

# Childhood household composition and future economic outcomes:

Are children of single parent families experiencing growing disadvantages as adults in Sweden?

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# Abstract

Family is a unit of socialization and transmitter of social, cultural and economic resources. Thus family arrangements may result in unequal future outcomes for the children growing up in them. A case in point is children from single parent households. The aim of this study is to investigate whether children growing up in single parent households in Sweden experience growing disadvantages during the life course, compared to children from two-parent households, and if socioeconomic factors explain this association. Previous literature shows that children from single parent households are disadvantaged but few have investigated the long term effects of childhood household composition in Sweden and whether disadvantages grow over time.

Using Swedish representative, longitudinal data from Generations and Gender Survey round 2 (GGSII), individuals living in Sweden during childhood between ages 20 to 59 were observed during the years 1990 to 2019. With ordered logistic regression for each year, earnings trajectories could be analyzed, with semi-elasticities used for interpretation.

The results showed that respondents from single parent households fare worse in future earnings compared to respondents from two-parent household. This is explained by differences in educational attainment: children from single parent households have lower educational level which produce lower future earnings. The effect is statistically significant during several years after 2010, however, the results show no evidence of growing disadvantages. Socioeconomic background partially alter the association but not entirely. Whether socioeconomic background functions as a confounder or a mediator to the association has not been determined in this study but is an important task for future research in order to establish the causal nature of socioeconomic background in relation to childhood household composition and children's future outcomes.

## **Keywords**

Childhood household composition, Single parent households, Cumulative disadvantages, Socioeconomic background, Education, Family Sociology, Social stratification

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# 1. Introduction

What constitutes a family has become increasingly fluid. People may experience family dissolutions such as separation, divorce or the loss of a loved one, or family formation such as marriage, childbirth and re-partnering. Some couples cohabit while some live apart. Some families consist of two parents, some of one parent, and some have several caregivers. At the same time, family composition is a unit of socialization and transmitter of social, cultural and economic resources, and there may be consequences of these family arrangements for the people within them.

A case in point is single parent households. Among households with children, the proportion of single parent households has increased from 12 to 14 percent between 2009 and 2019 in the EU (Nieuwenhuis, 2020). However, the trends show that single parent households are now better resourced: the share of single parents with low education has decreased and they are more likely to be employed than before (Nieuwenhuis, 2020). Nonetheless, single parent households still fare worse than two-parent households in many aspects. Research show that single parents have higher risk of poverty and material deprivation (Nieuwenhuis, 2020), higher risk of in-work poverty (Nieuwenhuis and Maldonado, 2018a), lower employment rates and earnings (Harkness, 2018), and scarcer possibilities for spending time with and taking care of their children (Carlson and Berger, 2013). In Sweden, 1 in 5 children lived with a single parent in 2020 and it is more common that children living with a single parent have low income standard (defined as a family's incomes are insufficient for the basic costs of living), and especially common among children living with a single mother (Statistics Sweden, 2022a).

While Sweden is a social democratic welfare state with relatively low income inequality and low poverty rates, income inequality has increased rapidly in Sweden since 1990. According to the OECD (2017a), Sweden had higher increase in income inequality than any other OECD country with available data, measured by the Gini coefficient. One of the reasons for this increase is demographic changes in household composition, accounting for 16 percent of the increase in the Gini coefficient (OECD, 2017a). Changes in household composition was mainly due to increased share of single and single parent households, who tend to have lower incomes compared to coupled households. Moreover, between 1995 and 2013 relative poverty rates

almost doubled in Sweden, from 7 to 14 percent, and 30 percent of single parents fell below the poverty line (OECD, 2017a).

Thus, single parents are at higher risk of low socioeconomic well-being compared to coupled parents in Sweden. But how does this affect their children growing up? Research from Sweden and Norway show that children from single parent families compared to children from two-parent families are more likely to have poor well-being (Fransson *et al.*, 2018), lower educational attainment (Jonsson and Gähler, 1997) and experience downward income mobility (Bratberg, Rieck and Vaage, 2014). However, accounting for socioeconomic factors are sometimes found to confound (for example Treanor, 2016) or mediate (for example Harkness, 2018) the association between childhood household composition and children's future outcomes. Thus perhaps it is not childhood household composition per se that cause disadvantages for children from single parent households, but rather the available resources during childhood.

Thus, the findings from Sweden show that children from single parent families are disadvantaged compared to two-parent households, however, few studies examine the long term economic effects of children from single parent households in Sweden. In light of the growing income inequality in Sweden since the 1990s, it is relevant to examine if children growing up in single parent households during this period also experience growing disadvantages, compared to children from two-parent households. And how does socioeconomic factors affect the association between childhood household composition and children's future outcomes?

## **1.1 Research aim**

The aim of this study is to investigate whether children growing up in single parent households in Sweden experience growing disadvantages during the life course, compared to children from two-parent households, and if socioeconomic factors explain this association. This will be examined by using Swedish representative data from Generations and Gender Survey round 2 (GGSII), observing individuals during the years 1990 to 2019. The research questions of this study are:

1. Does growing up in a single parent household in Sweden have growing negative consequences on earnings trajectories in adulthood?

2. How does socioeconomic background affect the relationship between childhood household composition and adult earnings?
3. Does respondent's educational level mediate the relationship between childhood household composition and adult earnings?

## **1.2 Definitions and demarcations**

Childhood household composition: respondent's childhood household composition is with whom the respondent lived with most during his/her childhood. The household compositions are two biological parents, one biological parent, and one biological parent and one stepparent.

The main focus of this study is mainly the difference between children from single parent households and children from two-parent households, however, findings for children from household with one biological parent and one stepparent will still be presented in the results.

This study is restricted to 20 to 59 year old Swedish people who lived in Sweden during their childhood.

## **1.3 Disposition**

This study begins by examining the previous literature made on the subject of single parent households, how this affects children's future outcomes, and the theoretical argument of cumulative disadvantage. Following the literature review is the methodology, presenting the data, operationalizations, analytical strategy and analytical method. Thereafter, the results are presented by the three research questions, followed by a sensitivity analysis. Last, the results are discussed in relation to the aim of this study, previous research, limitations and future research. The results are also discussed in relation to the current economic situation in Sweden.

## 2. Literature review

How and why do children of single-parent households come to be disadvantaged in their adulthood? In this section, these questions are answered. First, literature on single-parent families are explored and how they face disadvantages in their socioeconomic well-being compared to two-parent families. Second, the literature explores how this disadvantaged socioeconomic position of single parents can result in disadvantaged outcomes for their children growing up. Third, cumulative advantage (CA) is presented as an explanation to why inequality between children of different childhood households compositions may appear: being subjected to a disadvantaged position early in life cause disadvantages to cumulate over time. However, the CA thesis is contested by the educational context of Sweden and what opportunities it may create for individuals from families of lower socioeconomic status.

### 2.1 Single parent families

Single parents are not a homogenous group. There are many reasons to how and why people become single parents. Separation and divorce of parents are the most common causes today of single parenthood (Bernardi, Mortelmans and Larenza, 2018), and these differ from the people that are single parents at birth or as a cause of a partner's death. Single parenthood can be a temporary state during the life course since many re-partner after some years, however it does not always result in new cohabiting partners. Single parenthood is also strongly gendered with the majority of single mothers. In Sweden, around 15 percent of all households with children are single mothers and only around 5 percent are single fathers (Statistics Sweden, 2022b).

There is selectivity into single parenthood that is often driven by age (Harkness, 2018), education (Härkönen and Dronkers, 2006; Lundberg, Pollak and Stearns, 2016; Harkness, 2018; Härkönen, 2018) and race/ethnicity (Lee and McLanahan, 2015) which influence family formation and dissolution (Dufur and Alexander, 2017). Low educated mothers are more likely to be single than highly educated mothers, the prevalence of low educated single mothers is two or three times as high as among the highly educated single mothers in many European countries (Härkönen, 2018). Looking at data from the UK, lone mothers, regardless of whether they



became lone mothers at birth or as a cause of a separation, were younger and less educated, compared to coupled mothers (Harkness, 2018). Looking at single parenthood as a result of separation, lower education among women negatively affected divorce risk in some European countries, however Sweden showed no effect of education on divorce risk (Härkönen and Dronkers, 2006). Other selectivity processes into separation are psychological and relational problems, marrying young, previous marriages and divorce, the length of the marriage, having children or being childless (Härkönen, 2014).

However, the question arises whether the lower educational level among single parent families is a result of single parenthood or not. While selectivity processes suggest that socioeconomic status of single parents is a confounder – single parents have low socioeconomic status before they became single parents and therefore are selected into single parenthood – it is also possible that socioeconomic status functions as a mediator – single parent households lose socioeconomic status when they become single parents. In this section, we will look closer into the findings from the literature on the causal nature of single parents' socioeconomic status.

So, how and why are single parents disadvantaged? In the European Union, single parent households have a higher risk of poverty, material deprivation, and very low work intensity (Nieuwenhuis, 2020). A common explanation to the higher risk of poverty is lower levels of education among single parents, especially for single mothers, which restricts their position on the labour market and moreover their earnings (Härkönen, 2018). However, the educational level of single parents has increased in the EU, looking from 2009 to 2019, but the level of risk of poverty has remained more or less unchanged since 2011 (Nieuwenhuis, 2020). Hence, increasing the resources of single parents in terms of education does not guarantee that the economic situation of single parents improves. Therefore, in order to capture the complexity of the situation single-parent families may face, Nieuwenhuis and Maldonado (2018b) explain the economic well-being of single parents as an interplay between inadequate resources, inadequate employment and inadequate policies – a triple bind. Compared to two-parent families, single parent families have to negotiate the complexities of the triple bind, defined as a 'situation in which a person is confronted with irreconcilable demands or a choice between undesirable courses of action' (Nieuwenhuis and Maldonado, 2018b, p. 14).

Inadequate resources refer to the situation single-parent households face when there is only one breadwinner which means less economic resources, more vulnerability in times of

unemployment and more difficult to achieve work-life balance. Data from the UK shows that single mothers experience a decrease in income and earnings after childbirth and after a separation (Harkness, 2018). While lone mothers at birth have no partner that can compensate for the loss in mother's income after childbirth, other family members play an important role as an income source. Separated mothers experience a slightly higher income and earnings after the separation, however, with time they reach the same low income levels as lone mothers at birth (Harkness, 2018). These findings suggest that single parenthood is a cause of lower socioeconomic status, hence socioeconomic status functions here as a mediator.

Inadequate resources in terms of time and care of children are also more common among single parent families. Single parent families have lower levels of parental engagement compared to two-parent families (Carlson and Berger, 2013). The absence of a partner in the household limits care, income, time and flexibility. Different forms of co-parenting, such as an actively involved parent, can help to provide these resources. Swedish research show that children of separated parents living an equal amount time at both parents' homes experience better well-being compared to living with only one single parent (Bergström *et al.*, 2013, 2015).

Inadequate employment refers to two reasons that single parents can experience hardships in employment, compared to other workers: gender inequality and precarious employment conditions (Nieuwenhuis and Maldonado, 2018b). Employment is positively associated with well-being, reduced risk of poverty and material deprivation, future employment opportunities, access to insurance-based social security and self-realisation. However, women are more likely to work part-time and exit the labour market in relation to motherhood which has a negative effect on their income. Mothers can experience motherhood penalties while fathers experience fatherhood premiums (Yu and Hara, 2021). Motherhood in general is associated with reduced female employment, reduced work hours and reduced earnings and is not necessarily driven by single parenthood (Harkness, 2018). However, since most single parents are mothers, the risk of these inequalities can be more prominent for single mothers compared to single fathers.

Lower rates of employment among single mothers has been shown in the UK, however, this seems to reflect selection into 'lone parenthood' rather than it being an effect of single motherhood itself – single mothers had low employment rates even before they became parents (Harkness, 2018). This supports the thesis that the socioeconomic status is a confounder – there

is selectivity into single parenthood through socioeconomic status rather than single parenthood causing lower socioeconomic status.

The labour market has also become increasingly precarious partly due to globalization (Nieuwenhuis and Maldonado, 2018b). Precarious working conditions in addition to low wages has resulted in a rise in in-work poverty – earnings from employment are more frequently insufficient for household incomes – especially among single parents compared to dual earners (Nieuwenhuis and Maldonado, 2018a). In 2018, the share of single parents in in-work poverty in Sweden was around 16 percent, and 6 percent among coupled parents (Nieuwenhuis, 2020). Single parents working in precarious employments, non-standard working hours combined with childcare responsibilities creates a great deal of stress and affects single parents' and their children's well-being (Nieuwenhuis and Maldonado, 2018b).

Inadequate policies refer to welfare policies that redistribute means from non-parents to parents, such as child benefits and child support, public childcare and parental leave, but may fail to benefit single parent families. Many welfare states have changed direction of welfare policies, moving from redistribution of cash transfers to social investment policies that promotes education, training and employment (Nieuwenhuis and Maldonado, 2018b). This development has resulted in lower levels of cash transfers. For example, in the welfare state of Sweden from mid 1990s to 2010s there were cutbacks on unemployment benefits. Reduced unemployment benefits in addition to mass unemployment resulted in increased risk of poverty among single adults, with and without children, during this period, while couples were much less affected (Alm, Nelson and Nieuwenhuis, 2020). Thus, while social investments in education and employment may be beneficial for single parents, these social investments may not replace the benefits the redistribution policies provide for the ones in need of money, i.e. those on the threshold of poverty.

On the other hand, family policies also compensate to a great deal. Studies have examined the role of family policies for single parent families and show that countries with more extensive family policies – especially parental leave and family allowance – work in favour of single parents, such as reduced poverty (Maldonado and Nieuwenhuis, 2015), and partly moderate the negative influence of single parenthood on children's academic achievements (Hampden-Thompson and Pong, 2005). Sweden is one of the few countries in the OECD with generous

cash transfers and benefits for single parents, partly because family benefits are income-related and includes a premium for single parents (Bradshaw, Keung and Chzhen, 2018).

To conclude the central idea of the the triple bind, inadequacies in resources, employment and policy are not exclusive to single parents, but, compared to two-parent households, single parents have fewer degrees of freedom combining these three inadequacies (Nieuwenhuis and Maldonado, 2018b). The authors argue that the triple bind is widespread among single-parent households and increasingly so, affecting the socioeconomic well-being of single parents and their children. On the other hand, there are solutions that aid single parents, such as shared child residence between separated parents and extensive family welfare policies. Moreover, the selectivity into single parenthood has been explored but it is still unclear from the literature to what extent the selectivity explains single parenthood. Whether socioeconomic status functions as a confounder or a mediator also shows ambiguous results in the literature both supporting socioeconomic status as a mediation and a confounder. No study has yet brought these ambiguities up for discussion.

## **2.2 Household composition and children's future outcomes**

In the previous section, the complex situation of single parent families has been explored. This section investigates the effects this has on the children growing up in single parent households.

A classical thesis in the literature on single parent families and the effect on children came from McLanahan (2004) who argued that the second demographic transition – delay in fertility and marriage, increase in divorce, nonmarital childbearing and maternal employment – has resulted in increased inequality of parental resources in the US, resulting in diverging destinies of the children growing up following different trajectories of the mothers. The first trajectory were the women that were highly educated, postponed childbearing, and worked well-paid jobs, resulting in gained resources; while the second trajectory were the women that were less educated, had low-paying jobs, and higher divorce rates, leading to less parental resources. Additionally, an increase in single motherhood among the less educated women was also a growing concern after the second demographic transition. These differences in parental resources resulted in growing disparities in children's resources, where the greatest gains in

children's resources were concentrated among the most educated parents, and the fewest gains, or losses, were concentrated among the least educated parents. The argument of diverging destinies has been explored and findings show both supporting and contesting results.

First and foremost, single parent's social and economic resources has been found associated with differences in children's wellbeing. In Sweden, children living full time with a single parent reported more often poor economic conditions, social relations and health outcomes compared to non-separated families (Fransson *et al.*, 2018). Children in shared residence reported better wellbeing compared to children in single parent families. However, Treanor (2016) finds that children's social, emotional and behavioural wellbeing is more determined by social support and parental income rather than family composition. Thus, the disadvantaged social and economic position single parents are often subjected to, is the most important reason for children's lower wellbeing, rather than family composition per se. This supports the diverging destinies thesis.

Studies report that children of single parents and separated parents have lower educational attainment compared to children of two parents (Garasky, 1995; Jonsson and Gähler, 1997; Bernardi and Radl, 2014; Brand *et al.*, 2019). The negative effect is greatest during preschool years and the more years spent living with a single parent (Krein and Beller, 1988; Garasky, 1995). A casual mediation analysis of why children of divorced parents have lower educational attainment in the US is explained by reduced children's psychosocial skills, alongside economic strain and family instability (Brand *et al.*, 2019). Thus, on the individual level, growing up in a non-intact family is related to generally lower educational attainment. However, comparing children from Germany, Italy, the UK and the US show that while children from non-intact families have lower educational attainment, the increased prevalence of non-intact families does not increase the inequality in educational attainment on the aggregate level (Bernardi and Boertien, 2017). This finding does not support the diverging destinies thesis of increased inequality between children from intact and non-intact families.

Childhood household composition can also affect educational performance. Data from 25 OECD countries show that schools with higher share of children from single-parent families negatively influenced children's educational performance, and particularly children of single-parent families, accounting for socioeconomic status of the school, school size, school

percentage of immigrants and urban environment of the school (de Lange, Dronkers and Wolbers, 2014; de Lange and Dronkers, 2018).

How childhood household composition affects outcomes in adulthood has also been examined, for example the economic consequences of growing up in a single parent household compared to a two-parent household. Children of single mothers earn less in adulthood compared to children of continuously married parents (Lopoo and DeLeire, 2014). However, when controlling for the resources available to the child during childhood there appears to be no persistent effects of family structure. Again, consistent with other findings, it is the inadequate resources of single parent families that are most important for children's future outcomes.

Studies on intergenerational earnings mobility from US and Norway found that children raised outside of a two-parent household had higher earnings mobility, especially downward mobility (Bratberg, Rieck and Vaage, 2014; Bloome, 2017). A higher risk of downward occupational mobility was also the case for men raised outside of a two-parent household in the US (Biblarz and Raftery, 1993). The pathway of intergenerational earnings mobility among children of single mothers was explored in relation to their mother's poverty status (Lee and Allen, 2022). Children's educational attainment mediated the relationship between mother's poverty status and children's future earnings: children of single mothers in poverty in the US had lower educational attainment and therefore lower earnings as young adults, compared to children of single mothers not in poverty. These results suggest that parental resources makes a difference for children's future outcomes, as McLanahan's (2004) diverging destinies suggest.

McLanahan's (2004) thesis of diverging destinies of children with different parental resources has both been supported and contested in previous research. However, the causal role of parental socioeconomic status has still not been determined nor discussed by the previous literature, nevertheless it is central to the association of childhood household composition and children's future outcomes.

## **2.3 Cumulative disadvantage**

As studies have shown, growing up in a single parent household can have negative effects on the child in terms of well-being, human capital investments and future earnings. What may explain these disadvantaged outcomes is the cumulative disadvantage mechanism: that

disadvantages for an individual or a group accumulate over time, resulting in increased inequality (DiPrete and Eirich, 2006).

Cumulative advantage (CA) is traceable back to Robert Merton who coined the Matthew effect: how scientists with good reputation gains increased recognition while others with papers of the same rank does not (Merton, 1988). This type of cumulative advantage is a form of *strict* CA, where advantages or disadvantages grow exponentially over time. A second form of CA can be traced to Blau and Duncan (1967) who looked at ethnic/racial differences as a process of cumulative disadvantage where black men experienced growing disadvantages compared to white men. Thus the second form of CA looks at group differences in status, such as gender or race/ethnicity, or group differences exposed to a treatment over time, such as growing up in a single parent family compared to a two-parent family. Compared to strict CA, the latter form of CA does not necessarily result in growing inequality over time.

Studying childhood household composition is thus the second form of CA where individuals are exposed to growing up in a single parent household compared to two-parent household, and is called the cumulative exposure process (DiPrete and Eirich, 2006). The mechanism which creates the growing inequality between children of single parent households and children of two-parent households are the differences in resources available to the child during childhood, similar to McLanahan's (2004) thesis on diverging destinies. No studies, as far as I know, have studied whether childhood household composition is a process of cumulative disadvantage. Some studies are however of similar character, for example Krein and Beller (1988) who study how the period and length of living with a single parent affect children's educational attainment and Garasky (1995) who study how the effect vary with the child's age.

## **2.4 The educational context of Sweden**

Contrasting the thesis of cumulative advantage, is the possibility that growing up in the welfare state of Sweden can compensate for the initial disadvantaged effect from childhood household composition through a free higher education system. For example, Breen and Jonsson (2007) found that the increased social mobility during the 20<sup>th</sup> century in Sweden was due to an educational equalization that allowed more children of lower class origins to reach higher educational levels. However, different results has been found on the effect of childhood

household composition on educational attainment from Swedish data. Jonsson and Gähler (1997) found that a small effect of separation and educational attainment remained when controlling for socioeconomic characteristics. On the other hand, Björklund and Sundström (2006) found that when using a sibling-difference model which takes into account unobservable characteristics shared by sibling, there was no impact of parental separation on educational attainment. This may suggest that the educational system in Sweden evens out initial disadvantages and makes mobility from your parents' socioeconomic position possible.

## 2.5 Hypotheses

In light of the previous research made on the topic of childhood household composition and future outcomes, the first hypothesis of this study is:

**H1:** Growing up in a single parent household in Sweden has negative consequences on earnings trajectories during the life course and increase over time, following the cumulative disadvantage thesis.

There are diverging findings in the literature of whether socioeconomic background functions as a mediator or a confounder to the relationship between childhood household composition and future outcomes, i.e. whether single parents experience a decrease in resources when they become single parents (Harkness, 2018) or if they lack socioeconomic resources even before they became single parents (Lopoo and DeLeire, 2014). However, since the data in this study only allows for measuring parental socioeconomic status after becoming single parents and not before, this study will not be able to determine the causal nature of socioeconomic background, only see the effect it has on the association of interest. The second hypothesis is:

**H2:** Socioeconomic background will reduce the effect of childhood household composition on adult earnings.

Moreover, previous research show that children of single parents have lower educational attainment compared to children of two-parents (Garasky, 1995; Jonsson and Gähler, 1997; Brand *et al.*, 2019). Childhood household composition may result in lower educational attainment of the respondent and therefore lower earnings, hence mediate the relationship between childhood household composition and earnings. The third hypothesis is:



**H3:** Respondent's educational level mediates the relationship between childhood household composition and adult earnings

However, in a Swedish context with free higher education, education may have an equalizing effect on inequality (Breen and Jonsson, 2007). In this case we would expect a null relationship between childhood household composition and future earnings before including respondent's education in the model.

## 3. Methodology

This section presents the methodology of this study: data, operationalizations, analytical strategy and analytical method. Limitations and advantages are discussed throughout the text.

### 3.1 Data

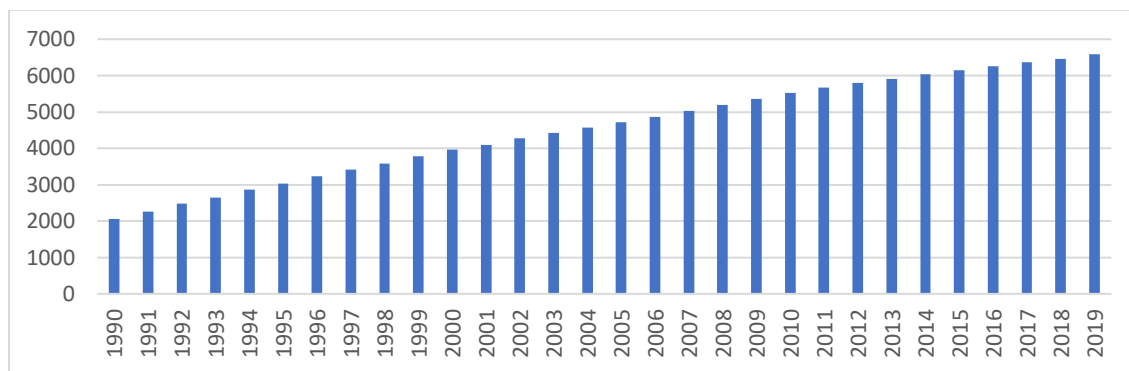
This study uses longitudinal data from Generations and Gender Survey round 2 (GGSII). The Swedish data was collected by Statistics Sweden, based on one online (or postal) questionnaire in 2021 and population registers from the years 1990-2019. The gross national sample was 30 000 individuals aged 18-59 years, with a response rate of 26 percent, giving a sample size of 8 082 respondents (SUDA, 2022). The non-response analysis made by Statistics Sweden showed that there is a higher probability of non-response among men compared to women, respondents of older and younger age compared to 35-44 year olds, respondents born outside of Europe compared to Sweden, and respondents with low education (pre gymnasium) compared to middle education (Löfgren, 2021). These systematic variations in the sample are controlled for. However, weights for non-response are not used in this study.

The population of interest in this study are adults who were resident in Sweden during their childhood. Adults are individuals 20 years or older. Including respondents that did not live in Sweden during their childhood in this study would not capture the circumstances of growing up in a Swedish context, therefore, people that did not live in Sweden during their childhood were removed from the sample. However, this will change the composition of foreign born

respondents because many that did not live in Sweden during childhood were foreign born. Individuals were observed between the years 1990 to 2019, therefore the size of the study sample varied every year depending on the cohorts above age 20 in each year, sample size thus ranged between 2058 respondents in 1990 and 6582 in 2019, see Figure 1.

Ethical considerations has been made by the Generations and Gender Survey when distributing the data. Respondents are anonymized and sensitive information such as income has been aggregated to categories. A *Statement of affiliation, confidentiality and acceptable use of GGS data sets* has been signed by the author. All data management and data analysis has been conducted in Stata 16 and has not been shared or distributed to a third party.

**Figure 1: Sample size 1990-2019**



## 3.2 Operationalizations

### Childhood household composition

The independent variable of interest is *childhood household composition*: with whom the respondent lived with during his/her childhood, until age 15. The variable is constructed with two variables: whether or not the respondent lived with both parents (yes or no), and if no, with whom the respondent lived with during his/her childhood. Childhood household composition thus consists of three groups: 1) respondent lived with both biological parents, 2) respondent lived with one biological parent, 3) respondent lived with one biological parent and one stepparent. In line with Swedish numbers, the majority of single parents in the data are single mothers. However, this study does not separate single mothers from single fathers because of very few single fathers in the sample.

Some limitations of this variable have been noted. There is lack of information concerning childhood household composition, such as the cause of single parenthood – separation, death of parent or from birth –, duration of living with a single parent, age of the respondent at the time of the family disruption/reformation, and whether the second biological parent was present during childhood or not. Access to this information would have been valuable to examine selection effects of childhood household composition.

### **Yearly income from job or business**

The dependent variable of this study is yearly income from job or business, excluding deficit, between the years 1990 and 2019. The variable is based on register data from Statistics Sweden and does not include work-related compensation, such as parental or sickness benefits, however short-term sickness pay is included. It is coded as an ordinal scale variable with 9 999 SEK intervals between categories, except the first category which ranges from 0 to 4 999 SEK. Thus, individuals that do not earn any or very little money one year are included in the dependent variable, these individuals may be unemployed, full time students, work part time or temporary employments.

When comparing income between years, inflation should be taken into consideration. However, since income is measured in categories, adjusting for inflation is not straightforward. To account for how inflation affects the income distributions, two relative thresholds were chosen, corresponding to a category of high respectively low income for each year's income distribution. What counts as high or low income is a theoretical question. A common practice within income inequality research is to divide the income distribution into deciles, quartiles, quantiles or percentiles (Eurostat, 2020). Other common measures such as poverty measures use a relative poverty threshold of 50% or 60% of the median income of the population (OECD, 2017b).

When deciding the income thresholds, I chose to divided the income distribution into percentiles with relative threshold categories of the 25<sup>st</sup> percentile (25%) of the distribution and the 75<sup>th</sup> percentile (75%) of the distribution. I chose these threshold categories because the income data consists of many observations in the first category 0 – 4999 SEK, which in many observed years are more than 10% of the population. These observations consist of respondents that have very low incomes during one year, for example have a part time or temporary job, are

unemployed, or studying. Since these observations do not correspond to individuals with a stable income, I chose to have the lower threshold at 25% of the population and correspondingly the upper threshold at 75% of the population. The thresholds are relative because the income distribution increases every year in the data, due to more respondents are included in the sample, inflation increases earnings and people earn more as they spend more time on the labour market. Therefore the income category of the outcome variable change accordingly to which income category the relative thresholds correspond to each year. Consequently, the relative thresholds partly account for inflation.

## **Socioeconomic background**

Socioeconomic background was measured with two variables: parents' occupational status during respondent's childhood, measured with International Socio-economic Index of occupational status (ISEI), and parents' completed years of education.

ISEI is a measure of socioeconomic status that captures educational and income differences between occupational groups, controlled for age effects, thus ranking occupations on an index scale (Ganzeboom, De Graaf and Treiman, 1992). The occupations are based on occupational categories from the International Standard Classification of Occupation (ISCO). In contrast to categorical approaches to socioeconomic measures, ISEI is a continuous measure which captures variability between occupational categories and order them according to a hierarchical principle.

The Swedish dataset from GGSII contained parent's occupations during respondent's childhood categorized according to ISCO-08 occupational codes. ISCO uses a four level hierarchical classification where occupations can be aggregated into four larger groups: 436 unit groups (4-digits), 130 minor groups (3-digits), 43 sub-major groups (2-digits) and 10 major groups (1-digit) (ILO, 2012). When translating ISCO codes into ISEI scores, using the 4-digit unit groups are to be preferred in order to maximize explanatory power of ISEI (Ganzeboom, 2013). However, the GGSII dataset used in this study only contained 3-digit minor groups of ISCO codes which implies that the data will not capture 100% the variation in ISEI that stem from ISCO. This limitation however is affordable because the use of minor groups still capture about 95.5% of the variation in ISEI than stem from ISCO (Ganzeboom, 2013).

Parents' education was an ordinal variable, parents' highest level of education, based on the International Standard Classification of Education from 1997 (ISCED-97). This variable was transformed into years of education. Based on the years given in ISCED-97 classifications (UNESCO, 2006) and from The Swedish Council for Higher Education (UHR, 2022) a translation into years of completed education could be made. Noted should be that this translation is not fully perfect since years of education do vary within some ISCED categories and must therefore be considered as an approximation. Still, this procedure has been widely used in research and have high validity (Antelius and Björklund, 2000).

How to combine the information of both parent's socioeconomic status (SES) has been discussed by Thaning and Hällsten (2020) who test different approaches to operationalize parents' SES: the dominance approach, the average approach and interaction-based approaches. They conclude that the dominance approach (only the dominant parent's SES is used) is widely used in current literature but has lowest explanatory power. Averaging both parent's SES, assuming that both parents' SES influence household resources equally, performed better than the dominance approach with relatively little loss of explanatory power. The operationalizations that performed best were the approaches where both parents were included as an interaction, also taking both parent's influence into account.

Existing literature that examine parents' SES and childhood household composition handle the operationalization in different ways. Many studies on single parents are concentrated to single mothers because these are of particular interest and thus the mother's socioeconomic status is used (Harkness, 2018; Härkönen, 2018; Lee and Allen, 2022). Some studies look at household income rather than parents' occupational status or level of education as a proxy of socioeconomic status (Lopoo and DeLeire, 2014; Brand *et al.*, 2019), hence finding a suitable approach to combine parental SES is not needed. Some studies have used the dominance approach (Jonsson and Gähler, 1997), while some chose only to use the mother's education as a proxy for parental education (Amato, Patterson and Beattie, 2015), or produce separate models for mothers and fathers (Kreyenfeld and Heintz-Martin, 2011). Commonly among these studies, the choice of operationalization is without further discussion or problematization.

Since the sample in this study contains respondents with either one or two parents, the interaction approach does not work. Therefore, the variables for socioeconomic background, parents' ISEI score and parents' completed years of education, was coded according to the

average approach because it is a parsimonious yet relatively powerful measure. The theoretical assumption of the additive influence of both parents goes in line with this study theoretical assumption that different resources are associated with two-parent households compared to single parent households. In those cases where there were only one parent, that parent's average was used. No information on occupation nor education was available for stepparents.

An eminent data limitation of the socioeconomic background indicators is many missing values on parental background, especially for fathers. For example, father's occupation had 3823 missing values, compared to 2753 on mother's occupation. Why this was the case has not been found in the data nor reported by GGSII. However, with the average approach of parental socioeconomic status, the large numbers of missing values has been reduced, with the consequence of only using the mother's socioeconomic status. This may create a bias if we assume equal influence from both parents. Another limitation was the ISEI score which didn't include parents that were housewives or did not work in the variable, which was a category in the original occupational variable. Instead, those who were housewives or did not work were coded as missing, thus losing valuable information.

### **Respondent's highest level of education**

Respondent's highest level of education was based on the categories from the International Standard Classification of Education from 2011 (ISCED-11) and is available from 1990 to 2019 from register data. This variable was kept as an ordinal variable with the given categories from ISCED-11, with 'Bachelor or equivalent' as a reference category. A bachelor degree is of particular relevance because having one is usually associated with higher earnings.

### **Foreign background**

Foreign background was coded into three main categories according to the definition of foreign background by Statistics Sweden (2020): foreign born with foreign born parents, Swedish born with foreign born parents and Swedish born with at least one parent born in Sweden. Note that, in this study, respondents that are foreign born with foreign born parents still lived in Sweden during their childhood. Respondents that couldn't be placed into any of these categories, for example foreign born respondents with missing information on their parents were coded into a separate category Other. When dealing with lots of missing values on parents' background I prefer to keep the ambiguous observations in a separate category rather than dropping them

because they are still important to the main association of interest, childhood household composition and earnings, and I want to avoid losing sample size which is important for statistical power.

The categories of foreign background are internally heterogeneous in terms of geographical origin. Statistics Sweden's definition does not differentiate children's background of a western country with a majority white population from a non-western country with a majority non-white population. These groups may experience very different living conditions in Sweden, in terms of labour market opportunities (Lundborg, 2013) and discrimination (Bursell, 2014). Therefore, the category foreign born with foreign background was divided into two categories, one of foreign born respondents from a western country (including Denmark, Norway, Iceland, France, Netherlands, Belgium, Germany, Austria, Switzerland, UK, Ireland, USA, Canada, Australia, New Zealand, Finland, Spain, Portugal and Greece) and one of foreign born respondents from a non-western country (all other countries). This could only be done with foreign born respondents because there was no data on respondents' parents' country of origin.

### **Gender, age and number of siblings**

Other control variables were gender, age and number of siblings. Gender was coded as a dummy for female. Age was coded for each observed year, taking the observed year and subtracting the birthyears of the respondents. Since age has a curve-linear association with earnings, age is made into quadratic form. Number of siblings were constructed by adding number of brothers and number of sisters together. The data does not differentiate between biological siblings and step-siblings, nor how many siblings actually lived in the household during respondent's childhood. Although these limitations, number of siblings is still important to include in the model in order to account for different childhood conditions.

## **3.3 Analytical strategy**

The analytical strategy behind the choice of variables in the model is based on previous research made on the topic of childhood household composition and future outcomes.

As mentioned in the literature review, childhood household composition is affected by selectivity of why parents become single parents. Either it is through separation from or death

of a partner which means that socioeconomic and social resources could decrease after the separation due to the loss of an additional parent. On the other hand, single parenthood can happen directly from birth of the child, and the socioeconomic resources can be scarce even before becoming a single parent. The data does not provide information on whether the single parenthood of respondent's parent was a result of a separation, parental death or from birth. It does separate the respondents from single parent households and respondents from households with one biological and one stepparent.

Other selectivity processes of single parenthood that has been found in the previous literature is parents' education, ethnicity/race and age, parent's education and foreign background are controlled for in the study, however, the data does not provide information of how old the parents were at the age of becoming single parents. Many other selectivity processes of separation such as psychological and relational problems, previous marriages and divorces etc. are not possible to control for, hence there is unobserved heterogeneity in the model.

Three model specifications were chosen in the analysis. The first model consists of the main independent variable childhood household composition and individual characteristics gender, age, foreign background and number of siblings. Foreign background was included in the model because children of foreign born parents are associated with different living conditions, compared to children of Swedish born parents. For example children of foreign background are more prevalent of living in a rental property, living with a single parent, and having more siblings (Statistics Sweden, 2017). Foreign born people have higher rates of unemployment and experience more discrimination in the labour market compared to Swedish born people, which puts them in a vulnerable socioeconomic position (Statistics Sweden, 2023). Foreign background could thus be a confounder to the association between childhood household composition and earnings. The number of siblings is included as a control in the model to account for childhood circumstances that may affect the socioeconomic status of the household. For example having many children in a single parent household can make the social and economic resources even more scarce, compared to just being a single child.

The second model includes socioeconomic background in order to see how the association is affected. While it is clear from the literature that single parents generally have lower socioeconomic status compared to coupled parents, the question of whether socioeconomic background functions as a mediator or a confounder to the association between childhood



household composition and future outcomes remains un-answered. Some studies found that parental socioeconomic status decreased when becoming single parents, i.e. mediator (Harkness, 2018), while other studies found that socioeconomic status was low even before they became single parents, i.e. confounder (Lopoo and DeLeire, 2014). Since the data in this study only have access to parental socioeconomic status at one point in time and thus unable to look at socioeconomic status before becoming a single parent, the causal nature of socioeconomic background will not be determined. Socioeconomic background will therefore only be used as a control to see how it affects the original association.

The third model includes respondent's education in order to assess whether it moderates the association between childhood household composition and earnings<sup>1</sup>. Previous research show that people from single parent households have lower educational attainment (Garasky, 1995; Jonsson and Gähler, 1997; Brand *et al.*, 2019) and may function as a mediator in the association between childhood household composition and earnings. Lower earnings among respondents from single parent families may be a result of lower levels of education. Another possibility is that there is no association between childhood household composition and future earnings because education in a Swedish context with free higher education may eliminate the earlier disadvantages of what household composition produced and even out differences in respondent's future earnings. In this case, education does not function as a mediator.

Three sensitivity analyses were conducted in order to assess the robustness of the results. The first controlled for mediating factors unemployment, parental leave and pension. The second changed the age limit for the sample from 20 years to 30 years. The third changed the thresholds for the outcome variable, from the 25<sup>th</sup> and 75<sup>th</sup> percentile to the 30<sup>th</sup> and 70<sup>th</sup> percentile.

### **3.4 Analytical method**

The dependent variable of this study yearly income from job or business is an ordinal scale variable. While there are many income categories for each year in the data that produce an income distribution, the lack of information about the respondent's exact yearly income makes it difficult to know how the respondents differ from each other within a category. Thus a linear

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<sup>1</sup> The model including respondent's education had the best model fit according to the AIC measure.

regression is difficult to defend, instead an ordered logistic regression makes a better fit because it allows the ordered outcome categories to remain as they are and can still represent an underlying unobserved, continuous variable.

The ordered logit model, also called the proportional odds model, is derived from an unobserved, continuous  $y_i^* = \beta_0 + x_i'\beta + \varepsilon_i$  (McCullagh, 1980). Where  $\beta_0$  is the intercept,  $x_i'\beta$  are the coefficients for all predictors, and  $\varepsilon_i$  is the error term which in the proportional odds model assumes a logistic distribution and a fixed variance of  $\pi^2/3$ . The proportional odds model assumes parallel slopes with varying intercepts or cut points,  $\tau_j$ , called the *proportional regression assumption* (Fullerton, 2009). The equality of the parallel slopes can be tested with a Brant test which estimates the unobserved, continuous  $y^*$  as binary logits for  $m - 1$  ordered categories (Brant, 1990). Violating the proportional regression assumption can cause biased estimates. The Brant test has limitations though, it is usually very sensitive for example when few observations fall into an outcome category – which is the case for the many categories of the outcome variable of this study – the test may perform poorly (Agresti, 2010).

Because of the many categories in the outcome variable, some of the binary models in the Brant test couldn't be performed<sup>2</sup>. Therefore, the outcome variable was aggregated into 10 categories in order for the Brant test to work<sup>3</sup>. A statistically significant Brant test indicates that the proportional regression assumption has been violated. When running the Brant test for each observed year the variables gender, parents' ISEI score and age becomes significant during many years. During earlier years with lower sample sizes, parents' education, number of siblings and age squared are also significant. This indicates that the proportional regression assumption has been violated. However, the main independent variable childhood household composition is insignificant the majority of the observed years. Since childhood household composition is the main variable of interest and does not violate the parallel regression assumption I chose to keep the ordered logit regression model. When conducting a sensitivity analysis comparing the ordered logit model to an OLS regression model with the same independent variables, the results show similar direction in effect with statistically significant

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<sup>2</sup> The variables foreign background and respondent's highest level of education were unable to be run with the Brant test because the observations within these variables didn't fit into all of the categories in the outcome variable, thus the binary models for each outcome in the Brant test couldn't be performed.

<sup>3</sup> Observe that the model run in the Brant test thus differ from the model used in the analysis.

estimates, see Appendix A<sup>4</sup>. This indicates that, even though the parallel regression assumption was violated, the ordered logit regression model still produce robust results.

Ordered logistic regressions were run for each observed year in the data, generating 29 separate regressions. However, when doing several logistic regressions the problem of scaling of the regression coefficients must be considered (Mood, 2010; Karlson, Holm and Breen, 2012; Long and Mustillo, 2018). Since the proportional odds model assumes a fixed error variance of  $\frac{\pi^2}{3}$ , the coefficients are rescaled to adjust to the fixed error in every model. When the coefficients are rescaled the size of a  $\beta$  coefficient reflects both the effect of  $x'$  and the degree of unobserved heterogeneity that can't be captured by the fixed error variance, thus there is no way to distinguish the true  $\beta$  coefficient that generate  $y^*$ . Because of this, the  $\beta$  coefficient can't be compared between same-sample models. This is a problem for this study because we are comparing the  $\beta$  coefficients for childhood household composition across different years with different samples. Rescaling also creates a problem when looking for confounding or mediating effects, because the  $\beta$  coefficients will change when including a new variable regardless of the confounding or mediating effect is true or not.

One way to deal with the problem of rescaling is to use average marginal effects (AME) which represent the average change in probabilities, i.e. marginal effects, for the whole sample (Mood, 2010; Long and Mustillo, 2018). AME is a good summary measure to use because it allows for comparison of  $\beta$  coefficients between samples and models, and has a straightforward interpretation. However, since AME reference to the baseline probability of very small categories in the outcome variable, I instead use relative average marginal effects (instead of absolute average marginal effects) called semi-elasticities  $\frac{\partial \ln(y)}{\partial x}$ . This gives the proportional change in  $y^*$  given a change in  $x$  (StataCorp, 2019), which is interpreted in percent instead of percentage points as in AME.

Consequently, when including control variables in the model using semi-elasticities, one is able to detect how the effect changes, and detect mediating effects. Baron and Kenny (1986) present an analytical procedure of testing mediating effects: 1) variations in the independent variable

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<sup>4</sup> A multinomial regression model is to be perfered in a sensitivity analysis comparing ordered logit regression but couldn't be performed because of too many categories in the outcome, therefore an OLS was conducted instead.

account for variation in the presumed mediator, 2) variations in the presumed mediator significantly account for variations in the dependent variable, 3) controlling for the presumed mediator, a previously significant relation between the independent and the dependent variable is no longer significant. If the relation is close to zero, there is strong evidence for a single, dominant mediator. If the relation is not zero, this indicates that there are multiple mediating factors. This strategy will be used when distinguishing whether education is a mediator to the association between childhood household composition and adult earnings.

## 4. Results

In this section, the results from the data analysis are presented. First the descriptive results are presented, thereafter the results from the three research questions, and last, the results from the sensitivity analyses.

### 4.1 Descriptive results

Table 1 shows descriptive results from the sample in 2019. The total sample is 6582 respondents, of which 80 percent lived with both parents during childhood, 11 percent lived with a single parent and 6 percent lived with one biological parent and one stepparent. The sample has a mean age of 41 years old, and the share of women is slightly higher than men with 55 percent. 94 percent are of Swedish background and almost 4 percent are Swedish born with foreign background. Very low shares of the sample are foreign born from a Western or a non-Western country, 0.7 respectively 0.8 percent, which is because the sample only includes respondents who were resident in Sweden during childhood, excluding many that were born outside of Sweden.

From Table 1 one can see how respondents from different childhood household compositions vary in individual and socioeconomic characteristics. The groups are rather similar when it comes to age and share of women, however they differ in socioeconomic background. Respondents who lived in a two-parent household had higher parental ISEI score, 45, compared to respondents of single parents and biological/stepparents households. Respondents who lived

with a biological parent and a stepparent had the lowest parental ISEI score of 38. All three groups had the same median years of parents' education.

The group of respondents who lived with single parents during childhood had the highest share of respondents with foreign background, 5.1 percent compared with 3.7 percent of the whole sample. This group also had higher share of foreign born from a non-Western country compared to the whole sample, 1.4 percent. Respondents who lived with one biological parent and one stepparent had the highest share of foreign born respondents, 2.8 percent. They also had the highest median number of siblings, 2.8, which is probably due to children from previous family constellations are added to the household. Respondents from two-parent households had the lowest median number of siblings, 1.8.

**Table 1: Descriptive results, N=6582**

<i>Variable</i>	<i>Measure</i>	<i>Childhood household composition</i>			<i>Total sample (N=6582)</i>	<i>Number of missing responses</i>
		<i>Lived with both parents</i>	<i>Lived with single parent</i>	<i>Lived with biological parent and stepparent</i>		
	Percent	80.36	10.59	5.97	-	203
<b>Yearly earnings from job or business</b>	Median	375 000 - 384 999 SEK	365 000 - 374 999 SEK	355 000 - 364 999 SEK	375 000 - 384 999 SEK	11
<b>Age</b>	Mean (SD)	41.05 (10.79)	41.29 (10.41)	40.86 (10.35)	41.07 (10.72)	0
<b>Female</b>	Percent	54.49	56.53	60.81	55.32	0
<b>Siblings</b>	Mean (SD)	1.83 (1.19)	2.44 (1.81)	2.78 (1.82)	1.97 (1.36)	46
<b>Highest level of education</b>						19
Primary education	Percent	0.02	0.14	0	0.08	
Lower secondary education	Percent	3.35	8.49	8.93	4.56	
Upper secondary education	Percent	33.43	42.59	39.8	35.02	
Post-secondary non tertiary education	Percent	9.78	9.64	8.67	9.66	
Short cycle tertiary education	Percent	10.69	9.35	8.93	10.33	
Bachelor or equivalent	Percent	23.16	18.13	20.66	22.14	
Master or equivalent	Percent	18.01	10.94	12.5	16.58	
Doctoral or equivalent	Percent	1.55	0.72	0.51	1.35	
<b>Foreign background</b>						0
Swedish background	Percent	94.97	92.25	93.64	93.88	
Swedish born, foreign background	Percent	3.61	5.16	2.29	3.66	
Foreign born, Western country	Percent	0.66	0.43	1.02	0.71	
Foreign born, non-Western country	Percent	0.55	1.43	2.8	0.79	
Other	Percent	0.21	0.72	0.25	0.96	
<b>Parent's ISEI during childhood</b>	Median	45	41	38	43.5	1646
<b>Parent's years of completed education</b>	Median	12	12	12	12	79

The group of respondents from two-parent families had the highest median yearly income at category 375 000 – 384 999 SEK, compared to respondents from single parent households, 365 000 – 374 999 SEK, and biological and stepparent households, 355 000 – 364 999 SEK.

Comparing the highest level of education between the different childhood household compositions indicates that respondents from single parent households had a higher share of lower levels of education and lower shares of higher levels of education, compared to the other

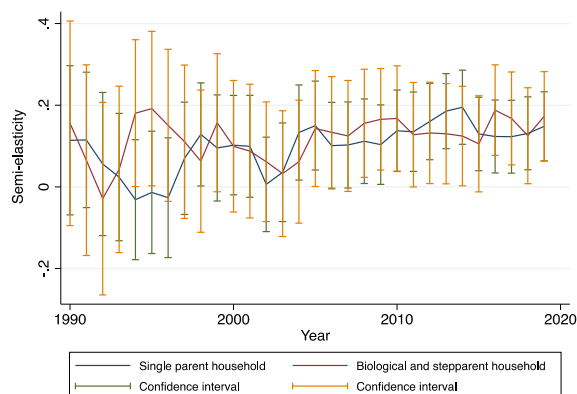
childhood household compositions. For example, 42.5 percent of respondents from single parent households had upper secondary education as highest level of education, compared to 33,4 percent of respondents from two-parent households.

## 4.2 Childhood household composition and cumulative disadvantage

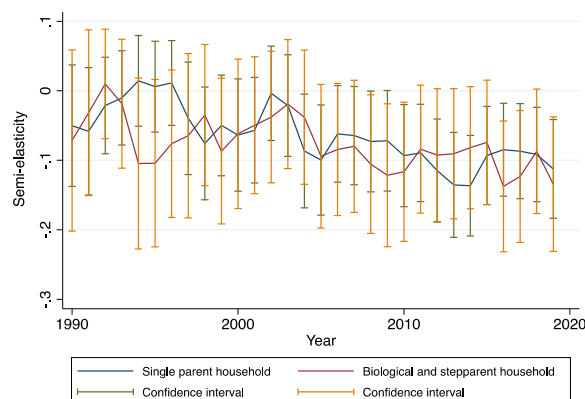
The first research question of this study is: does growing up in a single parent household in Sweden have growing negative consequences on earnings trajectories in adulthood? Figure 2 and Figure 3 display the association between childhood household composition and earnings from the ordered logit models with semi-elasticities, i.e. the percentage change in probability<sup>5</sup>.

Figure 2 shows the results of the outcome category at the 25<sup>th</sup> percentile of the income distribution, i.e. low income, and Figure 3 shows the results of the outcome category at the 75<sup>th</sup> percentile of the income distribution, i.e. high income. These semi-elasticities are plotted between the years 1990 to 2019, with corresponding confidence intervals, and adjusted for the individual characteristics age, gender, foreign background and number of siblings. Respondents from two-parent households is the reference category.

**Figure 2: Semi-elasticities of childhood household composition, 1990-2019. Outcome = 25<sup>th</sup> percentile. <sup>6</sup>**



**Figure 3: Semi-elasticities of childhood household composition, 1990-2019. Outcome = 75<sup>th</sup> percentile. <sup>6</sup>**



<sup>5</sup> Using Stata's margins, with the eydx(\*) option. This is the (relative) average marginal effect.

<sup>6</sup> Figures derived from ordered logistic regression models, see Appendix B, B.1

Looking at Figure 2 presenting the results for the outcome category at the 25<sup>th</sup> percentile of the income distribution, the semi-elasticities fluctuate between the years, particularly from 1990 to 2005. During these years, the effect of childhood household composition on earnings is not statistically significant for both groups and have large confidence intervals. This could be due to the small sample sizes these particular years which decrease statistical power. After 2005, the semi-elasticities appear to somewhat stabilize in fluctuation but the confidence intervals of both groups are still large, however, the effect is statistically significant the majority of the years 2008 and onwards.

For the group of respondents from single parent households, the effect of childhood household composition on earnings is statistically significant from 2008 and onwards, on at least 5 percent risk level. From the blue curve in Figure 2 one can see how the effect size remains above 0 and almost gradually increase over the years, however, the confidence intervals are still high thus a clear growth trend in effect size can't be determined. The semi-elasticities varies in size between 0.1 and 0.2 during these years, indicating that the probability of being in the outcome category at the 25<sup>th</sup> percentile of the income distribution is between 10 and 20 percent higher for respondents from single households, compared to respondents from two-parent households. The effect was greatest in 2014, statistically significant on the 0.1 percent risk level, and lowest 2010, statistically significant on the 5 percent risk level. However, confidence intervals are still large during these years therefore the size of the effect is possible to be larger or smaller.

For the group of respondents from households with biological and stepparents, the effect on earnings is not continuously statistically significant between the years 2008 and 2019. The size of semi-elasticities varies between 0.10 and 0.19 during these years, not statistically significant 2015 and 2011. The large confidence intervals also indicate that the effect is very close to zero during more years. The effect was greatest in 2016, showing that respondents from households of one biological parent and one stepparent had 19 percent higher probability of being in the outcome category at the 25<sup>th</sup> percentile of the earnings distribution that year, compared to respondents from two-parent households, statistically significant on the 0.1 percent risk level.

Moving to Figure 3, the graph shows the probability of being in the outcome category at the 75<sup>th</sup> percentile of the income distribution for the different groups of childhood household composition, between the years 1990 to 2019. Similar to Figure 2, the semi-elasticities fluctuate between years 1990 to 2005 and then begin to stabilize. The shape of the graph is an inverted

version of the graph in Figure 2, indicating that the probability of being in the outcome category at the 75<sup>th</sup> percentile of the income distribution is lower for respondents from single parent households and respondents from one biological and one stepparent household, compared to respondents from two-parent households.

Similar to Figure 2, the effect of childhood household composition on earnings is statistically significant from 2010 and onwards for the group of respondents from single parent households, and almost show a negative trend in effect size as the years go, mind the large confidence intervals. From 2010, the size of the semi-elasticities varies between -0.07 and -0.14. The effect was most negative in 2013 where the probability of being in the outcome category at the 75<sup>th</sup> percentile of the income distribution was 13.5 percent less for respondents from single parent households compared to respondents from two-parent households, statistically significant on the 0.1 percent risk level.

For respondents from one biological and one stepparent households, the effect of childhood household composition on earnings was statistically significant only a few observed years: 2008, 2009, 2010, 2016, 2017 and 2019. The effect was most negative 2016 where the probability of being in the outcome category at the 75<sup>th</sup> percentile of the income distribution was 13.7 percent less for respondents from one biological and one stepparent households compared to respondents from two-parent households, statistically significant on the 1 percent risk level.

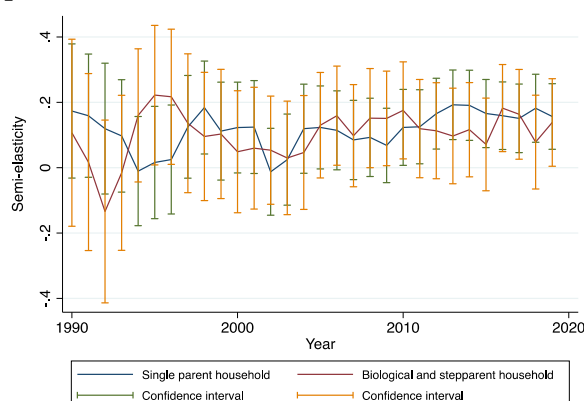
In conclusion, the effect of childhood household composition can be found statistically significant during 2008 to 2019 for respondents from single parent households and some years for respondents from biological and stepparent household. The effect sizes are substantial and indicate that respondents from single parent household and biological/stepparent households are less likely to have high income, although the confidence intervals are quite large. However, the effect does not substantially increase with time, rather it fluctuates, which does not support the cumulative disadvantage thesis.



## 4.3 Socioeconomic background – how does it affect the association?

When including socioeconomic background (parental ISEI score and parental education) in the model the second research question of this study can be investigated: how does socioeconomic background affect the relationship between childhood household composition and earnings?

**Figure 4: Semi-elasticities of childhood household composition, 1990-2019, including socioeconomic background. Outcome = 25<sup>th</sup> percentile.** <sup>7</sup>



**Figure 5: Semi-elasticities of childhood household composition, 1990-2019, including socioeconomic background. Outcome = 75<sup>th</sup> percentile.** <sup>7</sup>

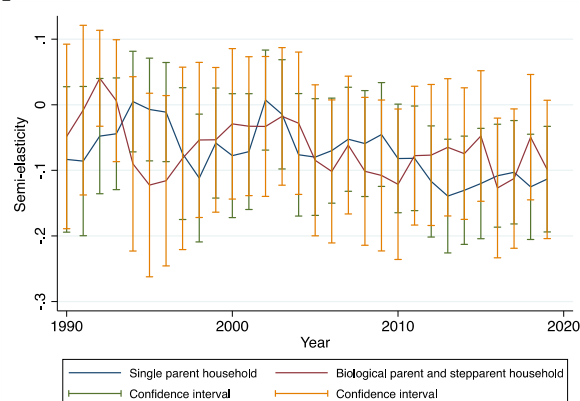


Figure 4 presents the semi-elasticities for the association between childhood household composition and earnings, for the outcome category at the 25<sup>th</sup> percentile of the income distribution, between the years 1990 to 2019, adjusted for socioeconomic background. Compared to Figure 2, the plotted curves are very similar; the tend still show a positive association between childhood household composition and earnings, although a growth curve is difficult to claim still. However, statistical significance has decreased for many observed years. For the group of respondents from one biological and one stepparent household this has resulted in more insignificant effects of childhood household composition on earnings. The years 2006, 2009, 2010, 2016, 2017 and 2019 show statistically significant effects, however, the confidence intervals are at many times very close to zero thus should be interpreted with caution. The effect is greatest in 2016, the probability of being in the outcome category at the

<sup>7</sup> Figures derived from ordered logistic regression models, see Appendix B, B.2

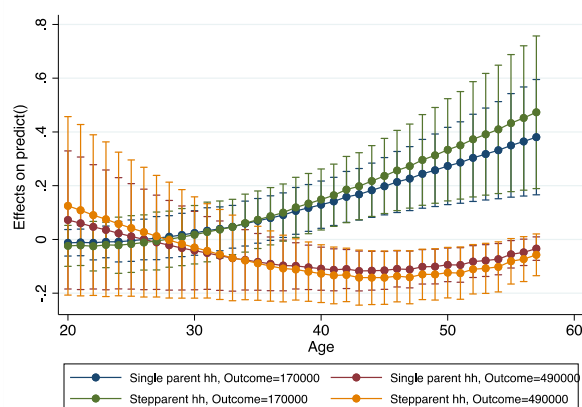
25<sup>th</sup> percentile of the income distribution was 18 percent higher for respondents from biological and stepparent households compared to respondents of two-parent households, statistically significant on the 1 percent risk level.

For the group of respondents from single parent households, the effect of childhood household composition is statistically significant from 2010 and onwards. From 2014 and onwards the effect has increased compared to Figure 2. In 2015, the probability of being in the outcome category at the 25<sup>th</sup> percentile of the income distribution was 16.6 percent higher for respondents of single parent households compared to respondents of two-parent households, statistically significant on the 1 percent risk level. The corresponding effect in 2015 in Figure 2, excluding socioeconomic background, was 13 percent higher probability.

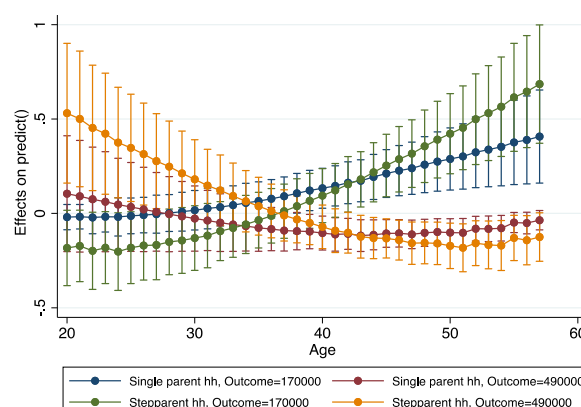
In Figure 5, similar changes in the effect of childhood household composition on earnings can be found in the outcome category at the 75<sup>th</sup> percentile of the income distribution, when accounting for socioeconomic background. The effect is insignificant during more observed years, and there is only a slight change in effect size.

In order to see the change more clearly when including socioeconomic background, the interaction effect of childhood household composition and age on earnings has been plotted, only for the year 2019. As can be seen in Figure 6 and Figure 7, the effect persists when including socioeconomic background in the model.

**Figure 6: Semi-elasticities of interaction childhood household composition and age, 2019. Excluding socioeconomic background.**



**Figure 7: Semi-elasticities of interaction childhood household composition and age, 2019. Including socioeconomic background.**



In conclusion, including socioeconomic background in the model does not eliminate the relationship between childhood household composition and earnings. The effect can still be

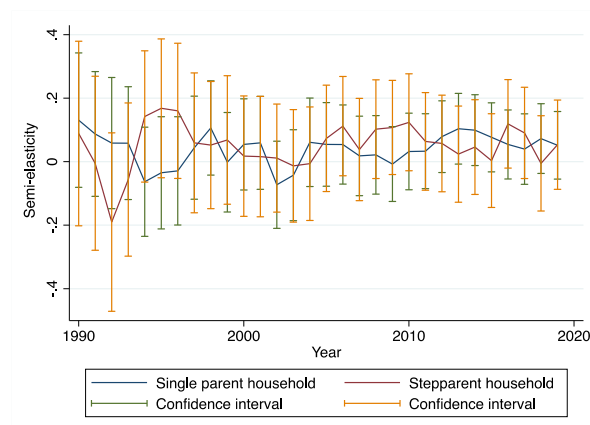
found during some observed years, especially for respondents from single parent households where the effect at times increases. However, a substantial difference in effect size is difficult to claim. This would suggest that socioeconomic background is not a confounder nor a full mediator to the association since the effect didn't disappear when including it in the model. However, it is possible that socioeconomic background partially mediate or partially confound the association between childhood household composition and adult earnings.

## 4.4 Education – a mediation analysis

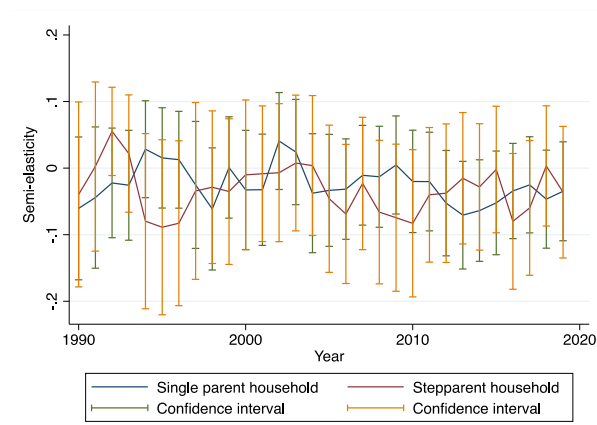
The third research question of this study is: does respondent's education mediate the relationship between childhood household composition and adult earnings? In Figure 8 and Figure 9 respondent's education is included in the model.

Including education in the model reduces the statistical significance significantly and the association between childhood household composition and earnings is no longer statistically significant any observed year, this is the case for both the outcome category at the 25<sup>th</sup> and 75<sup>th</sup> percentile of the income distribution. The effect size has also moved closer to zero for both outcomes, although not all observed years show this decrease in effect size.

**Figure 8: Semi-elasticities of childhood household composition, 1990-2019, including education. Outcome = 25<sup>th</sup> percentile.<sup>8</sup>**



**Figure 9: Semi-elasticities of childhood household composition, 1990-2019, including education. Outcome = 75<sup>th</sup> percentile.<sup>8</sup>**



<sup>8</sup> Figures derived from ordered logistic regression models, see Appendix B, B.3

The fact that the effect is no longer statistically significant, is an indication of that education works as a mediator to the association. The effect size has also decreased and is zero some observed years, thus suggests a partial mediation and that there might be multiple mediating factors that have not been observed yet (Baron and Kenny, 1986).

When the interaction effect of childhood household composition and age on adult earnings has been plotted only for the year 2019<sup>9</sup> as done in Figure 6 and Figure 7, and including respondent's education, the effect size comes closer to zero for respondents from single parent households and are in many cases not statistically significant, which supports the argument that education is a partial mediation to the association.

## 4.5 Sensitivity analysis

Three sensitivity analyses were conducted in order to see how the association changed when modifying the model. The model used in the analyses included socioeconomic background but excluded respondent's education because of the mediating impact it had on the association.

The first sensitivity analysis controlled for unemployment, parental leave and retirement for each observed year because these mediate the association between childhood household composition and earnings. Including the control variables caused the semi-elasticities to change quite drastically during the years 1990 to around 2000, although still not statistically significant. From 2010 and onwards, the association between childhood household composition and earnings persisted for respondents from single parent households, with only small alterations to semi-elasticities, both for the outcome category at the 25<sup>th</sup> and the 75<sup>th</sup> percentile of the income distribution. Thus, unemployment, parental leave and retirement does not mediate the association between childhood household composition and earnings.

In the second sensitivity analysis the age limit was changed from 20 years old to 30 years old. Years 1990 to 1993 were removed due to low sample sizes. Altering the age limit changed the statistical significance and the semi-elasticities substantially for the outcome category at the 25<sup>th</sup> percentile. Although the sample sizes had decreased, the effect for respondents from single parent households was statistically significant during more observed years compared to when

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<sup>9</sup> See graph in Appendix B, B.4

the age limit was 20 years old. The size of the semi-elasticities had also increased for many observed years, and was in many cases above 0.2, which was the highest semi-elasticity found in the sample including 20 year olds. In the outcome category at the 75<sup>th</sup> percentile, neither the statistical significance nor the effect size had changed substantially, only in the first years where the sample size is small. Thus, changing the age limit to 30 enhances the association between childhood household composition and earnings. This could be because respondents between ages 20 and 29 haven't yet established a stable yearly income which disturbs the larger effect of childhood composition on earnings for respondents over 30 years old.

The third sensitivity analysis changed the percentile thresholds from 25<sup>th</sup> and 75<sup>th</sup> percentile to 30<sup>th</sup> and 70<sup>th</sup> percentile. The change in thresholds did not alter the statistical significance much, however, the size of the semi-elasticities decreased marginally for both thresholds. This could be because the more extreme thresholds of the 25<sup>th</sup> and 75<sup>th</sup> percentile has bigger differences in probabilities among the groups of childhood household composition compared to the 30<sup>th</sup> and 70<sup>th</sup> percentile which are closer to the median.

## 5. Discussion

The aim of this study is to investigate whether children growing up in single parent households in Sweden experience growing disadvantages during the life course, compared to children from two-parent households. The descriptive results show that respondents from single parent households have lower socioeconomic background in terms of parental ISEI score, lower levels of higher education and lower yearly earnings, compared to respondents from two-parent households. This corresponds with previous research that single parent families have lower socioeconomic status and children from single parent families have lower educational and economic outcomes.

The first research question of this study aims to test whether childhood household composition results in growing disadvantages for children from single parent households: does growing up in a single parent household in Sweden have growing negative consequences on earnings trajectories in adulthood? The results show that there is a persistent statistical significant effect

of childhood household composition on earnings for respondents from single parent households from 2008 and onwards. The effect indicates that respondents from single parent households have higher probability of being in the low income category and lower probability of being in the high income category, compared to respondents from two-parent households. The effect ranges from 10 to 20 percent higher probability to end up in the low income category and 7 to 13.5 percent lower probability end up in the high income category. However, there is no evidence of growing differences between respondents from single parent households and respondents from two-parent households, nor respondents from one biological and one stepparent households, rather the effect fluctuates over the observed years. Thus these findings does not support the cumulative disadvantage thesis. These results were only adjusted for individual characteristics gender, age, number of siblings and foreign background, and can thus be a spurious relationship.

Therefore, adjusting for socioeconomic background is the aim of the second research question: how does socioeconomic background affect the relationship between childhood household composition and earnings? The results show that the effect is statistically insignificant during more observed years. However, for respondents from single parent households, the effect of childhood household composition and earnings still remains statistically significant from 2010 and onwards. The effect size still varies between 10 and 20 percent higher probability in the low income category and has even increased during some years. This indicates that including socioeconomic background does not fully confound the association between childhood household composition and earnings, opposite to what some of the previous research have found (Lopoo and DeLeire, 2014). Whether socioeconomic background mediates the association is harder to assess. Since the effect size doesn't disappear, it may be the case that socioeconomic background partially mediate the association, i.e. childhood household composition partially cause lower socioeconomic status, but there are other unobserved mediating factors that can affect the association. There is also the possibility that socioeconomic background functions both as a confounder and a mediator at the same time. It is likely that socioeconomic status was low before becoming a single parent, compared to coupled parents, and then became even lower after becoming a single parent. However, since the available data does not allow to measure socioeconomic status before parents experienced single parenthood, the confounding or mediating effect of socioeconomic background can't be fully determined in this study. The findings from the previous literature are also diverging, showing support both

for confounding and mediating effects. Establishing the causal nature of socioeconomic background on the subject of childhood household composition and children's future outcomes is an important task for the research field in the future.

The aim of the third research question is to adjust for respondent's education and assess whether it has a mediating effect: does education mediate the relationship between childhood household composition and earnings? The results show that the effect is no longer statistically significant during any observed year and has decreased in size, coming closer to zero. This suggests that education does largely mediate the association between childhood households composition and adult earnings, confirming the third hypothesis of this study. These findings are also in line with previous research (Lee and Allen, 2022). Hence, the reason why children of single parent households have lower future earnings is because they attain lower education. This partially support McLanahan's (2004) thesis of diverging destinies: children from single parent households fare worse compared to children from two-parent households. Whether these diverging destinies are a result of parents' socioeconomic status or the childhood household composition per se, hasn't been established in this study. Moreover, the Swedish education system does not seem to eliminate the disadvantage that children from single parent households experience.

There are limitations to these results which must be highlighted. First and foremost is the Brant test which indicated that some of the control variables in the model violated the parallel regression assumption, thus the results should be interpreted with caution as they may be biased. However, the independent variable childhood household composition did not violate the parallel regression assumption which is the variable of interest in this study, and a sensitivity analysis with an OLS regression model was made which indicated robust results from the ordered logit model. Moreover, the Brant test is sensitive when dealing with many categories in the outcome variable and few observations in some categories in the independent variables, thus it is not surprising that the Brant test showed that the assumption had been violated. Still, this is a limitation from a statistical point of view.

Second, previous research emphasize the selectivity processes of becoming a single parent. These may be individual factors such as age and ethnicity, and socioeconomic factors such as education. Parental education and foreign background has been controlled for in this study, while age of single parenthood was not available information in the data. Moreover, there are

other selectivity processes into separation which have not been possible to account for in this study. Therefore there is unobserved heterogeneity in the model that can confound the association between childhood household composition and future earnings. Using a different statistical model, such as a siblings model or fixed effects model, the unobserved heterogeneity could be handled.

To conclude the findings from this study, respondents from single parent households fare worse in future earnings compared to respondents from two-parent household. This is partly because they differ in socioeconomic background which is possible to partially confound and/or mediate the association, and differ in educational attainment by having lower educational level which produce lower earnings in the future. While the effect is statistically significant during several years after 2010, there is no evidence of growing disadvantages over time, thus it is not a process of cumulative disadvantage. The increased income inequality that has developed in Sweden since the 1990s has not translated into growing inequality between people from different childhood household compositions. However, Sweden is currently (spring of 2023) moving into a recession following high inflation which has resulted in skyrocketing interest rates and food prices (Konjunkturinstitutet, 2023). How the recession will affect the economic situation for families with children, and especially low income families such as single parents, remains to be seen, but it is likely that they will become increasingly vulnerable which may affect children's future possibilities even more. Thus, more needs to be done by the welfare state to aid financially vulnerable families, such as educational investments for children from socioeconomically vulnerable families, increase flexibility for working parents and increase cash transfers for single parent families, in order to assure that children from single parent families do not remain or become increasingly disadvantaged.



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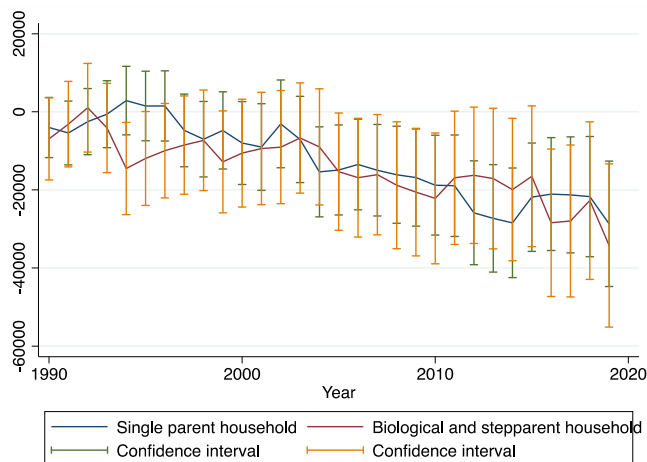
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# Appendix A



Sensitivity analysis: OLS regression model with Average Marginal Effects. Childhood household composition and earnings, adjusted for individual characteristics and socioeconomic background. Not adjusted for inflation.

# Appendix B

## B.1

	1999	2009	2019
<b>Childhood household composition</b>			
Single parent household	-0.133	-0.158*	-0.234**
Biological and stepparent household	-0.222	-0.258*	-0.275**
<b>Female</b>	-1.256***	-0.981***	-0.718***
<b>Siblings</b>	-0.065**	-0.09***	-0.059***
<b>Age</b>	0.956***	0.424***	0.346***
<b>Age-squared</b>	-0.008***	-0.005***	-0.003***
<b>Foreign background (ref = Swedish background)</b>			
Swedish born, foreign background	-0.418*	-0.302*	-0.058
Foreign born, Western country	0.306	0.036	-0.030
Foreign born, non-Western country	-0.679	-0.098	-0.424
Other	-1.923*	0.274	-0.456
Pseudo R2	0.04	0.04	0.03
n	3625	5128	6355

\* 0.05 significance level | \*\* 0.01 significance level | \*\*\* 0.001 significance level

Ordered logistic regression model with logit coefficients including individual characteristics. Examples for observed years 1999, 2009 and 2019.

## B.2

	1999	2009	2019
<b>Childhood household composition</b>			
Single parent household	-0.154	-0.102	-0.242**
Biological and stepparent household	-0.142	-0.232*	-0.212
<b>Female</b>	-1.287***	-1.024***	-0.75***
<b>Siblings</b>	-0.054*	-0.082***	-0.042*
<b>Age</b>	0.585***	0.407***	0.367***
<b>Age-squared</b>	-0.008***	-0.004***	-0.004***
<b>Foreign background (ref = Swedish background)</b>			
Swedish born, foreign background	-0.288	-0.292	-0.005
Foreign born, Western country	0.576	0.094	0.546
Foreign born, non-Western country	-0.572	-0.239	-0.08
Other	-0.856	1.195	0.416
<b>Parent's ISEI during childhood</b>	-0.001	0.004*	0.011***
<b>Parent's years of completed education</b>	0.055**	0.057***	0.068***
Pseudo R2	0.04	0.04	0.03
n	2836	3991	4923

\* 0.05 significance level | \*\* 0.01 significance level | \*\*\* 0.001 significance level

Ordered logistic regression model with logit coefficients including individual characteristics and socioeconomic background variables. Examples for observed years 1999, 2009 and 2019.

## B.3

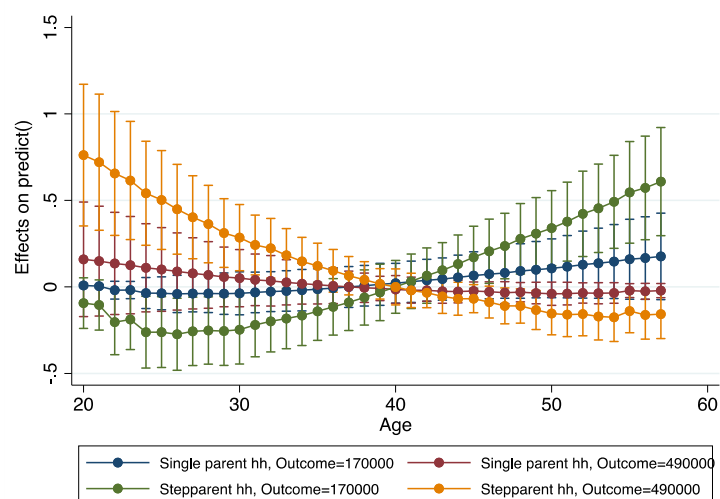
	1999	2009	2019
<b>Childhood household composition</b>			
Single parent household	0.003	0.011	-0.077
Biological and stepparent household	-0.094	-0.164	-0.08
<b>Female</b>	-1.393***	-1.121***	-0.93***
<b>Siblings</b>	-0.048	-0.066**	-0.023
<b>Age</b>	0.477***	0.319***	0.281***
<b>Age-squared</b>	-0.006***	-0.003***	-0.003***
<b>Foreign background (ref = Swedish background)</b>			
Swedish born, foreign background	-0.192	-0.269	-0.033
Foreign born, Western country	0.446	0.157	0.598
Foreign born, non-Western country	-0.779	-0.345	-0.247
Other	-1.062	1.302	0.656
<b>Parent's ISEI during childhood</b>	-0.003	0.001	0.006**
<b>Parent's years of completed education</b>	0.033*	0.033*	0.026
<b>Highest level of education (ref = Bachelor)</b>			
Primary education	-1.901	-	-
Lower secondary education	-1.440***	-1.070***	-1.435***
Upper secondary education	-0.913***	-0.312***	-0.640***
Post-secondary non tertiary education	-1.189***	-0.211	-0.440***
Short cycle tertiary education	-0.374*	-0.249*	-0.362***
Master or equivalent	0.399*	0.797***	0.706***
Doctoral or equivalent	0.373	0.906**	1.255***
Pseudo R2	0.05	0.05	0.04
n	2831	3988	4919

\* 0.05 significance level | \*\* 0.01 significance level | \*\*\* 0.001 significance level



Ordered logistic regression model with logit coefficients including individual characteristics, socioeconomic background variables and respondent's education. Examples for observed years 1999, 2009 and 2019.

## B.4



Semi-elasticities of the interaction effect of childhood household composition and age on adult earnings, 2019, including respondent's education.