

Lagrange expression:

$$\mathcal{L} = (1 - \alpha) \ln C_{t-1} + \alpha \ln y_t - \lambda(C_{t-1} + I_{t-1} - y_{t-1})$$

Substituting y_t with the equation for the child's lifetime earnings yields:

$$\mathcal{L} = (1 - \alpha) \ln C_{t-1} + \alpha \ln[(1 + r)I_{t-1} + w_t e_t + w_t u_t] - \lambda(C_{t-1} + I_{t-1} - y_{t-1})$$

Solving the maximization problem yields the following first order conditions:

$$\frac{\partial(\cdot)}{\partial C_{t-1}} = 0 \iff (1 - \alpha)\frac{1}{C_{t-1}} - \lambda = 0 \iff (1 - \alpha)\frac{1}{C_{t-1}} = \lambda$$

$$\frac{\partial(\cdot)}{\partial I_{t-1}} = 0 \iff \frac{\partial(\cdot)}{\partial y_t} \cdot \frac{dy_t}{dI_{t-1}} - \lambda = 0 \iff \alpha(1 + r)\frac{1}{[(1 + r)I_{t-1} + w_t e_t + w_t u_t]} - \lambda = 0$$

$$\iff \alpha(1 + r)\frac{1}{[(1 + r)I_{t-1} + w_t e_t + w_t u_t]} = \lambda$$

$$\frac{\partial(\cdot)}{\partial \lambda} = 0 \iff C_{t-1} + I_{t-1} - y_{t-1} = 0 \iff C_{t-1} = y_{t-1} - I_{t-1}$$

Substituting λ in the first of the first order conditions with the second of the first order conditions yields:

$$(1 - \alpha)\frac{1}{C_{t-1}} = \alpha(1 + r)\frac{1}{[(1 + r)I_{t-1} + w_t e_t + w_t u_t]}$$

$$(1 - \alpha)[(1 + r)I_{t-1} + w_t e_t + w_t u_t] = \alpha(1 + r)C_{t-1}$$

Substituting C_{t-1} with the third of the first order conditions yields:

$$(1 - \alpha)[(1 + r)I_{t-1} + w_t e_t + w_t u_t] = \alpha(1 + r)[y_{t-1} - I_{t-1}]$$

$$(1 - \alpha)(1 + r)I_{t-1} + (1 - \alpha)[w_t e_t + w_t u_t] = \alpha(1 + r)y_{t-1} - \alpha(1 + r)I_{t-1}$$

$$(1 - \alpha)I_{t-1} + (1 - \alpha)\frac{[w_t e_t + w_t u_t]}{(1 + r)} = \alpha y_{t-1} - \alpha I_{t-1}$$

Rearranging the terms yields the optimal level of investment:

$$(1 - \alpha)I_{t-1} + \alpha I_{t-1} = \alpha y_{t-1} - (1 - \alpha)\frac{[w_t e_t + w_t u_t]}{(1 + r)}$$

$$I_{t-1} = \alpha y_{t-1} - (1 - \alpha)\frac{[w_t e_t + w_t u_t]}{(1 + r)}$$

The optimizing problem is a maximum problem. This can be proven. Optimizing the utility function yields the following first order conditions:

$$\frac{\partial U}{\partial C_{t-1}} = (1 - \alpha)\frac{1}{C_{t-1}} \geq 0 \text{ if } \alpha \leq 1$$

$$\frac{\partial U}{\partial I_{t-1}} = \alpha(1 + r)\frac{1}{[(1 + r)I_{t-1} + w_t e_t + w_t u_t]} \geq 0 \text{ if } \alpha \geq 0$$

Second order conditions:

$$\frac{\partial^2 U}{\partial C_{t-1}{}^2} = 0 \iff -(1-\alpha)\frac{1}{C_{t-1}^2} \leq 0 \;\; \text{if} \;\; \alpha \leq 1$$

$$\frac{\partial^2 U}{\partial I_{t-1}{}^2} = -\alpha\frac{1}{y^2} \leq 0 \;\; \text{if} \;\; \alpha \geq 0$$

As long as $1 \geq \alpha \geq 0$ the constraints show that the utility function is concave. Then, if the budget constraint is linear the Lagrange function is concave, and the first order conditions yield the maximum point.

A.2 Deducting the econometrical difference-in-difference model

The econometric model equals

$$y_i^{child} = \alpha_i + \beta_i y_i^{par} + \delta_i D_i + \varepsilon_i.$$

With the difference-transformation it becomes

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = (\alpha_i - \alpha_i) + \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i\left(D_{iy} - D_{ie}\right) + \left(\varepsilon_{iy} - \varepsilon_{ie}\right),$$

but since the elderly sibling with divorced parents did not experience the divorce during his or her adolescence, then $D_{ie} = 0$, and the model equals

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i + \left(\varepsilon_{iy} - \varepsilon_{ie}\right).$$

If we expand the model with an interaction dummy variable the model equals

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i + \gamma_i D_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \left(\varepsilon_{iy} - \varepsilon_{ie}\right),$$

or

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i \; + \gamma_i D_i y_{iy}^{par} - \gamma_i D_i y_{ie}^{par} + \left(\varepsilon_{iy} - \varepsilon_{ie}\right).$$

However, since $D_i = 0$ for the "divorced" parents of the elderly sibling, i.e. the parents are not divorced when the elderly sibling grows up, but only when the younger grows up, $\gamma_i D_i y_{ie}^{par} = 0$, and the econometrical model equals

$$\left(y_{iy}^{child} - y_{ie}^{child}\right) = \beta_i\left(y_{iy}^{par} - y_{ie}^{par}\right) + \delta_i D_i \; + \gamma_i D_i \; y_{iy}^{par} + \left(\varepsilon_{iy} - \varepsilon_{ie}\right).$$

Appendix B

Table B.1: Child gender and the probability of divorce.

	1960 birth cohort	1970 birth cohort
Sex of 1st child		
Girl	-0.0064***	-0.0048
sd	(0.0023)	(0.0034)
N	*51 614*	*38 324*
Sex order of 1st two children		
Girl and girl	0.0009	-0.0870**
sd	(0.0027)	(0.0425)
N	*49 362*	*29 144*

Notes: *** significant at 1 %, ** significant at 5 %, * significant at 10
%. The reported coefficients are the marginal effect on the probability
of divorce and separation. The dependent variable is a binary variable
equal to zero if the child is a boy and one if it is a girl. The
independent variable is also a binary variable equal to zero if the
family is intact and one if it is disrupted due to divorce. The
estimations of the model are performed by running logistic
regressions.

Table B.2: Description of utilized variables.

Name	Definition
Pid	Personal id.
Yr	Year of observation.
Foedselsaar	Year of birth.
Deadby80	Recorded dead in 1980.
*Deadby90***	Recorded dead in 1990.
Age	Age in the year of question.
Sex	Sex.
Fstatus	Position within the family; father, mother, child, sibling, stepfather or stepmother.
Twin	Twins.
*Famtwin***	Families with twins.
Trill	Triplets.
Fpid	Biological father's personal id.
Mpid	Biological mother's personal id.
*Spid60**	Id of spouse in 1960.
*Spid70***	Id of spouse in 1970.
*Spid90***	Id of spouse in 1990.
*Tspid90***	True id of spouse in 1990.
*Cplid90***	Id which combines unique personal id and tspid.
*Fid90***	Family id in 1990.
*Kom60**	Municipality in 1960.
Kom70	Municipality in 1970.
Kom80	Municipality in 1980.
Urban70	Urban or rural residence in 1960.
Urban80	Urban or rural residence in 1970.
*Mstat60**	Marital status in 1960.

Mstat70	Marital status in 1970.
Mstat80	Marital status in 1980.
Mstat90**	Marital status in 1990.
Mlength60*	Number of years married in 1960.
Mlength70	Number of years married in 1970.
Nchild60*	Number of children in current marriage in 1960.
Nchild70	Number of children in current marriage in 1970.
Nkids90**	Number of children in current marriage in 1990.
Hhid60*	Unique household id in 1960.
Hhid70	Unique household id in 1970.
Hhid80	Unique household id in 1980.
Famid60*	Unique family id in 1960.
Famid70	Unique family id in 1970.
Famid90**	Unique family id in 1990.
Famstatus70*	Family type in 1970.
Famstatus80	Family type in 1980.
Famstatus90**	Family type in 1990.
Famtype70	Family type in 1970.
Famtype80	Family type in 1980.
Cohabit70*	Cohabiting parents in 1970.
Cohabit80	Cohabiting parents in 1980.
Cohabit90**	Cohabiting parents in 1990.
Cohabit80_mis	Missing information on cohabiting status in 1980.
Cohabit_changed**	Cohabit value changed between 1980 and 1990.
Contacth60*	Contact person in household in 1960.
Contacth70	Contact person in household in 1970.
Contacth80	Contact person in household in 1980.
Contactf60*	Contact person in family in 1960.
Contactf70	Contact person in family in 1970.
Contactf80	Contact person in family in 1980.
Nindh70	Number of individuals in the household in 1970.
Nindh80	Number of individuals in the household in 1980.
Nindf60*	Number of individuals in the family in 1960.
Nindf70	Number of individuals in the family in 1970.
Nindf80	Number of individuals in the family in 1980.
Indfam60*	Number of individuals in the family in 1960.
Indfam70	Number of individuals in the family in 1970.
Ffam60*	Number of parents in the family in 1960.
Ffam70	Number of parents in the family in 1970.
Ffam90**	Number of parents in the family in 1990.
Bfam60*	Number of children in the family in 1960.
Bfam70	Number of children in the family in 1970.
Bfam90**	Number of children in the family in 1990.
Intact70	Observed in a intact family in the 1970 family structure identification.
Intact80	Observed in a intact family in the 1980 family structure identification.
Intact90**	Observed in a intact family in the 1990 family structure identification.
Divorce70	Observed in a disrupted family due to divorce in the 1970 family structure identification.
Divorce80	Observed in a disrupted family due to divorce in the 1980 family structure identification.
Divorce90**	Observed in a disrupted family due to divorce in the 1990 family structure identification.
Intact_div	Observed in a intact family and disrupted family due to divorce in the 1970 and 1980 family structure identification, respectively.
Death70*	Observed in a disrupted family due to parental death in the 1970 family structure identification.
Death80	Observed in a disrupted family due to parental death in the 1980 family structure measure.
Death90**	Observed in a disrupted family due to parental death in the 1990 family structure measure.

Intact_death	Observed in a intact family and disrupted family due to parental death in the 1970 and 1980 family structure identifications, respectively.
Div_single70*	Observed as divorced and single parent in the 1970 family structure identification.
Div_single80	Observed as divorced and single parent in the 1980 family structure identification.
Div_single90**	Observed as divorced and single parent in the 1990 family structure identification.
Div_step70*	Observed as divorced and in a step family in the 1970 family structure identification.
Div_step80	Observed as divorced and in a step family in the 1980 family structure identification.
Div_step90**	Observed as divorced and in a step family in the 1990 family structure identification.
Dd_single70*	Observed as single parent in the 1970 family structure identification where the disrupted was caused by death of one parent / spouse.
Dd_single80	Observed as single parent due to parental death in the 1980 family structure identification. caused by death of one parent / spouse.
Dd_single90**	Observed as single parent due to parental death in the 1990 family structure identification. caused by death of one parent / spouse.
Dd_step70*	Observed in a step family in the 1970 family structure identification where the disrupted was caused by death of one parent / spouse.
Dd_step80	Observed in a step family in the 1980 family structure identification where the disrupted was caused by death of one parent / spouse.
Dd_step90**	Observed in a step family in the 1990 family structure identification where the disrupted was caused by death of one parent / spouse.
Pearn	Total pension-qualifying earnings.
Inc_missing	Missing earnings value in the year of question.
Cpi	Consumer price index.
Income00	Total pension-qualifying earnings with 2000 as base year.
Ln_income00	Log of total pension-qualifying earnings with 2000 as base year.
Ln_cinc5	Ln_income00 in the years chosen as short-run proxy for lifetime earnings for the children.
Ln_finc5	Ln_income00 in the years chosen as short-run proxy for lifetime earnings for the fathers.
Ln_minc5	Ln_income00 in the years chosen as short-run proxy for lifetime earnings for the mothers.
Ln_cinc5_sum	Sum of ln_cinc5.
Ln_finc5_sum	Sum of ln_finc5.
Ln_minc5_sum	Sum of ln_minc5.
Ln_cinc_avg_son	Five-year average of ln_income00 to the son in question.
Ln_cinc_avg_dau	Five-year average of ln_income00 to the daughter in question.
Ln_finc_avg	Five-year average of ln_income00 to the father in question.
Ln_minc_avg	Five-year average of ln_income00 to the mother in question.
Cinc5	Income00 in the years chosen as short-run proxy for lifetime earnings for the children.
Finc5	Income00 in the years chosen as short-run proxy for lifetime earnings for the fathers.
Minc5	Income00 in the years chosen as short-run proxy for lifetime earnings for the mothers.
Cinc5_sum	Sum of cinc5.
Finc5_sum	Sum of finc5.
Minc5_sum	Sum of minc5.
Sinc_avg	Five-year average of income00 to the son in question.
Dinc_avg	Five-year average of income00 to the daughter in question.
Finc_avg	Five-year average of income00 to the father in question.
Minc_avg	Five-year average of income00 to the mother in question.
Cage_avg	Average of children's age interval at which the five-year average of ln_income00 is measured.
Fage_avg	Average of father's age interval at which the five-year average of ln_income00 is measured.
Mage_avg	Average of mother's age interval at which the five-year average of ln_income00 is measured.
Fage_avg2	Squared of fage_avg.
Mage_avg2	Squared of mage_avg.
Cfcode	Unique father-child couple id.
Cmcode	Unique mother-child couple id.
S_pctile25	Sons situated in the first quartile of the group's income distribution.
S_pctile50	Sons situated in the second quartile of the group's income distribution.

S_pctile75	Sons situated in the third quartile of the group's income distribution.
D_pctile25	Daughters situated in the first quartile of the group's income distribution.
D_pctile50	Daughters situated in the second quartile of the group's income distribution.
D_pctile75	Daughters situated in the third quartile of the group's income distribution.
F_pctile25	Fathers situated in the first quartile of the group's income distribution.
F_pctile50	Fathers situated in the second quartile of the group's income distribution.
F_pctile75	Fathers situated in the third quartile of the group's income distribution.
M_pctile25	Mothers situated in the first quartile of the group's income distribution.
M_pctile50	Mothers situated in the second quartile of the group's income distribution.
M_pctile75	Mothers situated in the third quartile of the group's income distribution.
Fs_trans	Identifies father-son couples to be included in transition matrices.
Ms_trans	Identifies mother-son couples to be included in transition matrices.
Fd_trans	Identifies father-daughter couples to be included in transition matrices.
Md_trans	Identifies mother-daughter couples to be included in transition matrices.

Notes: * indicate that the variable is only utilized in the data sample for the 1960 cohort. ** indicate that the variable is only utilized in the data sample for the 1970 cohort.

Table B.3: 1960 birth cohort. Distribution of elderly siblings according to birth year.

	Intact families 1960-1980		Families divorced in the period 1960-1970		Families divorced in the period 1970-1980	
	Strict	Relaxed	Strict	Relaxed	Strict	Relaxed
Birth year of elderly sibling						
1938-1942	27	27	0	0	0	0
1943	23	23	0	0	0	0
1944	27	26	0	-	0	0
1945	57	57	1	-	0	0
1946	83	81	-	-	1	1
1947	132	131	-	-	1	1
1948	209	204	-	-	9	7
1949	293	297	-	-	4	4
1950	402	398	-	-	11	10
1951	544	545	-	-	16	16
1952	701	715	-	-	30	30
1953	863	899	-	-	47	45
1954	-	1 177	-	-	68	68
1955	-	1 469	-	-	81	81
N	3 361	6 049	1	0	119	263

Notes: When the divorce occurred between 1960 and 1970 the strict constraint equals 1943 and the relaxed constraint equals 1945. When the divorce took place between 1970 and 1980 the strict and relaxed constraints equal 1953 and 1955, respectively.

Table B.4: 1970 birth cohort. Distribution of elderly siblings according to birth year.

	Intact families 1970-1990		Families divorced in the period 1970-1980		Families divorced in the period 1980-1990	
	Strict	Relaxed	Strict	Relaxed	Strict	Relaxed
Birth year of elderly sibling						
1948-1952	110	110	5	5	0	0
1953	111	110	5	5	3	3
1954	167	166	-	5	2	2
1955	224	219	-	9	3	3
1956	329	326	-	-	9	8
1957	424	416	-	-	9	9
1958	564	553	-	-	14	13
1959	749	743	-	-	20	19
1960	871	847	-	-	42	41
1961	1 122	1 090	-	-	41	39
1962	1 437	1 397	-	-	62	60
1963	1 722	1 694	-	-	80	80
1964	-	2 253	-	-	-	131
1965	-	2 655	-	-	-	156
N	7 830	12 579	10	24	285	564

Notes: When the divorce occurred between 1970 and 1980 the strict constraint equals 1953 and the relaxed constraint equals 1955. When the divorce took place between 1980 and 1990 the strict and relaxed constraints equal 1963 and 1965, respectively.

Table B.5: Descriptive statistics of five-year earnings average. 1960 birth cohort. Intact families.

	Families intact in 1960				Families intact in the period 1960-1970				Families intact in the period 1960-1980			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.44	0.67	6.22	15.80	12.45	0.66	6.22	15.80	12.46	0.65	6.22	15.80
N		*14 579*				*13 954*				*12 489*		
Daughters												
Five-year earnings average	12.15	0.74	6.69	15.34	12.16	0.74	6.69	15.34	12.16	0.73	6.69	15.34
N		*13 497*				*12 954*				*11 628*		
Fathers												
Five-year earnings average	12.30	0.56	6.11	14.24	12.31	0.55	6.11	14.05	12.32	0.52	6.11	14.05
Average of age interval	47.59	2.12	40.00	63.00	47.60	2.70	41.00	63.00	47.32	1.26	47.00	57.00
Year of birth	1929.56	5.66	1912.00	1943.00	1929.53	5.63	1912.00	1943.00	1929.41	5.62	1912.00	1943.00
N		*26 235*				*25 545*				*23 924*		
Mothers												
Five-year earnings average	11.20	1.09	5.30	13.41	11.20	1.08	5.49	13.41	11.18	1.07	5.49	13.41
Average age interval	47.29	2.26	35.00	63.00	47.34	2.02	39.00	63.00	47.05	0.41	47.00	55.00
Year of birth	1932.90	5.19	1914.00	1944.00	1932.94	5.12	1914.00	1944.00	1933.00	5.01	1914.00	1944.00
N		*27 422*				*26 370*				*23 924*		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years that income is observed.

Table B.6: Descriptive statistics of five-year earnings average. 1960 birth cohort. Families disrupted due to divorce and separation.

	Families divorced in the period 1960-1970				Families divorced in the period 1970-1980				All divorced families			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.21	0.84	7.58	14.01	12.34	0.77	6.82	13.86	12.30	0.79	6.82	14.01
N		*312*				*684*				*996*		
Daughters												
Five-year earnings average	12.07	0.81	8.48	13.88	12.10	0.74	7.39	13.67	12.09	0.76	7.39	13.88
N		*278*				*627*				*905*		
Fathers												
Five-year earnings average	12.13	0.79	7.73	14.24	12.15	0.85	6.54	13.89	12.14	0.83	6.54	14.24
Average of age interval	47.32	2.90	46.00	63.00	50.65	4.76	41.00	63.00	49.62	4.54	41.00	63.00
Year of birth	1932.05	5.90	1912.00	1943.00	1932.34	4.77	1919.00	1942.00	1932.25	5.15	1912.00	1943.00
N		*585*				*1 301*				*1 886*		
Mothers												
Five-year earnings average	11.55	1.03	5.30	13.39	11.71	0.91	6.42	13.16	11.66	0.95	5.30	13.39
Average age interval	45.70	4.79	37.00	62.00	47.64	4.62	39.00	63.00	47.04	4.76	37.00	63.00
Year of birth	1934.96	5.43	1916.00	1944.00	1935.36	4.63	1919.00	1944.00	1935.24	4.89	1916.00	1944.00
N		*585*				*1 301*				*1 886*		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is observed. The first column identifies disruptions occurred between 1960 and 1970, the second column identifies disruptions occurred between 1970 and 1980, and the third and last column identifies all disruptions taken place between 1960 and 1980.

Table B.7: Descriptive statistics of five-year earnings average. 1960 birth cohort. Families disrupted due to death of a parent.

	Families disrupted in the period 1960-1970				Families disrupted in the period 1970-1980				All disrupted families			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.34	0.79	7.49	13.79	12.38	0.75	7.45	14.46	12.37	0.76	7.45	14.46
N		313				781				1 094		
Daughters												
Five-year earnings average	12.09	0.82	7.68	13.84	12.08	0.81	7.45	13.93	12.08	0.81	7.45	13.93
N		265				699				964		
Fathers												
Five-year earnings average	12.01	0.85	7.02	13.02	12.09	0.84	7.58	13.57	12.07	0.85	7.02	13.57
Average of age interval	47.49	5.82	40.00	60.00	55.48	5.26	43.00	63.00	53.51	6.41	40.00	63.00
Year of birth	1924.91	6.43	1912.00	1938.00	1926.52	5.26	1919.00	1939.00	1926.12	5.60	1912.00	1939.00
N		105				320				425		
Mothers												
Five-year earnings average	10.66	1.36	5.93	12.65	11.02	1.21	5.81	13.04	10.91	1.27	5.81	13.04
Average age interval	46.89	6.13	35.00	61.00	53.00	5.72	39.00	63.00	51.23	6.46	35.00	63.00
Year of birth	1928.12	6.14	1914.00	1942.00	1929.00	5.72	1919.00	1943.00	1928.74	5.85	1914.00	1943.00
N		467				1 145				1 612		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is observed. The first column identifies disruptions occurred between 1960 and 1970, the second column identifies disruptions occurred between 1970 and 1980, and the third and last column identifies all disruptions taken place between 1960 and 1980.

Table B.8: Descriptive statistics of five-year earnings average. 1970 birth cohort. Intact families.

	Families intact in 1970				Families intact in the period 1970-1980				Families intact in the period 1970-1990			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.57	0.61	7.21	15.17	12.59	0.60	7.21	15.17	12.60	0.59	7.21	15.17
N		20 101				18 527				16 668		
Daughters												
Five-year earnings average	12.10	0.73	3.56	14.56	12.11	0.72	3.56	14.56	12.12	0.71	3.56	14.56
N		18 590				17 243				15 445		
Fathers												
Five-year earnings average	12.39	0.62	5.57	14.88	12.40	0.60	5.57	14.88	12.42	0.57	5.57	14.88
Average of age interval	45.49	1.89	33.00	63.00	45.48	1.85	40.00	63.00	45.14	0.51	45.00	57.00
Year of birth	1940.90	5.93	1912.00	1953.00	1940.76	5.93	1912.00	1953.00	1940.60	6.00	1912.00	1953.00
N		37 478				34 992				32 113		
Mothers												
Five-year earnings average	11.61	0.94	5.32	13.85	11.61	0.94	5.32	13.85	11.60	0.93	5.32	13.85
Average age interval	45.73	1.67	38.00	63.00	45.78	1.67	38.00	63.00	45.59	0.49	45.00	47.00
Year of birth	1943.77	4.96	1922.00	1954.00	1943.68	4.93	1922.00	1954.00	1943.60	4.93	1922.00	1954.00
N		38 643				35 508				32 113		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is observed. The first column identifies disruptions occurred between 1970 and 1980, the second column identifies disruptions occurred between 1980 and 1990, and the third and last column identifies all disruptions taken place between 1970 and 1990.

Table B.9: Descriptive statistics of five-year earnings average. 1970 birth cohort. Families disrupted due to divorce and separation.

	Families divorced in the period 1970-1980				Families divorced in the period 1980-1990				All divorced families			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.42	0.72	8.19	14.98	12.50	0.65	7.74	14.01	12.46	0.69	7.74	14.98
N		*1 296*				*1 349*				*2 645*		
Daughters												
Five-year earnings average	11.96	0.79	7.66	13.71	12.06	0.76	7.52	13.93	12.02	0.77	7.52	13.93
N		*1 107*				*1 268*				*2 375*		
Fathers												
Five-year earnings average	12.19	0.85	6.08	14.18	12.26	0.87	6.17	14.35	12.23	0.86	6.08	14.35
Average of age interval	45.58	2.09	45.00	63.00	49.08	4.55	40.00	63.00	47.40	3.99	40.00	63.00
Year of birth	1943.02	5.39	1919.00	1953.00	1942.92	4.55	1929.00	1952.00	1942.97	4.97	1919.00	1953.00
N		*2 386*				*2 592*				*4 978*		
Mothers												
Five-year earnings average	11.77	0.93	6.06	13.25	11.89	0.89	6.36	13.57	11.83	0.91	6.06	13.57
Average age interval	45.13	0.81	45.00	58.00	46.51	3.98	38.00	63.00	45.85	3.00	38.00	63.00
Year of birth	1945.82	4.31	1924.00	1953.00	1945.49	3.98	1929.00	1954.00	1945.65	4.14	1924.00	1954.00
N		*2 386*				*2 592*				*4 978*		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is observed. The first column identifies disruptions occurred between 1970 and 1980, the second column identifies disruptions occurred between 1980 and 1990, and the third and last column identifies all disruptions taken place between 1970 and 1990.

Table B.10: Descriptive statistics of five-year earnings average. 1970 birth cohort. Families disrupted due to death of a parent.

	Families disrupted in the period 1970-1980				Families disrupted in the period 1980-1990				All disrupted families			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Sons												
Five-year earnings average	12.43	0.75	8.05	13.72	12.45	0.72	7.46	13.88	12.44	0.73	7.46	13.88
N		*278*				*510*				*788*		
Daughters												
Five-year earnings average	12.01	0.74	9.05	13.64	11.95	0.87	7.48	13.34	11.97	0.83	7.48	13.64
N		*240*				*530*				*770*		
Fathers												
Five-year earnings average	11.98	1.07	7.08	14.13	12.18	0.90	7.07	14.21	12.13	0.94	7.07	14.21
Average of age interval	45.49	7.69	33.00	63.00	52.71	5.40	41.00	63.00	50.97	6.76	33.00	63.00
Year of birth	1936.51	7.69	1919.00	1949.00	1939.29	5.40	1929.00	1951.00	1938.62	6.13	1919.00	1951.00
N		*82*				*259*				*341*		
Mothers												
Five-year earnings average	11.06	1.17	6.17	12.94	11.28	1.23	6.03	13.16	11.20	1.21	6.03	13.16
Average age interval	45.30	3.65	43.00	58.00	51.12	5.82	40.00	63.00	49.03	5.86	40.00	63.00
Year of birth	1939.87	6.48	1924.00	1952.00	1940.88	5.82	1929.00	1952.00	1940.52	6.08	1924.00	1952.00
N		*431*				*772*				*1 203*		

Notes: Earnings are measured in log. The reported age variable of parents is the age average of the five years in which the income is observed. The first column identifies disruptions occurred between 1970 and 1980, the second column identifies disruptions occurred between 1980 and 1990, and the third and last column identifies all disruptions taken place between 1970 and 1990.

Table B.11: Descriptive statistics of five-year earnings average for siblings.
1960 birth cohort. Strict constraint.

	Families intact in the period 1960-1980				Families divorced in the period 1970-1980			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Elderly siblings								
Five-year earnings average	12.14	0.82	4.86	14.63	12.17	0.87	8.09	13.90
Average of age interval	41.00	0.00	41.00	41.00	41.00	0.00	41.00	41.00
Year of birth	1950.71	2.36	1938.00	1953.00	1951.58	1.66	1946.00	1953.00
N			*3 458*				*119*	
Fathers								
Five-year earnings average	12.22	0.59	7.17	13.54	12.31	0.49	10.36	13.14
Average of age interval	50.93	5.86	35.00	62.00	48.61	3.35	41.00	56.00
Year of birth	1923.33	4.44	1912.00	1937.00	1926.39	3.35	1919.00	1934.00
N			*2 415*				*92*	
Mothers								
Five-year earnings average	11.14	0.92	5.93	13.34	11.23	1.05	6.85	12.61
Average age interval	48.18	6.69	39.00	59.00	46.07	3.49	40.00	56.00
Year of birth	1926.60	4.04	1915.00	1937.00	1928.94	3.49	1919.00	1935.00
N			*2 415*				*92*	

Notes: Earnings are measured in log. The reported age variable is the age average of the five years in which the income is measured. The first column identifies always-intact families, i.e. intact between 1970 and 1980 and the second column identifies disruptions occurred between 1970 and 1980. The strict constraint implies that siblings are born before 1953.

Table B.12: Descriptive statistics of five-year earnings average for siblings.
1960 birth cohort. Relaxed constraint.

	Families intact in the period 1960-1980				Families divorced in the period 1970-1980			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Elderly siblings								
Five-year earnings average	12.19	0.80	4.86	15.28	12.12	0.94	5.88	13.90
Average of age interval	41.00	0.00	41.00	41.00	41.00	0.00	41.00	41.00
Year of birth	1952.39	2.63	1938.00	1955.00	1953.28	1.83	1946.00	1955.00
N			*6 049*				*263*	
Fathers								
Five-year earnings average	12.23	0.56	6.31	13.54	12.30	0.54	9.72	13.14
Average of age interval	48.65	7.12	35.00	62.00	47.11	3.91	37.00	56.00
Year of birth	1924.89	4.89	1912.00	1938.00	1927.90	3.91	1919.00	1938.00
N			*4 023*				*198*	
Mothers								
Five-year earnings average	11.10	0.94	5.58	13.34	11.26	0.98	6.85	12.65
Average age interval	46.12	6.98	39.00	59.00	44.20	4.16	36.00	56.00
Year of birth	1928.20	4.59	1915.00	1940.00	1930.80	4.16	1919.00	1939.00
N			*4 023*				*198*	

Notes: Earnings are measured in log. The reported age variable is the age average of the five years in which the income is measured. The first column identifies always-intact families, i.e. intact between 1970 and 1980 and the second column identifies disruptions occurred between 1970 and 1980. The relaxed constraint implies that siblings are born before 1955.

Table B.13: Descriptive statistics of five-year earnings average for full siblings.
1970 birth cohort. Strict constraint.

	Families intact in the period 1970-1990				Families divorced in the period 1980-1990			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Elderly siblings								
Five-year earnings average	12.23	0.79	6.30	14.61	12.19	0.80	8.62	13.53
Average of age interval	38.00	0.00	38.00	38.00	38.00	0.00	38.00	38.00
Year of birth	1960.10	2.78	1945.00	1963.00	1960.86	2.21	1953.00	1963.00
N		*7 830*				*285*		
Fathers								
Five-year earnings average	12.29	0.49	7.75	13.73	12.42	0.61	8.21	13.57
Average of age interval	41.97	5.40	40.00	61.00	47.99	3.65	39.00	56.00
Year of birth	1933.72	5.13	1913.00	1949.00	1937.01	3.65	1929.00	1946.00
N		*4 564*				*190*		
Mothers								
Five-year earnings average	11.17	1.03	5.76	13.29	11.80	0.75	6.26	13.09
Average age interval	45.50	6.66	39.00	55.00	45.67	3.44	38.00	56.00
Year of birth	1937.34	4.03	1922.00	1950.00	1939.33	3.44	1929.00	1947.00
N		*4 564*				*190*		

Notes: Earnings are measured in log. The reported age variable is the age average of the five years in which the income is measured. The first column identifies always-intact families, i.e. intact between 1970 and 1980 and the second column identifies disruptions occurred between 1970 and 1980. The strict constraint implies that siblings are born before 1963.

Table B.14: Descriptive statistics of five-year earnings average for siblings.
1970 birth cohort. Relaxed constraint.

	Families intact in the period 1960-1980				Families divorced in the period 1970-1980			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Elderly siblings								
Five-year earnings average	12.30	0.77	6.30	15.00	12.35	0.72	8.62	14.53
Average of age interval	38.00	0.00	38.00	38.00	38.00	0.00	38.00	38.00
Year of birth	1961.83	3.09	1945.00	1965.00	1962.75	2.42	1953.00	1965.00
N		*12 579*				*564*		
Fathers								
Five-year earnings average	12.39	0.48	6.97	14.35	12.41	0.56	7.94	14.08
Average of age interval	40.51	2.88	40.00	61.00	41.96	4.50	33.00	56.00
Year of birth	1940.87	5.91	1913.00	1953.00	1943.04	4.50	1929.00	1952.00
N		*29 354*				*2 417*		
Mothers								
Five-year earnings average	11.34	0.95	5.64	13.50	11.71	0.77	6.26	13.33
Average age interval	40.57	4.29	39	55.00	39.42	3.93	31.00	56.00
Year of birth	1943.85	4.87	1922.00	1954.00	1945.58	3.93	1929.00	1954.00
N		*29 354*				*2 417*		

Notes: Earnings are measured in log. The reported age variable is the age average of the five years in which the income is measured. The first column identifies always-intact families, i.e. intact between 1970 and 1980 and the second column identifies disruptions occurred between 1970 and 1980. The strict constraint implies that siblings are born before 1965.

Appendix C

C.1 Results from OLS regressions

Table C.1.1: Results from OLS regressions for families disrupted due to divorce and separation. The families are split into single parents and step families.

	1960 birth cohort						1970 birth cohort					
	Families divorced in the period 1960-1970		Families divorced in the period 1970-1980		All divorced families		Families divorced in the period 1970-1980		Families divorced in the period 1980-1990		All divorced families	
Mobility pair	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family
Son-father												
β	0.017	0.135	0.149***	0.121	0.114***	0.159**	0.047*	0.068	0.083***	0.200***	0.082***	0.076**
ρ	0.015	0.145	0.168	0.123	0.124	0.148	0.056	0.076	0.111	0.268	0.102	0.095
$sd(\beta)$	(0.073)	(0.098)	(0.037)	(0.094)	(0.033)	(0.071)	(0.026)	(0.063)	(0.021)	(0.061)	(0.018)	(0.033)
N	229	83	587	97	786	210	1062	234	1213	136	2063	582
Son-mother												
β	0.010	-0.090	0.097***	0.276***	0.071***	0.037	0.042*	-0.015	0.007	0.135***	0.015	0.074***
ρ	0.011	-0.167	0.116	0.289	0.085	0.045	0.053	-0.020	0.011	0.184	0.020	0.106
$sd(\beta)$	(0.059)	(0.057)	(0.032)	(0.105)	(0.028)	(0.060)	(0.025)	(0.047)	(0.019)	(0.054)	(0.016)	(0.028)
N	229	83	587	97	786	210	1062	234	1213	136	2063	582
Daughter-father												
β	0.044	0.224**	0.083**	0.048	0.073**	0.124*	0.062**	0.048	0.065***	-0.008	0.074***	0.018
ρ	0.041	0.293	0.096	0.056	0.080	0.135	0.067	0.052	0.073	-0.010	0.083	0.019
$sd(\beta)$	(0.073)	(0.103)	(0.036)	(0.109)	(0.033)	(0.074)	(0.030)	(0.060)	(0.026)	(0.073)	(0.020)	(0.041)
N	217	61	551	76	731	174	899	208	1133	135	1873	502
Daughter-mother												
β	0.184***	0.233***	0.040	0.119***	0.065**	0.220***	0.088***	0.058	0.102***	0.064	0.117***	0.020
ρ	0.208	0.524	0.049	0.142	0.079	0.311	0.102	0.076	0.124	0.078	0.139	0.025
$sd(\beta)$	(0.061)	(0.054)	(0.037)	(0.086)	(0.033)	(0.048)	(0.028)	(0.055)	(0.026)	(0.086)	(0.020)	(0.038)
N	217	61	551	76	731	174	899	208	1133	135	1873	502

Notes: *** significant at 1 %, ** significant at 5 %, * significant at 10 %. The mobility elasticity β is estimated by running separate regressions for each family type, and the correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is a five-year average of log earnings. For the 1960 cohort the average of the age at time of earnings observation is 36 for sons, 42 for daughters, 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

Table C.1.2: Results from OLS regressions for divorced families. The families are separated according to which parent who has the custody of the children.

Mobility pair	1960 birth cohort		1970 birth cohort	
	All divorced families		All divorced families	
	Father custody	Mother custody	Father custody	Mother custody
Son-father				
β	0.196***	0.085**	0.090***	0.077***
ρ	0.191	0.087	0.106	0.096
sd(β)	(0.065)	(0.040)	(0.031)	(0.018)
N	268	642	732	1913
Son-mother				
β	0.035	0.073***	0.027	0.031*
ρ	0.035	0.093	0.041	0.040
sd(β)	(0.060)	(0.030)	(0.024)	(0.017)
N	268	642	732	1913
Daughter-father				
β	0.006	0.169***	-0.007	0.075***
ρ	0.006	0.173	-0.009	0.085
sd(β)	(0.070)	(0.041)	(0.045)	(0.020)
N	141	520	474	1901
Daughter-mother				
β	0.050	0.154***	0.042	0.114***
ρ	0.057	0.194	0.055	0.133
sd(β)	(0.079)	(0.036)	(0.036)	(0.020)
N	141	520	474	1901

Notes: *** significant at 1 %, ** significant at 5 %, * significant at 10 %. The correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is a five-year average of log earnings. For the 1960 cohort the average of the age at time of earnings observation is 36 for sons, 42 for daughters, 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

Table C.1.3: Results from OLS regressions for families disrupted due to death of one parent. The families are split into single parents and step families.

| Mobility pair | 1960 birth cohort | | | | | | 1970 birth cohort | | | | | |
| | Families disrupted in the period 1960-1970 | | Families disrupted in the period 1970-1980 | | All disrupted families | | Families disrupted in the period 1970-1980 | | Families disrupted in the period 1980-1990 | | All disrupted families | |
	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family	Single parent	Step family
Son-father												
β	0.404**	-	0.177**	1.190	0.193***	1.190	-0.103	-	0.053	0.017	0.002	0.017
ρ	0.421		0.194	0.433	0.220	0.433	-0.149		0.065	0.038	0.003	0.038
$sd(\beta)$	(0.174)	-	(0.084)	(0.742)	(0.074)	(0.742)	(0.097)	-	(0.064)	(0.324)	(0.053)	(0.324)
N	55	0	168	17	206	17	41	0	120	3	159	3
Son-mother												
β	0.112***	-	0.081***	0.195*	0.089***	0.195*	0.054	-	0.022	-0.050	0.032	-0.050
ρ	0.194		0.127	0.298	0.148	0.298	0.081		0.036	-0.127	0.052	-0.127
$sd(\beta)$	(0.035)	-	(0.024)	(0.111)	(0.020)	(0.111)	(0.043)	-	(0.031)	(0.159)	(0.025)	(0.159)
N	258	0	613	25	846	25	237	0	385	12	614	12
Daughter-father												
β	0.266**	-	0.110	-0.093	0.170***	-0.093	0.021	-	0.132*	0.236	0.094*	0.236
ρ	0.267		0.113	0.065	0.178	0.065	0.031		0.134	0.752	0.107	0.752
$sd(\beta)$	(0.127)	-	(0.079)	(0.558)	(0.067)	(0.558)	(0.096)	-	(0.070)	(0.118)	(0.058)	(0.118)
N	52	0	156	13	195	13	42	0	139	4	179	4
Daughter-mother												
β	0.033	-	0.077***	0.042	0.061***	0.042	0.083*	-	0.044	0.059	0.050*	0.059
ρ	0.056		0.112	0.122	0.093	0.122	0.127		0.061	0.216	0.072	0.216
$sd(\beta)$	(0.039)	-	(0.029)	(0.055)	(0.024)	(0.055)	(0.049)	-	(0.039)	(0.068)	(0.031)	(0.068)
N	213	0	543	20	736	20	198	0	385	8	579	8

Notes: *** significant at 1 %, ** significant at 5%, * significant at 10%. The mobility elasticity β is estimated by running separate regressions for each family type, and the correlation coefficient ρ is computed from the mobility elasticity. The measure of earnings is a five-year average of log earnings. For the 1960 cohort the average of the age at time of earnings observation is 36 for sons, 42 for daughters, 47.59 for fathers and 47.29 for mothers. For the 1970 cohort the age averages are 33 for sons and daughters, 45.49 for fathers and 45.73 for mothers.

C.2 Results from transition matrices

C.2.1 Intact families

Table C.2.1.1: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1970.

Immobility index: 2.86	Sons				
Married fathers (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.34	0.27	0.23	0.16	*3 312*
Lower middle quartile	0.26	0.30	0.25	0.19	*3 330*
Upper middle quartile	0.22	0.25	0.27	0.26	*3 354*
Upper quartile	0.17	0.18	0.25	0.40	*3 345*
N	*3 260*	*3 343*	*3 356*	*3 382*	*13 341*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.2: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.87	Sons				
Married fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.33	0.28	0.23	0.16	*3 048*
Lower middle quartile	0.25	0.31	0.25	0.19	*3 134*
Upper middle quartile	0.22	0.25	0.27	0.26	*3 158*
Upper quartile	0.16	0.17	0.25	0.41	*3 149*
N	*2 998*	*3 135*	*3 153*	*3 203*	*12 489*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.3: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1970.

Immobility index: 2.75	Daughters				
Married fathers (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.29	0.29	0.24	0.18	*3 072*
Lower middle quartile	0.26	0.27	0.27	0.20	*3 129*
Upper middle quartile	0.23	0.24	0.26	0.26	*3 108*
Upper quartile	0.20	0.19	0.24	0.37	*3 102*
N	*3 073*	*3 083*	*3 139*	*3 116*	*12 411*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.4: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.75	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married fathers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.29	0.29	0.24	0.18	*2 832*
Lower middle quartile	0.26	0.27	0.27	0.20	*2 930*
Upper middle quartile	0.24	0.24	0.26	0.26	*2 933*
Upper quartile	0.20	0.19	0.24	0.37	*2 933*
N	*2 854*	*2 888*	*2 954*	*2 932*	*11 628*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.5: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1970.

Immobility index: 2.60	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.28	0.27	0.24	0.22	*3 410*
Lower middle quartile	0.25	0.25	0.26	0.25	*3 510*
Upper middle quartile	0.24	0.25	0.25	0.25	*3 531*
Upper quartile	0.22	0.23	0.26	0.29	*3 335*
N	*3 388*	*3 452*	*3 468*	*3 478*	*13 786*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.6: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.60	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.27	0.27	0.24	0.22	*3 159*
Lower middle quartile	0.24	0.25	0.26	0.25	*3 286*
Upper middle quartile	0.24	0.25	0.25	0.25	*3 238*
Upper quartile	0.21	0.23	0.26	0.30	*2 806*
N	*2 998*	*3 135*	*3 153*	*3 203*	*12 489*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.7: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1970.

Immobility index: 2.66	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.29	0.27	0.25	0.20	*3 217*
Lower middle quartile	0.25	0.27	0.25	0.23	*3 209*
Upper middle quartile	0.23	0.25	0.26	0.26	*3 161*
Upper quartile	0.22	0.21	0.25	0.32	*3 211*
N	*3 173*	*3 204*	*3 210*	*3 211*	*12 798*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.8: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.66	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.28	0.26	0.25	0.21	*2 965*
Lower middle quartile	0.25	0.27	0.26	0.23	*3 005*
Upper middle quartile	0.23	0.25	0.26	0.26	*2 925*
Upper quartile	0.22	0.21	0.25	0.32	*2 733*
N	*2 854*	*2 888*	*2 954*	*2 932*	*11 628*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.9: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.82	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Married fathers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.31	0.28	0.23	0.17	*4 441*
Lower middle quartile	0.25	0.28	0.27	0.19	*4 536*
Upper middle quartile	0.22	0.25	0.27	0.26	*4 549*
Upper quartile	0.17	0.19	0.25	0.39	*4 612*
N	*4 344*	*4 543*	*4 604*	*4 647*	*18 138*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.10: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1990.

Immobility index: 2.82		Sons			
Married fathers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.31	0.28	0.24	0.17	*3 978*
Lower middle quartile	0.25	0.28	0.27	0.20	*4 239*
Upper middle quartile	0.22	0.25	0.27	0.27	*4 229*
Upper quartile	0.16	0.19	0.25	0.40	*4 222*
N	*3 885*	*4 185*	*4 272*	*4 326*	*16 668*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.11: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.78		Daughters			
Married fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.30	0.28	0.25	0.18	*4 050*
Lower middle quartile	0.27	0.27	0.26	0.19	*4 274*
Upper middle quartile	0.22	0.25	0.26	0.27	*4 294*
Upper quartile	0.18	0.20	0.24	0.38	*4 236*
N	*4 086*	*4 204*	*4 254*	*4 310*	*16 854*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.12: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1990.

Immobility index: 2.78		Daughters			
Married fathers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.30	0.27	0.25	0.18	*3 612*
Lower middle quartile	0.27	0.28	0.26	0.19	*3 972*
Upper middle quartile	0.22	0.25	0.26	0.27	*3 972*
Upper quartile	0.18	0.20	0.24	0.38	*3 889*
N	*3 710*	*3 827*	*3 932*	*3 976*	*15 445*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.13: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.63	Sons				
Married mothers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.27	0.27	0.25	0.22	*4 702*
Lower middle quartile	0.24	0.26	0.26	0.24	*4 664*
Upper middle quartile	0.24	0.25	0.25	0.25	*4 582*
Upper quartile	0.20	0.23	0.25	0.32	*4 458*
N	*4 433*	*4 620*	*4 657*	*4 696*	*18 406*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.14: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1990.

Immobility index: 2.64	Sons				
Married mothers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.26	0.27	0.25	0.22	*4 347*
Lower middle quartile	0.24	0.26	0.26	0.24	*4 404*
Upper middle quartile	0.24	0.25	0.26	0.26	*4 139*
Upper quartile	0.19	0.23	0.26	0.33	*3 778*
N	*3 885*	*4 185*	*4 272*	*4 326*	*16 668*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.15: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.71	Daughters				
Married mothers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.30	0.26	0.23	0.21	*4 206*
Lower middle quartile	0.26	0.27	0.25	0.23	*4 403*
Upper middle quartile	0.23	0.26	0.26	0.25	*4 313*
Upper quartile	0.18	0.21	0.27	0.34	*4 180*
N	*4 165*	*4 264*	*4 321*	*4 352*	*17 102*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.1.16: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1990.

Immobility index: 2.72	Daughters				
Married mothers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.29	0.26	0.24	0.21	*3 887*
Lower middle quartile	0.25	0.26	0.25	0.23	*4 127*
Upper middle quartile	0.23	0.26	0.26	0.26	*3 887*
Upper quartile	0.18	0.20	0.27	0.35	*3 544*
N	*3 710*	*3 827*	*3 932*	*3 976*	*feil*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

C.2.2 Disrupted families due to divorce and separation

Table C.2.2.1: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1970.

Immobility index: 2.55	Sons				
Divorced fathers (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.39	0.18	0.21	0.22	*119*
Lower middle quartile	0.42	0.32	0.16	0.10	*73*
Upper middle quartile	0.42	0.12	0.30	0.16	*57*
Upper quartile	0.24	0.27	0.22	0.27	*63*
N	*116*	*69*	*68*	*59*	*312*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.2: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1970 and 1980.

Immobility index: 2.74	Sons				
Married (1970) and divorced (1980) fathers	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.40	0.23	0.20	0.17	*210*
Lower middle quartile	0.37	0.26	0.21	0.16	*140*
Upper middle quartile	0.21	0.23	0.31	0.24	*166*
Upper quartile	0.26	0.26	0.24	0.24	*168*
N	*214*	*169*	*164*	*137*	*684*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.3: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.69	Sons				
Divorced fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.39	0.22	0.21	0.19	*329*
Lower middle quartile	0.39	0.28	0.19	0.14	*213*
Upper middle quartile	0.26	0.21	0.31	0.22	*223*
Upper quartile	0.26	0.26	0.23	0.25	*231*
N	*330*	*238*	*232*	*196*	*996*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.4: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1970.

Immobility index: 2.37	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.30	0.29	0.20	0.20	*83*
Lower middle quartile	0.26	0.19	0.25	0.30	*53*
Upper middle quartile	0.37	0.19	0.16	0.27	*67*
Upper quartile	0.23	0.32	0.13	0.32	*75*
N	*81*	*71*	*51*	*75*	*278*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.5: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1970 and 1980.

Immobility index: 2.81	Daughters				
Married (1970) and	Lower	Lower middle	Upper middle	Upper	*N*
divorced (1980) fathers	quartile	quartile	quartile	quartile	
Lower quartile	0.33	0.28	0.21	0.18	*190*
Lower middle quartile	0.34	0.24	0.25	0.17	*151*
Upper middle quartile	0.21	0.28	0.22	0.29	*141*
Upper quartile	0.22	0.21	0.21	0.37	*145*
N	*176*	*159*	*138*	*154*	*627*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.6: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.67	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.32	0.28	0.21	0.19	*273*
Lower middle quartile	0.32	0.23	0.25	0.21	*204*
Upper middle quartile	0.26	0.25	0.20	0.28	*208*
Upper quartile	0.22	0.25	0.18	0.35	*220*
N	*257*	*230*	*189*	*229*	*905*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.7: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1970.

Immobility index: 2.29	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.39	0.29	0.22	0.10	*49*
Lower middle quartile	0.20	0.20	0.32	0.27	*44*
Upper middle quartile	0.52	0.13	0.17	0.18	*77*
Upper quartile	0.34	0.25	0.21	0.20	*142*
N	*116*	*69*	*68*	*59*	*312*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.8: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1970 and 1980.

Immobility index: 2.66	Sons				
Married (1970) and	Lower	Lower middle	Upper middle	Upper	*N*
divorced (1980) mothers	quartile	quartile	quartile	quartile	
Lower quartile	0.39	0.28	0.16	0.17	*69*
Lower middle quartile	0.34	0.31	0.18	0.17	*89*
Upper middle quartile	0.35	0.26	0.23	0.15	*168*
Upper quartile	0.27	0.22	0.27	0.23	*358*
N	*214*	*169*	*164*	*137*	*684*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.9: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.54	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.39	0.28	0.19	0.14	*118*
Lower middle quartile	0.29	0.28	0.23	0.20	*133*
Upper middle quartile	0.40	0.22	0.21	0.16	*245*
Upper quartile	0.29	0.23	0.26	0.22	*500*
N	*330*	*238*	*232*	*196*	*996*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.10: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1970.

Immobility index: 2.74	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.56	0.21	0.12	0.12	*34*
Lower middle quartile	0.30	0.32	0.18	0.20	*50*
Upper middle quartile	0.31	0.13	0.29	0.27	*62*
Upper quartile	0.21	0.30	0.15	0.33	*132*
N	*81*	*71*	*51*	*75*	*278*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.11: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1970 and 1980.

Immobility index: 2.57	Daughters				
Married (1970) and	Lower	Lower middle	Upper middle	Upper	*N*
divorced (1980) mothers	quartile	quartile	quartile	quartile	
Lower quartile	0.31	0.25	0.23	0.21	*61*
Lower middle quartile	0.39	0.23	0.19	0.20	*75*
Upper middle quartile	0.30	0.30	0.17	0.22	*138*
Upper quartile	0.24	0.24	0.25	0.27	*353*
N	*176*	*159*	*138*	*154*	*627*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.12: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.63	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.40	0.23	0.19	0.18	*95*
Lower middle quartile	0.35	0.26	0.18	0.20	*125*
Upper middle quartile	0.31	0.25	0.21	0.24	*200*
Upper quartile	0.24	0.26	0.22	0.29	*485*
N	*257*	*230*	*189*	*229*	*905*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.13: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.62	Sons				
Divorced fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.40	0.26	0.19	0.16	*458*
Lower middle quartile	0.34	0.27	0.22	0.16	*273*
Upper middle quartile	0.36	0.22	0.23	0.20	*286*
Upper quartile	0.33	0.20	0.17	0.31	*279*
N	*469*	*309*	*259*	*259*	*1 296*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.14: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980 and 1990.

Immobility index: 2,76	Sons				
Married (1980) and divorced (1990) fathers	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.37	0.27	0.19	0.18	*426*
Lower middle quartile	0.32	0.30	0.23	0.15	*264*
Upper middle quartile	0.29	0.24	0.25	0.22	*299*
Upper quartile	0.27	0.17	0.23	0.33	*360*
N	*425*	*328*	*299*	*297*	*1 349*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.15: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1990.

Immobility index: 2.70	Sons				
Divorced fathers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.38	0.26	0.19	0.17	*884*
Lower middle quartile	0.33	0.29	0.23	0.15	*537*
Upper middle quartile	0.32	0.23	0.24	0.21	*585*
Upper quartile	0.29	0.18	0.21	0.32	*639*
N	*894*	*637*	*558*	*556*	*2 645*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.16: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.65	Daughters				
Divorced fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.36	0.25	0.24	0.15	*382*
Lower middle quartile	0.31	0.31	0.23	0.15	*262*
Upper middle quartile	0.31	0.23	0.25	0.21	*229*
Upper quartile	0.29	0.22	0.21	0.29	*234*
N	*356*	*282*	*259*	*210*	*1 107*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.17: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980 and 1990.

Immobility index: 2.78	Daughters				
Married (1980) and divorced (1990) fathers	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.27	0.34	0.23	0.16	*382*
Lower middle quartile	0.33	0.25	0.25	0.17	*274*
Upper middle quartile	0.25	0.28	0.24	0.23	*298*
Upper quartile	0.19	0.21	0.22	0.38	*314*
N	*327*	*345*	*296*	*300*	*1 268*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.18: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1990.

Immobility index: 2.73	Daughters				
Divorced fathers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.31	0.30	0.23	0.16	*764*
Lower middle quartile	0.32	0.28	0.24	0.16	*536*
Upper middle quartile	0.28	0.26	0.24	0.22	*527*
Upper quartile	0.23	0.21	0.22	0.34	*548*
N	*683*	*627*	*555*	*510*	*2 375*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.19: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.53	Sons				
Divorced mothers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.43	0.23	0.19	0.15	*250*
Lower middle quartile	0.33	0.27	0.20	0.19	*221*
Upper middle quartile	0.38	0.24	0.19	0.19	*349*
Upper quartile	0.32	0.23	0.21	0.24	*476*
N	*469*	*309*	*259*	*259*	*1 296*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.20: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980 and 1990.

Immobility index: 2.62	Sons				
Married (1980) and divorced (1990) mothers	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.38	0.29	0.18	0.16	*213*
Lower middle quartile	0.32	0.28	0.18	0.22	*165*
Upper middle quartile	0.32	0.24	0.24	0.20	*374*
Upper quartile	0.29	0.22	0.24	0.25	*597*
N	*425*	*328*	*299*	*297*	*1 349*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.21: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1990.

Immobility index: 2.58	Sons				
Divorced mothers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.40	0.26	0.18	0.16	*463*
Lower middle quartile	0.33	0.27	0.19	0.20	*386*
Upper middle quartile	0.35	0.24	0.21	0.20	*723*
Upper quartile	0.31	0.22	0.23	0.25	*1 073*
N	*894*	*637*	*558*	*556*	*2 645*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.22: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.66	Daughters				
Divorced mothers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.40	0.23	0.18	0.19	*210*
Lower middle quartile	0.37	0.31	0.19	0.13	*207*
Upper middle quartile	0.32	0.23	0.28	0.17	*270*
Upper quartile	0.26	0.26	0.25	0.23	*420*
N	*356*	*282*	*259*	*210*	*1 107*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.23: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980 and 1990.

Immobility index: 2.70	Daughters				
Married (1980) and divorced (1990) mothers	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.34	0.27	0.18	0.21	*181*
Lower middle quartile	0.34	0.26	0.20	0.20	*182*
Upper middle quartile	0.26	0.32	0.23	0.18	*345*
Upper quartile	0.20	0.24	0.26	0.29	*560*
N	*327*	*345*	*296*	*300*	*1 268*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.24: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1990.

Immobility index: 2.69	Daughters				
Divorced mothers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.37	0.25	0.18	0.20	*391*
Lower middle quartile	0.35	0.29	0.20	0.16	*389*
Upper middle quartile	0.29	0.28	0.25	0.18	*615*
Upper quartile	0.23	0.25	0.26	0.27	*980*
N	*683*	*627*	*555*	*510*	*2 375*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.25: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Single parent families observed in 1980.

Immobility index: 2.70	Sons				
Divorced fathers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.38	0.23	0.21	0.18	*254*
Lower middle quartile	0.41	0.28	0.18	0.13	*165*
Upper middle quartile	0.26	0.23	0.31	0.21	*190*
Upper quartile	0.27	0.25	0.23	0.25	*177*
N	*260*	*192*	*183*	*151*	*786*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.26: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Step families observed in 1980.

Immobility index: 2.62	Sons				
Divorced fathers (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.44	0.17	0.19	0.20	*75*
Lower middle quartile	0.33	0.27	0.23	0.17	*48*
Upper middle quartile	0.30	0.09	0.33	0.27	*33*
Upper quartile	0.20	0.31	0.24	0.24	*54*
N	*70*	*46*	*49*	*45*	*210*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.27: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Single parent families observed in 1980.

Immobility index: 2.72	Daughters				
Married fathers (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.32	0.29	0.22	0.17	*226*
Lower middle quartile	0.35	0.24	0.24	0.18	*171*
Upper middle quartile	0.24	0.28	0.21	0.28	*170*
Upper quartile	0.24	0.23	0.18	0.34	*164*
N	*213*	*191*	*155*	*172*	*731*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.28: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Step families observed in 1980.

Immobility index: 2.42	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.32	0.26	0.17	0.26	*47*
Lower middle quartile	0.21	0.15	0.27	0.36	*33*
Upper middle quartile	0.34	0.16	0.18	0.32	*38*
Upper quartile	0.16	0.29	0.18	0.38	*56*
N	*44*	*39*	*34*	*57*	*174*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.29: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Single parent families observed in 1980.

Immobility index: 2.65	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.42	0.28	0.16	0.13	*92*
Lower middle quartile	0.33	0.28	0.24	0.16	*83*
Upper middle quartile	0.39	0.24	0.22	0.16	*194*
Upper quartile	0.29	0.23	0.25	0.23	*417*
N	*260*	*192*	*183*	*151*	*786*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.30: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Step families observed in 1980.

Immobility index: 2.26	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.27	0.27	0.27	0.19	*26*
Lower middle quartile	0.24	0.28	0.20	0.28	*50*
Upper middle quartile	0.47	0.16	0.20	0.18	*51*
Upper quartile	0.33	0.20	0.27	0.20	*83*
N	*70*	*46*	*49*	*45*	*210*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.31: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Single parent families observed in 1980.

Immobility index: 2.75	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.32	0.29	0.23	0.16	*273*
Lower middle quartile	0.30	0.30	0.17	0.23	*165*
Upper middle quartile	0.21	0.28	0.21	0.29	*131*
Upper quartile	0.19	0.23	0.28	0.31	*167*
N	*198*	*203*	*165*	*170*	*736*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.32: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Step families observed in 1980.

Immobility index: 3.12	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.27	0.55	0.18	0.00	*11*
Lower middle quartile	0.00	0.00	0.50	0.50	*2*
Upper middle quartile	0.00	0.50	0.50	0.00	*2*
Upper quartile	0.20	0.00	0.40	0.40	*5*
N	*4*	*7*	*6*	*3*	*20*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.33: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Single parent families observed in 1990.

Immobility index: 2.73	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1980)	quartile	quartile	quartile	quartile	
Lower quartile	0.38	0.28	0.18	0.16	*678*
Lower middle quartile	0.33	0.29	0.23	0.14	*426*
Upper middle quartile	0.32	0.23	0.24	0.21	*455*
Upper quartile	0.30	0.17	0.22	0.32	*504*
N	*697*	*502*	*441*	*423*	*2 063*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.34: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Step families observed in 1990.

Immobility index: 2.58	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.39	0.22	0.19	0.20	*206*
Lower middle quartile	0.34	0.26	0.21	0.19	*111*
Upper middle quartile	0.32	0.22	0.25	0.20	*130*
Upper quartile	0.27	0.24	0.16	0.33	*135*
N	*197*	*135*	*117*	*133*	*582*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.35: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Single parent families observed in 1990.

Immobility index: 2.78	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married fathers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.31	0.30	0.23	0.15	*601*
Lower middle quartile	0.32	0.29	0.24	0.15	*417*
Upper middle quartile	0.26	0.26	0.24	0.24	*416*
Upper quartile	0.21	0.22	0.22	0.35	*439*
N	*522*	*507*	*437*	*407*	*1 873*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.36: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Step families observed in 1990.

Immobility index: 2.55	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced fathers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.31	0.28	0.23	0.18	*163*
Lower middle quartile	0.32	0.24	0.24	0.20	*119*
Upper middle quartile	0.33	0.23	0.28	0.15	*111*
Upper quartile	0.32	0.18	0.19	0.30	*109*
N	*161*	*120*	*118*	*103*	*502*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.37: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Single parent families observed in 1990.

Immobility index: 2.57	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.41	0.27	0.18	0.15	*330*
Lower middle quartile	0.32	0.28	0.19	0.21	*275*
Upper middle quartile	0.36	0.24	0.22	0.18	*589*
Upper quartile	0.30	0.23	0.23	0.24	*869*
N	*697*	*502*	*441*	*423*	*2 063*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.38: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Step families.

Immobility index: 2.62	Sons				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.40	0.23	0.20	0.18	*133*
Lower middle quartile	0.35	0.25	0.22	0.18	*111*
Upper middle quartile	0.31	0.26	0.18	0.25	*134*
Upper quartile	0.31	0.21	0.21	0.27	*204*
N	*197*	*135*	*117*	*133*	*582*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.39: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Single parent families observed in 1990.

Immobility index: 2.72	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Married mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.39	0.24	0.18	0.19	*276*
Lower middle quartile	0.37	0.30	0.17	0.16	*280*
Upper middle quartile	0.28	0.29	0.25	0.18	*504*
Upper quartile	0.21	0.26	0.27	0.27	*813*
N	*522*	*507*	*437*	*407*	*1 873*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.2.40: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Step families observed in 1990.

Immobility index: 2.60	Daughters				
	Lower	Lower middle	Upper middle	Upper	*N*
Divorced mothers (1970)	quartile	quartile	quartile	quartile	
Lower quartile	0.34	0.25	0.19	0.22	*115*
Lower middle quartile	0.32	0.26	0.27	0.16	*109*
Upper middle quartile	0.31	0.24	0.29	0.16	*111*
Upper quartile	0.32	0.22	0.21	0.26	*167*
N	*161*	*120*	*118*	*103*	*502*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is measured is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

C.2.3 Disrupted families due to death of one parent

Table C.2.3.1: 1960 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.58	Sons				
	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Widowers (1980)					
Lower quartile	0.33	0.22	0.20	0.24	*54*
Lower middle quartile	0.27	0.30	0.21	0.21	*56*
Upper middle quartile	0.40	0.10	0.17	0.33	*30*
Upper quartile	0.11	0.25	0.39	0.25	*28*
N	*48*	*39*	*39*	*42*	*168*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.2: 1960 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.99	Daughters				
	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Widowers (1980)					
Lower quartile	0.44	0.14	0.20	0.22	*50*
Lower middle quartile	0.27	0.29	0.31	0.13	*48*
Upper middle quartile	0.09	0.32	0.44	0.15	*34*
Upper quartile	0.21	0.17	0.29	0.33	*24*
N	*43*	*36*	*47*	*30*	*156*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.3: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1970.

Immobility index: 2,67	Sons				
	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Widows (1970)					
Lower quartile	0.39	0.27	0.22	0.12	*109*
Lower middle quartile	0.20	0.30	0.25	0.25	*60*
Upper middle quartile	0.29	0.24	0.18	0.29	*45*
Upper quartile	0.25	0.20	0.23	0.32	*44*
N	*79*	*67*	*57*	*55*	*258*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.4: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1970 and 1980.

Immobility index: 2.70	Sons				
Married mothers (1970) and widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.34	0.25	0.24	0.18	*182*
Lower middle quartile	0.36	0.27	0.20	0.18	*135*
Upper middle quartile	0.26	0.20	0.26	0.28	*125*
Upper quartile	0.20	0.25	0.28	0.27	*171*
N	*176*	*148*	*151*	*138*	*613*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.5: 1960 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.69	Sons				
Widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.36	0.25	0.23	0.15	*291*
Lower middle quartile	0.31	0.28	0.22	0.20	*195*
Upper middle quartile	0.27	0.21	0.24	0.28	*170*
Upper quartile	0.21	0.24	0.27	0.28	*215*
N	*255*	*215*	*208*	*193*	*871*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.6: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1970.

Immobility index: 2.75	Daughters				
Widows (1970)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.30	0.30	0.25	0.15	*93*
Lower middle quartile	0.39	0.16	0.21	0.24	*38*
Upper middle quartile	0.17	0.23	0.23	0.37	*35*
Upper quartile	0.21	0.23	0.30	0.26	*47*
N	*59*	*53*	*53*	*48*	*213*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.7: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1970 and 1980.

Immobility index: 2.77	Daughters				
Married mothers (1970) and widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.33	0.30	0.22	0.15	*191*
Lower middle quartile	0.27	0.33	0.16	0.23	*129*
Upper middle quartile	0.22	0.31	0.21	0.26	*98*
Upper quartile	0.18	0.22	0.27	0.33	*125*
N	*143*	*157*	*118*	*125*	*543*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.8: 1960 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.76	Daughters				
Widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.32	0.30	0.23	0.15	*284*
Lower middle quartile	0.30	0.29	0.17	0.23	*167*
Upper middle quartile	0.21	0.29	0.22	0.29	*133*
Upper quartile	0.19	0.22	0.28	0.31	*172*
N	*202*	*210*	*171*	*173*	*756*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.9: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980.

Immobility index: 2.54	Sons				
Widowers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.24	0.35	0.35	0.06	*17*
Lower middle quartile	0.20	0.40	0.30	0.10	*10*
Upper middle quartile	0.20	0.20	0.30	0.30	*10*
Upper quartile	0.25	0.50	0.00	0.25	*4*
N	*9*	*14*	*12*	*6*	*41*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.10: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1980 and 1990.

Immobility index: 2.90			Sons		
Married fathers (1980) and widowers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.43	0.22	0.22	0.14	*37*
Lower middle quartile	0.30	0.21	0.27	0.21	*33*
Upper middle quartile	0.24	0.43	0.24	0.10	*21*
Upper quartile	0.10	0.20	0.37	0.33	*30*
N	*34*	*30*	*33*	*24*	*121*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.11: 1970 cohort. Transition matrix with computed transition probabilities between fathers and sons. Family structure observed in 1990.

Immobility index: 2.86			Sons		
Widowers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.37	0.26	0.26	0.11	*54*
Lower middle quartile	0.28	0.26	0.28	0.19	*43*
Upper middle quartile	0.23	0.35	0.26	0.16	*31*
Upper quartile	0.12	0.24	0.32	0.32	*34*
N	*43*	*44*	*45*	*30*	*162*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.12: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980.

Immobility index: 2.22			Daughters		
Widowers (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.36	0.32	0.23	0.09	*22*
Lower middle quartile	0.43	0.14	0.21	0.21	*14*
Upper middle quartile	1.00	0.00	0.00	0.00	*2*
Upper quartile	0.00	0.25	0.50	0.25	*4*
N	*16*	*10*	*10*	*6*	*42*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.13: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1980 and 1990.

Immobility index: 3.05	Daughters				
Married fathers (1980) and widowers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.45	0.20	0.18	0.18	*56*
Lower middle quartile	0.50	0.25	0.18	0.07	*28*
Upper middle quartile	0.13	0.33	0.21	0.33	*24*
Upper quartile	0.21	0.18	0.18	0.42	*33*
N	*49*	*32*	*26*	*34*	*141*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.14: 1970 cohort. Transition matrix with computed transition probabilities between fathers and daughters. Family structure observed in 1990.

Immobility index: 2.96	Daughters				
Widowers (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.42	0.23	0.19	0.15	*78*
Lower middle quartile	0.48	0.21	0.19	0.12	*42*
Upper middle quartile	0.19	0.31	0.19	0.31	*26*
Upper quartile	0.19	0.19	0.22	0.41	*37*
N	*65*	*42*	*36*	*40*	*183*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.15: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980.

Immobility index: 2.89	Sons				
Widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.39	0.22	0.20	0.18	*127*
Lower middle quartile	0.34	0.24	0.34	0.07	*41*
Upper middle quartile	0.28	0.23	0.38	0.13	*40*
Upper quartile	0.21	0.17	0.31	0.31	*29*
N	*81*	*52*	*64*	*40*	*237*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.16: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1980 and 1990.

Immobility index: 2.52	Sons				
Married mothers (1980) and widows (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.31	0.27	0.23	0.20	*142*
Lower middle quartile	0.36	0.23	0.24	0.17	*95*
Upper middle quartile	0.28	0.32	0.22	0.19	*69*
Upper quartile	0.31	0.30	0.19	0.19	*83*
N	*123*	*107*	*86*	*73*	*389*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.17: 1970 cohort. Transition matrix with computed transition probabilities between mothers and sons. Family structure observed in 1990.

Immobility index: 2.63	Sons				
Widows (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.35	0.25	0.22	0.19	*269*
Lower middle quartile	0.35	0.24	0.27	0.14	*136*
Upper middle quartile	0.28	0.28	0.28	0.17	*109*
Upper quartile	0.29	0.27	0.22	0.22	*112*
N	*204*	*159*	*150*	*113*	*626*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.18: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980.

Immobility index: 2.49	Daughters				
Widows (1980)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.39	0.27	0.17	0.16	*92*
Lower middle quartile	0.22	0.32	0.14	0.32	*50*
Upper middle quartile	0.24	0.33	0.12	0.30	*33*
Upper quartile	0.30	0.30	0.22	0.17	*23*
N	*62*	*59*	*32*	*45*	*198*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.19: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1980 and 1990.

Immobility index: 2.85	Daughters				
Married mothers (1980) and widows (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.43	0.22	0.17	0.18	*138*
Lower middle quartile	0.31	0.33	0.22	0.14	*94*
Upper middle quartile	0.36	0.23	0.20	0.21	*81*
Upper quartile	0.14	0.16	0.42	0.28	*76*
N	*128*	*92*	*93*	*76*	*389*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.

Table C.2.3.20: 1970 cohort. Transition matrix with computed transition probabilities between mothers and daughters. Family structure observed in 1990.

Immobility index: 2.75	Daughters				
Widows (1990)	Lower quartile	Lower middle quartile	Upper middle quartile	Upper quartile	*N*
Lower quartile	0.41	0.24	0.17	0.17	*230*
Lower middle quartile	0.28	0.33	0.19	0.20	*144*
Upper middle quartile	0.32	0.26	0.18	0.24	*114*
Upper quartile	0.18	0.19	0.37	0.25	*99*
N	*190*	*151*	*125*	*121*	*587*

Note: The quartiles refer to the position of the person in question relative to the income distribution of his or her cohort. The person's income is the average of log annual income over a period of five years. The year in which the family structure is observed is depicted in parenthesis. *N* depicts the number of children and parents in the respective quartiles.