THE IMPACT OF FAMILY COMPOSITION ON ADULT EARNINGS

Frida Skog
Table of Contents

Table of Contents i
Abstract iii
List of original papers in the thesis v
Acknowledgements vii
Introduction 1
Theoretical framework 3
  Contextual factors 4
  Previous literature on family composition and child outcomes 6
Data and Method 13
  Unconfoundedness 14
Papers I–IV 17
  Paper I: Effects of spacing and sibship size on adult earnings: results from a
    propensity score matching on a population-based cohort. 17
  Paper II: Sibling effects on adult earnings among poor and wealthy children:
    Evidence from Sweden. 18
  Paper III: Long-term effects of parental divorce: a population-based causal
    analysis 19
  Paper IV: Children of divorce: The effect of post-divorce family re-formation on
    children’s future earnings 20
Conclusions 21
References 25
Abstract

Background This thesis addresses to what extent childhood family composition contributes to variations in adult earnings. Family composition refers both to the number of children in a family (i.e., siblings), the arrangement or organisation of that family system, whether the parents reside together or whether there are non-parental adults and/or half-siblings in the household or not (i.e., parental divorce, parental remarriage, single mother households and half-siblings). The births of siblings, a divorce, and a family re-formation are events through which the composition of the family and the resources surrounding a child may change. The theoretical framework I employ draws on economic theories, focusing on the investments that parents are able to make in their children. A key assumption is that different family constellations increase or decrease the conditions for allocating resources within the family. While previous research has shown that siblings, as well as divorce and remarriage, are negatively linked to child outcomes, there are inconsistencies in the literature. There has been debate over the unconfoundedness of previous studies, something that is handled here by analysing large sets of representative data using a robust parameter. The longitudinal dataset used is based on Swedish administrative data and the cohorts analysed is born in the beginning of the 1970s.

Method There has been a rapid development in statistical theory concerning estimation of causal effects with observational data. Adjusting for circumstances that precede the treatment variables of interest is important for the methodological framework chosen here; causal inference with potential outcomes. Here, adjustment is made using a scalar function called the propensity score. The propensity score is a summarising function of the confounding variables. One argument for using propensity score matching here is that the estimated quantities are nonparametrically identified.

Results The findings show that number of siblings impacts negatively on adult earnings. However, it is not always of concern. For example, no effect of siblings is found in affluent families, and if siblings are closely spaced this results in better outcomes for children. For children growing up in poverty it is better to have one sibling than to be an only child, and this effect is more pronounced for firstborn children. Divorce, remarriage and half-siblings do not seem to lower the future earnings of children.
**Conclusion** A key conclusion of this thesis are that some of the most well-established patterns in the sociology of the family, namely the link between number of siblings and adult earnings, and between divorce/family reformation and adult earnings, can be broken by resources.
List of original papers in the thesis

I. Frida Skog, Daniel Larsson, Ingeborg Waernbaum and Urban Lindgren (manuscript): Effects of spacing and sibship size on adult earnings: results from a propensity score matching on a population-based cohort.


Acknowledgements

This dissertation could not have been completed without the contributions of others. I wish to offer my most heartfelt thanks to the following – for your time, and for your efforts:

To my supervisors, Rune Åberg and Daniel Larsson, for not letting me slip through the cracks, for tireless commitment, selfless care and immense patience. Rune, your integrity, honesty and kindness have impressed me deeply – I am taking that with me. Daniel, I genuinely admire the engagement and passion you bring to every new subject or task, it is an ability that is so inspiring to me. Sincerely, thank you both.

To Karina Nilsson and Urban Lindgren for providing funding and giving me the opportunity to participate in the Umeå SIMSAM research program and to work in the ASTRID data lab at the department of Geography and Economic History. Thank you both, and a special thank you also to Mats Borrie who was a part of our research team.

To Ingeborg Waernbaum for patience and for generously sharing your knowledge of and love for statistical theory, and for comments on the introductory chapter. To Anna Baranowska-Rataj for kind advice and detailed review of all four papers. To Jana Javornik for valuable suggestions on the manuscript. To Hanna Bertilsdotter-Rosqvist for reading and providing important feedback on the introductory chapter. To all of you for support, kind words of encouragement, warm hugs and friendship. Thank you.

To Jonas Edlund for commenting constructively on an early draft of this thesis, and to Marianne Sundström for a critical reading and review of the manuscript for the final seminar. To Mikael Hjerm and Ingemar Johansson Sevä for excellent advice and careful review of the full thesis. Thank you all for reading and giving me valuable feedback.

To Ragnar Lundström, Cristian Colliander, and Simon Lindgren for sharing knowledge of the crafts of coding and scientific writing, for caring, for countless lunches at ‘the shelf’ and above all, for keeping your sense of humour when I had lost mine. Thank you so much.

Umeå, November 2016

Frida Skog.
Introduction

The family context into which we are born has significant impact on the lives we are able to lead (Parsons, 1949; Becker, 1991). The adult outcomes of children do not reflect their individual attainments and efforts exclusively, but also the socioeconomic inequalities to which they are subjected (Corak, 2013; Knudsen et al., 2006). Family resources influence children’s lives in a range of different welfare dimensions, among them education and income. While the education, class, and financial status of parents are well-established predictors of child outcomes, and part of the reproduction of social inequalities, the focus of this thesis is on the role of childhood family composition for the future earnings of individuals.

Here, family composition refers both to the number of children in a family (i.e., siblings), and the arrangement or organisation of that family system, whether the parents reside together or whether there are non-parental adults and/or half-siblings in the household or not (i.e., parental divorce, parental remarriage, single mother households, and half-siblings). The practices of, and strategies for, parenting depend in part on the monetary, educational and emotional resources available to the individual parent, but they may also depend on the number of children and adults in the household. The births of siblings, a divorce, and a family re-formation are events through which the composition of the family and the resources surrounding a child may change significantly, as well as the allocation of resources within the family. Therefore, such events may also shape the impact of family resources on the reproduction of social inequalities. Investigating the effects of family composition is thus of great interest for sociologists studying social inequality. The organisation and distribution of resources varies between two-parent families, divorced families, families with only one child, and families with a large number of children. Accordingly, this thesis addresses how family composition affects the resources available to children and how this impacts on their adult earnings. Specifically, I analyse if the sibling constellation a child grows up in, and if the events of parental divorce, family re-formation and the birth of half-siblings, are linked to adult earnings.

I use adult earnings as the outcome variable, and as a proxy for living conditions. Earnings constitute an important measure of labour market success, and access to economic resources, both of which are of critical importance in modern capitalist economies. Earnings can be conceptualised as reflecting other possible outcomes, for example education and occupation,
access to social networks, housing standard, as well as an individual’s possibilities for buying material goods and living a healthy and stress-free life (Halleröd & Larsson, 2008). The extent to which earnings are related to family background is widely recognised as a measure of equality of opportunity (Corak, 2013).
Theoretical framework

The theoretical framework draws on economic theories, focusing on the 'investments' that parents are able to make in their children (Becker, 1974, 1991). Children’s adult outcomes have been suggested to be linked to household economy, family relations, and strains and stressors (Elder, 1994), all of which can be summed up with the concept of resources. Resources may thus be positive or negative in character; they encompass conditions such as social capital, familial cultures and characteristics, abilities, and health traits that may result in different kinds of parental investments in children. These resources shape the lives of children, and they affect the individual’s opportunities on the labour market (Roemer, 2004).

A key assumption is that different family constellations increase or decrease the conditions for allocating resources within the family. According to Foster (2002), economists have been concerned with different aspects of endowments and investments in children’s human capital in relation to the unequal distribution of adult outcomes, while sociologists have been investigating aspects of intergenerational class mobility and the role of the family in determining future life chances (see for example Blau & Duncan, 1967; Erikson & Goldthorpe, 1992). Instead of conceptualising the opportunities of individuals as determined by abilities and chance, Becker (1974) and Becker & Thomes (1976) propose that the family contributes to the human capital of children, through parental investments and care, and thus provides children with different opportunities for adult attainment. Resources are neither fixed nor mechanically transmitted to children from parents. The composition of families is also not fixed, and changes in family composition may both reduce mobility and drive inequality by altering parents’ investments, and thus the opportunities available to children (Corak, 2013).

Becker states that opportunities of individuals are constrained by the resources available to them. For Becker, resources may be material, such as income, but may also be of immaterial character such as time and cognitive capabilities. Behaviours are furthermore constrained by opportunities provided by the economy and the market, they are contingent on the actions of other people as well as by the institutional contexts in which they are situated. In Becker’s framework, individuals are understood as rational actors, but this is not primarily as regards specific behaviours of individuals, but rather in relation to the ways in which background characteristics
condition these opportunities on a more general level (Becker, 1991; Foster 2002; Corak, 2013).

Adult earnings are thus determined by the interaction between investment and opportunities. While some resources are sometimes assumed to be transmitted from parents to children by default, such as culture and genetics (Roemer, 2004), material investments in children are limited by income resources. In sociological research, both culture and genetic endowments have been suggested to correlate with financial resources (Halpern-Meekin & Turney, 2016). This means that the conditions for families to prepare their children for successful labour market attainment, i.e. adult earnings, are not equally distributed. Parents with scarce resources are forced to make limited investments in their children, and sometimes also to distribute income resources unevenly between siblings.

**Contextual factors**

When Becker developed his framework, social norms regulating family practices, and perhaps also the economic role of the family, had been in a state of change in the Western world for decades (Lee, 2015) – and particularly so in the Scandinavian countries (Lesthaeghe, 2010). The first signs emerged during the period between the 1950s and the 1970s, when sex, marriage and childbirth became increasingly separated, and when divorces and non-marital cohabitation increased, as did non-marital childbirth. Esping-Andersen & Billari (2015) have pointed out the importance of relating the theoretical framework of Becker to the second demographic transition (Lesthaeghe, 2010), primarily referring to the increased earning power of women as the economy developed in the Western world. Economic theories regarding the family emerged in relation to the social and demographic changes following the great depression and the Second World War such as changes in family roles (Bronfenbrenner, 1973; Coleman, 1974; Elder, 1979). In these theories, attention is directed to the ways in which social and institutional factors intersect during the life course of the individual, and the family is seen as the link between “the macroscopic events of economic decline and the micro world of children” (Elder, 1985).

Following these arguments, researchers aim to understand how family processes relate to social changes of more general character – such as increased gender equality and its consequences for families. Fertility and divorce rates are related to women’s increased economic independence (Becker, 1991), and the growth of the welfare state protected the individual rather than the family/household.

The cohorts chosen for analysis in this project were born in early 1970s Sweden. Considering the Swedish context from the 1970s and twenty years
onwards, changes regarding family norms and practices can be interpreted as responses to changing economic conditions (Ryder, 1965; Easterlin, 1973; Elder, 1985). This study focuses on times characterised by the increased economic independence of women, and changes in family life and fertility (Sobotka, 2008). It has been argued that some of these changes – including women’s economic independence, as well as postponed marriage and planned fertility – have produced resource gains for families. Other changes however – such as increased divorce rates and non-marital child births – have been suggested to be followed by resource losses for children (MacLanahan, 2004). It has also been suggested that these transitions have produced different outcomes, as regards educational and earnings, for different groups of women, and different opportunities accordingly also for their children (MacLanahan, 2004; Sobotka 2008).

Educational and occupational patterns shifted during this time, and class divergences in partnering and parenting therefore emerged (Haveman et al., 2004; McLanahan, 2004; Härkönen & Dronkers, 2006; Lundberg & Pollack, 2007). The expansion of women’s employment changed the roles, and the relationships between roles, within the family. It could thus be argued that families became less important as the responsibilities for the care and education of children were taken over by the welfare state. Some suggest that these transitions widened class-based inequalities between families, since educated and higher paid women have primarily pooled their resources with men whose positions are similar, or higher, to theirs. Highly resourceful dual-earner couples make significant marriage gains, while unemployment and economic hardship are more common among low-income households (Haveman et al., 2004; Esping-Andersen, 2009). All children did not, in other words, gain equally from the second demographic transition. Outcome differences between children in different classes may have been accentuated by family planning and maternal employment. Parental resources are after all largely determined by the parents’ labour market positions, but their economic well-being is also affected by welfare state policies. The interactions between families, labour markets and welfare state policies have the potential for either levelling the playing field for children, protecting them from resource losses or exacerbate diverging life paths.

The framework outlined above provides an understanding of individual opportunities as depending on resources. While institutions and other context-specific factors such as cultural norms shape the relative influence of family resources on adult earnings, parental investments in children depend not only on these factors. The amount of family resources invested in individual children also depend on the number of individuals competing for the same resources within the family. The composition of the family
conditions the allocation of resources to children, and thus also their adult outcomes. A divorce, or a transition into a single parent family, reduces the total amount of resources in the family. Additional children reduce the amounts invested in each child. The incidence of living with both parents, the number of siblings, and the possible presence of other non-parental adults in the household are all circumstances that may affect parental investments in children.

Family composition can be hypothesised to organise relationships and resources in a family in different ways. The consequences of having siblings may depend on family resources, as would the experiences of divorce and remarriage. The concept of resources and the presumed dilution of resources are furthermore complicated by the fact that additional individuals in the household may also bring resources to the family for distribution between its members. Both siblings and stepparents accordingly need to be recognised also as providers of resources for children. In this thesis, other aspects than the mere number of family members are also hypothesised to be of importance. These aspects include, for example, the age gap between siblings, sibling birth order, and whether the siblings are full biological siblings or not.

**Previous literature on family composition and child outcomes**

In a large number of empirical investigations, siblings have been conceptualised primarily as resource diluters rather than resources (see Blau & Duncan, 1967; Blake, 1981; Downey, 1995, 2001; Powell & Steelman, 1990; Zajonc & Marcus, 1975; Conley, 2001; and Steelman et al., 2002 for a review). This literature has observed negative associations between the number of siblings and child outcomes, such as educational performance and cognitive attainment. A general assumption of the often applied resource dilution model (Blake, 1981) is that parental resources such as capital, social and emotional support, and time spent with the child, are diluted by each additional sibling. The model also posits that negative effects of siblings should be particularly noticeable in poorer families, where resources are scarce to begin with (Steelman et al., 2002). In socioeconomic contexts where the majority of families are able to provide sufficiently for their needs, additional siblings may dilute the resources in a noticeable way only among those who are very poor (Phillips, 1999; Ponczek & Souza, 2012). Although the resource theory suggests that children without siblings should have better outcomes than children without siblings, other studies suggest that only children have more limited social and interpersonal skills (Downey & Condron, 2004), something that may lead to less favourable adult outcomes.
Most studies on the number of siblings have investigated education and various cognitive outcomes (Butcher & Case, 1994). Only a few have examined adult outcomes (for reviews see McHale et al., 2012; Steelman et al., 2002) and even fewer have estimated earnings outcomes (Kantarevic & Mechoulan, 2006; Lampi & Nordblom, 2012; Rainer & Siedler, 2009). Several studies are sibling correlation studies (Björklund et al., 2009; Schnitzlein, 2014), measuring what fraction of the variation between siblings can be attributed to the sharing of resources between siblings. While there is strong evidence of a negative relationship between sibling group size and education (Alwin, 1991; Downey, 1995, 2001; Lampi & Nordblom (2012), there are studies that suggest that the effect of sibship size are caused by selection (Black et al., 2005; Conley & Glauber 2006; Guo & VanWey, 1999; Rodgers et al., 2000) arguing that parents with many children differ from parents having only one or just a few children.

Most studies of sibship spacing show that close spacing between births constitutes a disadvantage for children (Buckles & Munnich, 2012; Downey et al., 1999; Powell & Steelman, 1990, 1993, 1995; Zajonc, 2001). Holding other family factors constant, Powell & Steelman (1993) have shown that close spacing increases the likelihood of dropping out of high school, but that this effect was not as strong as that of sibship size. Buckles & Munnich (2012) show that longer gaps between the firstborn and the secondborn child is related to better reading-test scores for the firstborns and that an increase in spacing causes better reading scores for older siblings. Findings that close spacing comes with adverse effects on children have been contested, and according to Rosenzweig and Zhang (2006) there is yet no convincing evidence that spacing has an independent effect on child outcomes, when accounting for family size, and that close sibling spacing may be beneficial for children due to economies of scale. Buckles & Munnich (2012) also find that the negative effect of close spacing is larger for children with low-earning parents, while the effect was not statistically significant for children with high-earnings parents.

The assumption that siblings provide social support as well as opportunities for fostering social competences is complicated by empirical findings showing the importance of birth order; firstborns seem to perform better than only children, secondborns, and thirdborns, and so on (Zajonc & Marcus, 1975). From these findings an additional hypothesis, the firstborn advantage, has emerged. To be a firstborn thus constitutes an advantage. However, if sibling gains are asymmetrically allocated, the arguments presented above regarding social support and social skills suggest that younger siblings should be performing better than the older ones. In part,
the firstborn advantage has been explained by the social training that firstborns receive from tutoring younger siblings. In part, it has also been explained by the resource dilution model since this assumes that the oldest child receives more parental resources than the following siblings do (Conley & Glauber, 2006). Whether financial constraints impact on the effect of birth order or not is still an open question however, as different patterns have been observed (Kantarevic & Mechoulan, 2006; De Haan, et al., 2014).

The effects of divorce and remarriage on children have been a question of significant importance for family researchers for a long time. In the context of this thesis, the negative effects of divorce are explained as related to decreased resources surrounding the child, in terms of money and parental time. We do know that divorce infers financial costs for both adults, i.e.; women, as well as their children due to the decline in household income, and a lower economic well-being than that of women and children in married families (Thompson et al., 1994; McLanahan, 2009; Lopoo & Deliere, 2014).

One strand of research has focused on the ways in which parental divorce during childhood influence the future family relations of children, i.e.; non-marital fertility and early childbearing (Ermisch & Francesconi, 2001; McLanahan & Bumpass, 1988), marital disruption (Gähler et al., 2009), and adolescent adjustment (Cavanagh, 2008). Another influential strand of research has focused on educational outcomes, including high school graduation (Haveman et al., 1991), years of schooling (Sandefur & Wells, 1999), education and occupational status (Amato, 2001; Biblarz & Raftery, 1993; Ermisch & Francesconi, 2001), educational transitions (Steele et al., 2009), and educational attainment in general (Jonsson & Gähler, 1997; Biblarz & Gottainer, 2000; Björklund et al., 2007). The results in general show that children of divorced parents have less favourable outcomes than children from intact families.

The literature is scarcer however, and the results are less clear, when looking specifically at the effects of divorce on adult earnings. As pointed out by McLanahan et al. (2013), studies on the consequences of childhood family dissolution on labour market outcomes generally suggest long-term adverse effects, but the empirical evidence for this is marked by inconsistencies. It has been found that dissolution is associated with lower wage rates and lower labour market status (Fronstin et al., 2001), a higher risk of unemployment during young adulthood (Caspi et al., 1998), and lower levels of labour market participation in general (Corak, 2001; Ermisch & Francesconi, 2001; Gruber, 2004). In closer relation to earnings and income, negative effects have been observed for income per capita and women’s earnings (Gruber, 2004), and men’s family income (Corak, 2001). While
previous research has found statistically modest, but significant, negative effects of parental absence (Corak, 2001; Lang & Zagorsky, 2001), as well as negative effects of unilateral divorce laws (Gruber, 2004) on wages and earnings, these studies have not specifically investigated exposure to divorce. Studies estimating adult outcomes, aiming at controlling for unobserved factors (Björklund et al., 2007) or economic well-being in childhood (Lopoo & DeLeire, 2014) have found that once these factors are controlled for, effects are small and statistically insignificant.

The literature is ambivalent as regards whether the empirically established correlation between divorce and child outcomes reflects a causal link, mediated by lost resources, or if results are biased because of a social selection, since economic hardship has also been shown to predict divorce (McLanahan et al., 2013). Progressive divorce laws and increased female labour market participation transform the mechanisms through which family context, divorce, and adult outcomes for children are mediated, primarily because they make women less economically dependent on marriage. The suggested pathways between divorce and negative outcomes for children – social stigma and psychological trauma, as well as loss of resources – should therefore be less prominent in the Swedish context and for children born in the early 1970s.

Divorce is furthermore followed by a heterogeneity of family constellations. There are reasons to believe that outcomes are dependent on the family constellation also after the divorce, since research focusing on other outcomes, such as emotional and health outcomes, shows that children in re-formed families perform poorer than children with single mothers (Biblarz & Raftery, 1999; MacLanahan & Sandefur, 1994). Even though parental divorce, remarriage and stepfamilies are no longer considered abnormal, it is commonly understood that the nuclear family provides children with more benefits than single mother families and stepfamilies do (Harcourt et al., 2013). In general, research also identifies negative cognitive and educational (Hawkins et al., 2007; Artis, 2007), as well as negative emotional and health outcomes for children from re-formed families (Barrett & Turner, 2005; Sweeney et al., 2009; Zill et al., 1993, see also Coleman et al., 2000; Portrie & Hill, 2005; Jeynes, 2006; Sweeney, 2010 for reviews).

Although previous research mainly observes negative relationships between stepfamilies and child outcomes, views differ between researchers regarding the effects of re-formation and half-siblings for the life chances of children (Coleman et al., 2000; Brown, 2004; Jeynes, 2006). Since the effects of siblings and divorce are considered to be associated with increased competition for resources due to more mouths to feed, or a decrease in
resources due to fewer resource providers, the issue of resource strain in stepfamilies is not entirely straightforward. The straining of resources is in this case suggested to be related to stress due to a lack of regulation of family relationships, i.e. between stepparents and children, and between half-siblings. When norms regulating family relationships are unclear, these relationships become strained and insecure. In the stepfamily, the resources of the resident parents may be shifted towards their new partner, rather than to their children, further depriving children of resources. Post-divorce re-formation of the family also exposes children to more transitions, which may increase stress and resource strain. Conversely, a remarriage could be beneficial for children by reinstating resources once lost through the divorce.

Taking family size into account complicates this reasoning however, since divorced single-mother families are commonly smaller than re-formed families. While it is reasonable to expect children to react negatively to major transitions in the family, the effect is less clear when the outcome is in the adulthood and not in childhood or juvenescence. While some researchers suggest that it is the disruption of the old family and the change of family constellation that matters, other researchers oppose the idea that family structure in itself explains the life chances of the child (Portrie & Hill, 2005).

The notion that children from families with certain sibling compositions, and children from divorced households, are affected by the family structure – and not by preceding circumstances – has been debated in the literature cited above. The data analysed in this thesis is Swedish administrative data, which enables longitudinal analysis covering several decades through demographic and socioeconomic variables. The data contains individual information for the entire population, and every individual is linked to their respective parents and siblings. Apart from the existence of these good quality data, Sweden provides an excellent case for testing the universality of the resource perspective. Primarily, this is because the resources surrounding a child are not only conditioned by parental traits and practices in Sweden, but in significant regards also by the welfare state. Policies aimed at families, such as childcare and child allowances, a generous parental leave program, extensive female labour market participation, and an educational system free of charge, can all be thought to moderate the effects of family composition on children. While it is not novel to focus on welfare consequences of changes in the family composition and in family relationships, this thesis contributes to the research field by investigating whether previously found associations still hold true in the Swedish context. Employing the propensity score matching technique on a large representative dataset, enables an analysis specifically of the causal effects of family composition on adult earnings.
While many researchers have been interested in aspects of family composition such as siblings, divorce and remarriage, and their link to a diverse range of outcomes such as education, cognitive and social skills, and health for a long period of time, effects in the long term has not garnered the same amount of research interest. Even though studies based on educational attainment and intellectual development are of importance, their outcomes constitute relatively crude proxies for assessing adult living conditions. In this thesis, I investigate the long-term outcomes by focusing on a variable that has not yet been thoroughly investigated previously, and in relation to which research is marked by inconsistencies, namely adult earnings.

In sum, the aim here is to analyse the outcomes, measured as adult earnings, for children growing up in different family compositions. To meet this aim, and in relation to the theoretical arguments discussed above, this thesis provides answers to the following research questions:

- Does growing up as an only child, and growing up with siblings, impact differently on adult earnings?

- What are the effects on adult earnings of growing up in a large sibling group as opposed to having fewer siblings?

- How does the birth spacing of siblings impact on adult earnings?

- Are the effects of sibling constellations on adult earnings contingent on the economic resources of the family?

- What is the impact of parental divorce on adult income inequality?

- Does post-divorce family re-formation have an effect on adult earnings?
**Data and Method**

The dataset used in this study is based on Swedish administrative data, containing information on a wide range of socioeconomic and demographic variables. It includes all individuals born in Sweden in 1973 who were still residing in Sweden in 2008. For paper II (Skog, manuscript a) the dataset is supplemented with additional cohorts and the analyses are employed on cohorts born 1971, 1972, 1973, and 1974, in order to provide larger sample sizes for the groups of interest in that specific study. The individuals are linked with anonymised identification numbers that make it possible to observe family relations within the population. The treatment variables are constructed with information from the registers on siblings, their birth years and whether they are sharing both or just one parent, dates for (parental) marriage, and dates for (parental) divorce and remarriage. Furthermore, it is possible to observe information on parents from the 1970 and 1975 censuses. The baseline variables used to describe childhood circumstances are from the censuses datasets, containing the closest pre-birth variables available. The covariates used for all four studies are gender, number of siblings, parental age, as well as origin, education and income, for both the mother and the father respectively. The outcome variable is adult earnings, received as employed or self-employed. It measures the mean earnings over a three-year period; for papers I (Skog et al., manuscript), III (Skog, manuscript b), and IV (Skog & Larsson, manuscript) 2006, 2007 and 2008, and for paper II (Skog, manuscript a) 2008, 2009, and 2010.

The longitudinal dataset makes it possible to follow individuals over time, monitoring events and their outcomes. The measurement sequence is in the order of cause and effect; first the changing factor, then the outcome. Any baseline imbalances between groups that may influence the selection to treatment and the outcome must be adjusted.

If family composition is an important factor on the pathway between childhood and adult earnings, it must have a causal impact on the outcome of concern. Since causality is central to the arguments presented here, an analytical method capable of handling this question is required. While family compositional variables such as divorce and number of siblings are not randomly distributed across different classes, we cannot assume that the outcomes associated with family composition are not linked to any other factor that is more common among parents who divorce or have a large number of children. Accounting for this selection is important in order not to over- or underestimate the causal effects under investigation (Rosenbaum & Rubin, 1983; Sekhon, 2011). Longitudinal data is required to provide...
observations of differences prior to changes in the family composition. There has been a rapid development in statistical theory concerning estimation of causal effects with observational data (Imbens & Wooldridge, 2009; Pearl, 2009; Imbens & Rubin, 2015). Adjusting for circumstances that precede the treatment variables of interest is important for the methodological framework chosen here; causal inference with potential outcomes. Assessing the impact of any change means making inferences about the outcomes that would have been observed for the individuals if the conditions had not changed. The effect estimators are defined as causal parameters, measuring the difference in mean outcome between individuals exposed to the causal factor and individuals that were not exposed to it. For each individual there are two potential outcomes, but only one observed. Estimating the non-observed potential outcome is conducted by imputing the counterfactual outcomes using the potential outcomes framework as described by Holland (1986), Rubin (1974; 2005), Rosenbaum (2002) and Pearl (2010). The non-observed potential outcome is inferred conditional on pre-treatment variables. This approach defines the total effect of a treatment on an outcome, including all mediating variables.

In this framework, a matching estimator compares each individual that experienced a change such as birth of a sibling or parental divorce with similar individuals that did not experience the change and use the difference between them as the causal effect of the change. Under an assumption of no unmeasured confounding, the two individuals differ only with respect to the experimental variable of interest, in this case birth of sibling or parental divorce for example. But being the only child or being part of a large family, or growing up with married parents or with a divorced and single mother is likely not independent of the socioeconomic conditions a child is born into. If these socioeconomic conditions affect both the probability of, for example, having many siblings or the parents’ divorce, and their outcomes, they are considered “confounding factors” and the critical exercise in all statistical analysis is (of course) to properly adjust for these factors. Here, adjustment is made using a scalar function called the propensity score. The propensity score is a summarising function of the confounding variables. Comparing individuals based on the propensity score has been proposed since if matching on the covariates is valid, so is matching on the propensity score. Matching on the covariates may be more difficult however, due to problems with high dimensionality of the vector (Rosenbaum & Rubin, 1983).

**Unconfoundedness**

While administrative data is generally recognised to be of good quality, one methodological concern that arises with observational data is that we cannot observe both outcome under treatment and outcome without treatment for
the same individual at the same time. Those under treatment may also in several regards differ from those who did not receive treatment. The assumption of ruling out selection based on observed covariates is known as unconfoundedness. The gold standard for achieving unconfoundedness is randomised experiments since randomisation is a robust instrument for unconfoundedness. While unconfoundedness is a strong assumption, it is commonly defined as having enough pre-treatment covariates so that conditional on these observables, assignment to treatment can be assumed to be random. Since most quantitative sociological studies – such as the ones presented here – rely on observational data, they require us to make assumptions of unconfoundedness. Different solutions to this selection problem have been proposed, for example regression adjustment, instrumental variable analysis and matching techniques such as propensity score matching (Stuart, 2010).

One argument for using propensity score matching here is that the quantities I aim to estimate are nonparametrically identified. This means that with the assumption of unconfoundedness, only one additional assumption needs to be made; the overlap assumption. By contrast, we would be required to make even more assumptions in order to conduct, for example, a regression adjustment or instrumental variable analysis, which relies on assumptions of functional form and distributional restrictions, not to mention the problem of finding a valid instrument in the observational dataset. In this case, relying on the richness of the data is more robust than using an instrument that might violate instrumental analysis assumptions. The overlap assumption concerns the similarity of the covariate distribution for the groups under comparison. This assumption is key and whether it holds or not cannot be overlooked, as it may be in cases using parametric models such as regression adjustment. The overlap in covariate distribution is easily evaluated by visual inspection of histograms or by assessing differences in means between the compared groups on each covariate. Lack of overlap means that we need to extrapolate the model without empirical support. This design is robust since it does not violate design requirements. Propensity score matching is an effective adjustment estimator when we have reason to suspect heterogeneity between groups under comparison – which one may have in regards to family composition.
Papers I–IV

The thesis comprises four studies, the results of which are presented and discussed in four articles:

**Paper I: Effects of spacing and sibship size on adult earnings: results from a propensity score matching on a population-based cohort.**

Authors: Frida Skog, Daniel Larsson, Ingeborg Waernbaum and Urban Lindgren. The authors conceived the topic and design of the paper together. Frida Skog, Daniel Larsson and Ingeborg Waernbaum performed the data analysis. Frida Skog and Daniel Larsson drafted the manuscript. Frida Skog, Daniel Larsson, Ingeborg Waernbaum and Urban Lindgren revised the manuscript and all authors have read and approved the final manuscript.

Paper I (Skog et al, manuscript) takes as its point of departure the fact that it is generally argued that the sibling constellation a child grows up with impacts on adult life chances (see for example Black et al., 2005; Downey, 2001; Kantarevic & Mechoulan, 2006; Zajonc & Sulloway, 2007; Lampi & Nordblom, 2012; and Schnitzlein, 2014; Blake, 1989; Falbo, 2012; Trent & Spitze, 2011; for reviews see McHale et al., 2012; Steelman et al., 2002). It investigates if adult earnings are affected by 1) being an only child, 2) having many siblings, and 3) close birth spacing between siblings. The results show that individuals having grown up with more than three siblings have substantially lower income in adulthood than those with fewer siblings. The results also show that those having a closely spaced sibling have higher income than those with a wider spaced sibling. In sum, the paper argues that, in the Swedish context, it seems as if children with many siblings are disadvantaged, and that the adverse effects of siblings are less severe if siblings are closely spaced. No outcome differences between only children and siblings are found.

The results regarding only children largely contradict previous research, showing that only children in general fare better than others (Falbo & Polit, 1986), or that they fare worse than others (Lampi & Nordblom, 2012). Three explanations for this discrepancy are suggested. First, that selection into being an only child differs between times and contexts, and thus is sensitive to the dataset chosen. Second, that previous links found between being an only child and primarily educational outcomes are reflecting a different
causal mechanism than the one of interest for our outcome variable, earnings. Third, we suggest that our large dataset and non-parametric method can account for selection in a more precise way than previous studies.

The results regarding close spacing are also not in line with previous research, generally showing that close birth spacing is more adverse for children than wider gaps and especially in relation to educational outcomes (Buckles & Munnich, 2012; Downey et al., 1999; Powell & Steelman, 1990, 1993). Also in relation to this finding, several explanations are suggested. First, that the social skills provided by having a closely spaced sibling mediates between educational disadvantages and earnings. But also that a more effective allocation of resources may be linked to close spacing in the Swedish context, with extensive maternal leave and high female labour market participation. The fact that closely spaced siblings seem to be less affected by dilution than siblings born further apart also suggests that it is easier to allocate and balance resources to children with similar needs, and in similar phases of development. It may also be argued that this fertility pattern facilitates the labour market participation of mothers, and their earning power.

**Paper II: Sibling effects on adult earnings among poor and wealthy children: Evidence from Sweden.**

*Author: Frida Skog.*

While previous research in general observes adverse effects of siblings on children, less is known about the ways in which material circumstances condition these effects. Paper II (Skog, manuscript a) estimates the effects of 1) being an only child, 2) being a firstborn, and 3) having a large sibling group on adult earnings. Estimates are made for poor and wealthy children respectively in order to examine whether effects occur for both groups. The results show that being an only child impacts negatively, and being a firstborn positively, on adult income in the poor population. Having a large sibling group however, is negative for poor children. Corresponding effects for wealthy children could not be observed. These results suggest that the effect of having siblings on adult earnings is dependent on economic resources in the family. It also suggests that siblings can be important resources for children in poverty. The positive effect of being the firstborn suggests that the positive effect of siblings is more a matter of *being* a sibling rather than *having* a sibling. It is also shown that the positive effect of siblings disappears when the sibling group grows too large. That no effect of siblings or birth order is found for wealthy children suggests that the
resources that can be provided by siblings can be compensated for with other resources. Also, that no effect of a large sibling group can be shown suggests that the mechanism between a large sibling group and adverse outcomes is linked to the dilution of parental resources, but as long as there are enough resources for all children the dilution is harmless.

Paper III: Long-term effects of parental divorce: a population-based causal analysis

Author: Frida Skog.

It is generally argued that parental divorce during childhood impacts on the child’s life chances in a negative way (see for example Ermisch & Francesconi, 2001; Ermisch et al., 2004; Amato, 2001, 2005; Cherlin et al., 1998; D’Onofrio et al., 2005, 2006; Biblarz & Raftery 1993). The literature is ambivalent as regards whether the correlation between divorce and child outcomes reflects a causal link or not (Bhrolcháin 2001; for reviews, see Bernardi et al., 2013; McLanahan et al., 2013). A central argument for Paper III (Skog, manuscript b) is that changing demographics also changes the empirical relationships between divorce and its implications for children. The analysis shows that individuals experiencing parental divorce are not met by more adverse outcomes than those whose parents remain married. The study finds no effect of parental divorce on adult earnings after adjusting for family background and family size. The results contradict previous studies that have generally shown negative educational and psychological effects following parental divorce. However, the results are in line with studies employing techniques for making causal conclusions and focusing on adult earnings (cf. Björklund et al., 2007, Lopoo & Deliere, 2014). This suggests that outcomes regarding earnings may reflect a different mechanism than those previously found for education or childhood and adolescent stress – either that children and adolescents are able to bounce back to baseline after temporary blows to their developmental pathways, or that children of divorce are finding alternative labour market strategies to compensate for the disruption. An alternative explanation is that studies employing statistical techniques that are able to adjust for selection into divorce with higher precision and that previous negative results reflect a negative selection into divorce.
Paper IV: Children of divorce: The effect of post-divorce family re-formation on children’s future earnings

Authors: Frida Skog and Daniel Larsson. Both authors conceived the paper topic and design together. Frida Skog performed the data analysis. Both authors together drafted and revised the manuscript, and both authors have read and approved the final manuscript.

The aim of paper IV (Skog & Larsson, manuscript) is to investigate three different post-divorce processes regarding the effect on future labour market earnings for children. In relation to the observation that family behaviours have changed over the last couple of decades and that the nuclear family has become a less dominant family configuration, this study investigates the effects of events after the divorce on the adult earnings of children. The events are: family re-formation (i.e., re-partnering), the presence of half-siblings, and the total number of siblings (i.e., having a large sibling group). While previous research in general observes negative outcomes from family re-formation (see for example Barrett & Turner, 2005; Brown, 2004, 2006; Sweeney et al., 2009; Zill et al., 1993; Lizardi et al., 2010; Harcourt et al., 2013, see also Coleman et al., 2000; Portrie & Hill, 2005; Jeynes, 2006; Sweeney, 2010 for reviews), we found no effect of re-partnering or half-siblings, but a substantial negative effect of number of siblings. We conclude that family structure does not seem to impact on children’s life chances with the exception of family size. We establish that a large sibling group is negative for children regardless of whether the siblings are born to the same mother and fathers, or if they only share the same mother. The results suggest that the childhood aspects that affects adult earnings are related to the original family and family size, including resource dilution from siblings regardless of whether these children originate in the nuclear family or in the divorced and re-formed family. Furthermore, there is a negative selection on parental traits into re-formation and half-siblings. Mothers with less resources prior to re-formation are more likely to engage in a new family. There is a positive selection on mothers’ socio-economic traits into single motherhood. When the selection is accounted for by adjusting on the propensity score, we see no evidence of a negative effect of family re-formation, with or without new children. We also see that children in re-formed families and children with half-siblings are more likely to have large sibling groups, but when family composition is adjusted for, a substantial effect of a large sibling group remains.
Conclusions

This thesis addresses to what extent family composition – the number of siblings and whether the parents live together, or whether there are non-parental adults and/or half-siblings in the household or not – contributes to variations in adult earnings. The theoretical perspective I employ suggests that resources mediate the impact of family composition on adult earnings. While previous research in general has shown that siblings, as well as divorce and remarriage, are negatively linked to child outcomes, there are some inconsistencies and gaps in previous literature.

First, there has been debate over the unconfoundedness of previous studies, something that is handled here by analysing large sets of representative data using a robust parameter. Replication is of crucial importance for this field of research, since the relationships between family composition and adult earnings can be thought to vary with different institutional contexts. The longitudinal dataset used is based on Swedish administrative data. The data structure is well suited for the assumptions underlying a semi-parametric method called propensity score matching. Propensity score matching is an effective adjustment estimator when we have reason to suspect heterogeneity between groups under comparison.

The main conclusion is that the number of siblings that an individual child has matters for adult earnings. This result supports the resource dilution hypothesis, which states that siblings depress children’s development, since they may decrease the availability and transference of resources to children. The findings clearly show that family size impacts on adult earnings. Since it impacts causally, and negatively, on children’s adult earnings it is difficult not to regard it as a mechanism through which income inequality is reproduced.

However, while having a large number of siblings dilutes the resources available to a child, this may not always be of concern. For example, no effects of siblings in affluent family environments are found, and if siblings are closely spaced this results in better outcomes for children. This suggests that the amount and balance of resources are conditional factors. More resources mean less dilution, or no harmful dilution, and dilution also seems to be alleviated by close spacing of siblings. While family size impacts negatively on children in the general population, in the poorest population and in the divorced population, there is no evidence of this effect among the wealthier households in the study population. This finding underscores the
importance of parental earning power, and material resources, for the adult outcomes of children.

The observation that the adult earnings of wealthy children are not affected by family size suggests that the observed disadvantages are linked primarily to resources, and not to siblings. The resources available to each child in a family may be sufficient even as parental resource dilution increases. The assumption that increased family size implies a downward mobility for children, does not seem to be true in the case of wealthy children since they are not affected at all by increased family size. Conversely, the resources available to each child in poor families may be affected and limited even by a small increase in family size. Even if investments decrease, children born to wealthy parents may not be subjected to the negative effects of resource dilution following the introduction of siblings into their family, due to the benefits provided by the status of their parents.

The assumption that resources are not only monetary is underscored by the finding that children without siblings do not seem to fare better than children with siblings, neither in the population as a whole, nor at the extreme ends of the income distribution spectrum. In the poor population, those who are only children actually fare worse than siblings do. Furthermore, firstborns are the ones benefitting from having siblings the most in the poor population. In this group, it is better to be a firstborn than to be an only child. This suggests that the mechanism through which siblings operate is linked neither to the social support received from siblings, nor to the time invested by the parents in their children, but rather to something specific in the firstborn position that particularly benefits children with scarce resources.

So then, are these results consistent with the resource dilution hypothesis? The most evident contradiction is that children in poverty fare better with one sibling than with none. If parents are poor they may not be able to transfer neither resources nor skills, and in such scarce circumstances the skills acquired from siblinghood may be an important resource. If there is nothing to dilute which is linked to the parents, the sibling may be the only resource available to a child.

The findings presented here are nevertheless in line with the resource dilution model. After adjusting for confounding factors, individuals with many siblings have lower earnings in adulthood than individuals with fewer siblings do. In a large group of siblings, parental resources will be diluted, and this impacts negatively on adult earnings. Family size appears to be particularly relevant for those with limited resources. Limiting the number of
children in a family cannot however be considered as a viable strategy for securing resources, since being an only child does not seem be beneficial for children as regards adult earnings.

While a large number of siblings in affluent families could be hypothesised to decrease variance in adult earnings, by limiting their social mobility opportunities, this analysis provides no support for this hypothesis. Resourceful parents may not need defensive strategies to protect the future social status of their children. The downward social mobility induced by limited resources may widen inequality even more than it would if the effect were the same across the population.

With respect to the other aspects of family composition investigated here, divorce and remarriage, such events do not seem to lower the future earnings of children. Family re-formation is commonly thought to influence the distribution of family resources, such as emotional and financial support. While most previous research has found negative effects of family re-formation, after adjusting for parental characteristics and family size (including children born after the divorce), no effects of divorce, single motherhood, and remarriage are observed here. Different maternal post-divorce behaviours correlate with family size, for example such that remarriage produces a larger number of siblings for children. It could thus be argued that a factor of key importance here is family size, and not divorce and remarriage. But, as can be seen in paper II (manuscript a), neither are siblings, as long as the resources available to the child are abundant.

Becker’s (1974, 1991) resource perspective states that changes in family composition should affect parental investments in children, and thus their future earnings. Divorce, for example, has been suggested to affect children negatively by limiting the resources available for investments. Conversely, a remarriage should be beneficial for children by again increasing such resources. Furthermore, the labour market participation of mothers is linked to divorce because single mothers cannot depend on marriage for financial support of her and her children. In the investigated context, children and women had resources that were not exclusively linked to the nuclear family. This indicates that female labour market participation is important for children, as well as affluent resources in the childhood family. Important findings of this thesis are that some of the most well-established patterns in the sociology of the family, namely the link between number of siblings and adult earnings, and between divorce/family re-formation and adult earnings, can be broken by resources.
The papers presented suggest that women’s economic independence have produced resource gains for children, and that increased divorce rates are not followed by resource losses for children. It has been suggested that these transitions have produced different outcomes for different groups of women, with different implications accordingly also for their children (MacLanahan, 2004; Sobotka, 2008), something which is also confirmed here. In fact, the negative effects of having a large number of siblings cannot be found in affluent families.
References


