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DO BIRTH ORDER AND FAMILY SIZE MATTER FOR INTERGENERATIONAL INCOME MOBILITY? EVIDENCE FROM SWEDEN

by

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Do birth order and family size matter for intergenerational income mobility? Evidence from Sweden

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Abstract

Previous studies of intergenerational income mobility have not considered potential birth-order or family-size effects in the estimated income elasticity. This paper uses a large sample of individuals born between 1962 and 1964; income elasticities with respect to the father's income are estimated for individuals in different birth-order positions for a given family size. This paper presents results based on labor income and total income for sons and daughters separately. The elasticity tends to decrease with birth order for a given family size, especially in the labor-income analysis of fathers and sons. Family size, on the other hand, does not seem to have a large impact on the intergenerational income elasticity.

JEL classification: J62, J12.

Key words: Birth order, family size, intergenerational mobility.

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1. Introduction

Rising interest in intergenerational income mobility has generated many studies of the relation between the long-run income of parents and children.[1] The interest in the transmission of economic status from one generation to another is generally motivated by a wish to determine the degree of equality of opportunity. The extensive Swedish welfare system is usually interpreted as a decision to promote equal opportunities: for instance, most schools are public and higher education is free of charge to reduce the importance of family background. In this way, studies that examine the intergenerational income mobility can be useful as *equality barometers* in society.

The empirical studies in this area have not yet considered potential birth-order or family-size effects in the income relation of parents and children. Children's similarities to their parents and their tendencies to approach a similar income level may, to some degree, depend on whether or not they are the only child in the household. The presence of several siblings reduces the time that the parents are able to devote to each child. The unique position in the birth order of each child may also have an impact on this process. For example, first-born children grow up in more adult-oriented environments than later-born children. Earlier studies of intergenerational income mobility only provide average income elasticities over individuals from all categories of birth-order positions and family sizes. The focus in this study is to find out whether or not income elasticities for individuals with different birth-order positions and family sizes deviate from the average income elasticity. More specifically, the first part of the analysis provides conventionally estimated average income elasticities with respect to the father's income for both sons and daughters. The second part of the analysis allows for birth-order and family-size differences in the estimated elasticities. Potential differences are evaluated at the end. Throughout the paper, family size refers to the number of full siblings in the family.

The average income elasticity in Sweden for fathers and sons is estimated to be 0.28 (Björklund and Jäntti 1997), 0.24 (Björklund and Chadwick 2002), and 0.13 (Österberg 2000). It is about 0.10 for fathers and daughters (Österberg 2000). In the US, the elasticity for fathers and sons is about 0.40, while the estimates for fathers and daughters are about the same (Solon 1992, Zimmerman 1992, Chadwick and Solon 2002). Still, there is little

[1] See Solon (1999) for a recent survey.

knowledge about what drives the intergenerational transmission of income. For instance, to the extent that a parent's income has an impact on the future income of the children, is the impact equivalent for all children in a household? Allowing for birth-order and family-size differences is one way to learn more about the mechanisms behind the transmission of economic status between generations.

The next section discusses why to expect birth-order and family-size effects in an intergenerational context; section 3 provides a short overview of the existing literature on birth-order and family-size effects on the level of earnings and educational attainment. Section 4 presents the econometric framework for estimating average income elasticities and income elasticities by birth order and family size. Section 5 describes the data and the sample selection, section 6 presents the empirical results and section 7 concludes the paper.

2 Why to expect birth-order and family-size effects

Earlier research offers several suggestions why birth order may affect an individual's future outcome. Ejrnaes and Pörtner (2002) divide them in four categories: constraints, household-environment, cultural and biological factors. Most of these categories are also relevant for the discussion of family size.

Financial constraints and imperfect capital markets may reduce opportunities to equalize expenditures on children and therefore opportunities for children may vary, depending on the birth-order position. Further, when the first child is born, many parents are at the start of their careers, while later-born children may arrive when the parents are closer to the peak of their careers and earnings profile, especially if there are several children in the household (Behrman and Taubman 1986). This may favor later-born children compared with earlier-born children, even though the impact on intergenerational income elasticity for siblings of different birth order is unclear.

From a constraints perspective, it may be that high-income earners have fewer children on average and more resources to spend on each child, compared to low-income earners. Studies have shown that the highest income elasticities between generations are estimated at

the top of the parents' income distribution in Sweden (Österberg 2000). This would predict a negative relation between the number of siblings and income elasticity.[2]

The household-environment explanation suggests that the specific number of siblings and ages of siblings affect the environment in which the children grow up. Initially, first-born children spend more time alone with their parents, because there are no other siblings with whom to compete for parents' attention. It has been argued that last-born children may also have this advantage (Hanushek 1992). This is a reasonable argument if there is a large age difference between the second-to-last and the last-born child.

Parental separation is another aspect connected to the household-environment explanation. Separation from the father—which is still the most common outcome—may decrease the father's influence on the children. Because of this, lower income elasticity between children and absent fathers may be expected. Beyond this general effect, separations may also generate birth-order differences in the income elasticity, especially if there are large age differences between the siblings. Later-born siblings are younger at the time of the separation, so they have a shorter experience of living in the same household as their father, compared with older siblings. Therefore, a weaker income relation between the father and the later-born siblings may be expected. This will be referred to as a separation hypothesis.

Sulloway (1997), a leading debater about the significance of birth order, argues that first-born children are more likely to identify with authority than their younger siblings. Clausen (1966) discusses the tendency of parents to delegate parts of their authority over younger children to the first-born child. He suggests that first-born children tend to recognize and accept parental authority more than later-born children. It has also been argued that since first-born children grow up in an adult-oriented environment, they tend to imitate their parents more than their younger siblings (Behrman and Taubman 1986).[3] A related discussion concerns role models and the idea that younger siblings might consider older siblings as role models and identify with them, which reduces the relative influence from the parents.

Differences in the family environment that depend on family size may occur because parents with several children have less time to devote to each child. The observation that economic and social family resources become diluted as the family grows is described as a

[2] However, such a finding would, at least to some degree, depend on the model being incorrectly specified and including a quadratic income term may yield a different result.

trade-off between "child quantity and child quality" (Blake, 1981; 1989). Hanushek (1992) develops a family maximization model based on a theory presented by Becker (1960) and Becker and Lewis (1973). It distinguishes between *public time*, which the family spends together, and *private time*, which a child spends alone with one or two parents. Naturally, the amount of public time does not necessarily decrease with the number of children in the family, unless the parents must work more to support a larger family, while the amount of private time is likely to do so. One hypothesis is that there is less parental influence on children in large families, which may generate weaker income relations. The intergenerational income elasticity would then again be expected to decrease with family size; accordingly, children without siblings would be expected to exhibit the largest income elasticity.

Finally, birth-order effects may also be due to cultural factors. For example, there is an old tradition that the eldest son inherits the farm. This agricultural habit is also common when private companies are inherited within a family. If this tradition still exists, it may be reasonable to predict higher income elasticity among first-born children.

3. Previous research on birth-order and family-size effects

Previous studies of birth order and family size have exclusively focused on the effects on wage level, education level, and schooling performance. Lindert (1977) finds a negative relation in US data between family size and the expected years of schooling. He also finds significant sibling position effects on schooling performance. The results indicate that in large families, first-born children have an advantage over middle-born children. Using US data, Behrman and Taubman (1986) find negative effects of family size on years of schooling. They also find differences by birth order in the effects on years of schooling. First-born children receive more schooling, and the effects remain when controlling for family size. The birth-order differences on the effect on earnings, on the other hand, become insignificant when controlling for family size. Kessler (1991) finds neither significant birth-order nor childhood family-size effects on the level or growth of wages in US data. Hanushek (1992) finds positive effects on schooling performance in US data by being the

[3] Behrman and Taubman (1986) point out that these kinds of arguments date back to Galton (1874).

first-born, but this effect is found to be entirely explained by the first-born's higher probability of belonging to small families. The study confirms earlier findings that schooling achievement decreases with a larger family size. Björklund and Jäntti (1998) find that children from large families in Sweden, Finland, and the US can expect to earn less than children from small families. Finally, Raaum and Aabo (2001) find that first-born children obtain more education than their siblings. Overall, these findings indicate the importance of integrating the birth-order analysis with the family-size analysis to avoid confounding birth-order effects with family-size effects.

4. Empirical framework

4.1 Estimating intergenerational income elasticity

A traditional model of the relation between the income of parents and children is shown in equation 1:

$$(1) \quad Y_{ci} = \alpha + \beta Y_{pi} + \varepsilon_i$$

where Y_{ci} is the long-run log income of child c in family i, Y_{pi} is the long-run log income of parent p in family i, and ε_i is a random component distributed as $N(0, \sigma^2)$. β measures the elasticity of the childrens' income with respect to the parents' income. Consequently, $(1-\beta)$ refers to the degree of income mobility. If the childrens' income has the same variance as the parents' income, β also equals the intergenerational correlation. If the variances differ, correlations can be obtained by multiplying the elasticity coefficient by the ratio of the standard deviations of the parents' and the childrens' incomes.

The income measure of the model in equation 1—the long-run income—is not observed in the data. To approach the model in equation 1, income averages taken over several years are used because they produce a better measure of long-run income than single-year measures of income (Solon 1992). A parent's income is usually measured later in the life cycle compared to the children, therefore intergenerational income mobility studies usually include age controls in the regressions to adjust for the life-cycle variation in income of both generations. In the present study, children are of similar age and therefore the age variables

for children are not included. Furthermore, parents are represented by the fathers in this study. Least squares is applied to the regression:

$$(2) \quad Y_{ci} = \beta_0 + \beta_1 \overline{Y}_{fi} + \beta_2 \overline{A}_{fi} + \beta_3 \overline{A}^2_{fi} + \varepsilon_i,$$

where Y_{ci} is the children's log income in 1999 and $\overline{Y}_{pi}$ is the three-year average of the father's log incomes for 1970, 1975 and 1980. $\overline{A}_{pi}$ is the father's average age during the income years and $\overline{A}^2_{ci}$ is the average of the father's squared age during those years.

4.2 Allowing for birth-order and family-size effects

A previous finding is that the intergenerational income elasticity tends to rise with the average age of the children in the sample (Reville 1995). There is then an obvious risk in this type of analysis that age effects are mistaken for birth-order effects. One solution is to use individuals of similar age but who still have different birth-order positions and belong to families of different sizes.

To allow for birth-order and family-size effects, individuals of similar age are divided into sub-samples, depending on birth-order position and family size. Separate regressions are then run based on these samples: children without siblings; first-born children in two-child families; second-born children in two-child families; and so forth. In this way, the individual's birth order and family size can affect the estimation of intergenerational income elasticity.

5. Data and sample selection

The data used in this study are entirely based on administrative records kept by Statistics Sweden. They consist of a random sample that covers 20% of the population born in Sweden between 1962 and 1973, which amounts to about 250,000 individuals. In the data, full siblings, half siblings, and adopted children can be identified, but only full siblings are included in the analysis. Income data are gathered from registers based on employers' compulsory reports to the tax authorities and include the years 1990, 1993, 1996, and 1999. Some information about the individuals' parents, such as birth date and income, are

collected from the 1970, 1975, 1980, 1985, and 1990 censuses. The income variables are annual labor income—including sickness benefits, parents' allowances, and income from farming activity—and total income, which includes annual labor income, pensions, unemployment benefits, capital income (including capital gains), and income from real estate property (*inkomst av annan fastighet*).[4]

A few restrictions are imposed on the samples used in estimation. The analysis is based on children who are born between 1962 and 1964. An age restriction on the fathers is also applied, including those born in 1920 and later. The fathers are also required to be alive in 1980. As a baseline income restriction, the children are required to have a positive income in 1999, while fathers are required to have a positive average income over the income years (1970, 1975, and 1980). One could argue that only fathers who have a positive income every year should be included. There is a trade-off between achieving a good measure of long-run income—which is promoted by including as many income observations per individual as possible—and avoiding that the sample is biased toward high-income earners. Including only those individuals who report positive income in all years produces a better measure of long-run income. But excluding those who have experienced unemployment would increase the sample's average income since more low-income earners become unemployed. This, in turn, might alter the estimated income elasticity because high-income earners tend to have higher income elasticity (Österberg 2000). Over-sampling high-income earners might also alter the analysis of family-size effects because high-income earners tend to have fewer children. Österberg (2000) presents results using both types of income restrictions. The restriction that requires a positive income every year produces slightly higher estimates of income elasticity for fathers and sons. The present study follows Österberg (2000) and uses both types of income restrictions, but to save some space, the appendix presents the results for the birth-order and family-size analysis where a positive income is required in every year. The income restriction that requires positive average income results in 25,072 father and son pairs and 23,885 father and daughter pairs.[5].

Table 1 presents the averages of labor income for sons with a positive income in 1999. For the complete sample, the average annual income in 1999 is SEK 256,000 (about

[4] Total income in 1970 is the net of deductions while total income in 1975 and 1980 is not. The difference, however, is expected to be small.

[5] Previous studies have shown large differences in the income elasticity of sons and daughters. So the analysis should be made separately for sons and daughters.

EUR 24,000). Income averages, according to birth order and family size, indicate that the average income decreases with family size, and for a given family size it also decreases with birth order. The same pattern occurs for total income (see the appendix, which also includes income averages for daughters). Table 2 shows sample characteristics for fathers. In 1975, the average age of the fathers is 42, and their average annual income is SEK 232,000 which is slightly lower than the sons' average income.

6. Empirical results

6.1 Average elasticities

Table 3 presents estimates of average intergenerational income elasticities. The dependent variable is the sons'/daughters' log income in 1999. The fathers' income is a three-year average of log income. The regressions also include a constant and the fathers' age and age squared. For fathers and sons, an income elasticity of 0.277 is estimated in the regression based on labor income where a positive income is required for at least one year. This estimate is similar to those found in Björklund and Jäntti (1997) and Björklund and Chadwick (2002) but higher than the 0.13 estimate in Österberg (2000).[7] Perhaps the different result to some extent is explained by the older sample in Österberg (2000), where the individuals are born between 1941 and 1965, while the individuals in this study and the study by Björklund and Chadwick are born after 1960. Another possible reason is that Österberg includes non-biological fathers in the sample, which might reduce the elasticity. Still, this difference needs further explanation.

The requirement of positive income in all years for the fathers produces a larger estimate for labor income and total income, which is also the finding in Österberg (2000). Further, it is shown that the intergenerational income elasticity is stronger for labor income than for total income. For fathers and daughters, an income elasticity of 0.208 is estimated in the regression based on labor income where positive income is required for at least one year. This estimate is considerably higher than in Österberg's study where the comparable

[7] The measure of parental income in Björklund and Jäntti (1997) is a prediction of the fathers' log annual earnings based on his education and occupation.

estimate is .076. As in the case of fathers and sons, the income relation is stronger for labor income than for total income.

6.2 Elasticities by birth order and family size

Table 4 presents regression coefficients from estimations of the intergenerational income elasticity by birth order and family size for both fathers and sons and fathers and daughters. Column one and row one show the estimate for sons/daughters without siblings; column one and row two show the estimate for first-born sons/daughters in two-child families; and so forth.[8] The overall tendency in the analysis of fathers and sons is that the elasticity decreases with birth order for a given family size, especially in large families. In three-child families, the estimate for first-born sons deviates largely from the estimates for middle-born and last-born sons: the former estimate is more than twice as large as the latter. The far-right column provides estimates for different family sizes regardless of birth order. The results indicate no large differences in the elasticity connected with family size. The estimates for fathers and daughters show a similar but weaker elasticity pattern compared to the analysis of fathers and sons. The finding that the elasticity does not vary much depending on family size also holds for fathers and daughters.

To test whether or not the estimates are significantly different from each other, the data are pooled and regressions, where birth-order and family-size variables are interacted with the fathers' income, are run. In the analysis of fathers and sons, the estimates are significantly different from each other in two- and three-child families, while the estimates in four-child families are not significantly different from each other. In the analysis of fathers and daughters, the estimates are only significantly different from each other in three-child families. In both analyses, the estimates for family size that disregard the effect of birth order are not significantly different from each other.

Regressions are also run where the fathers are required to have had a positive labor income in all income years. Table A4 in the appendix shows these results. The estimates are slightly higher compared to the estimates in table 4, and the difference in elasticity between first-borns and last-borns is about the same.

[8] Note that sex composition does not matter; for instance, first-born sons may have either younger sisters and/or younger brothers.

Table 5 presents results based on total income for fathers and sons and fathers and daughters. Because total income also includes unemployment benefits, individuals who have experienced unemployment are included in this analysis.[9] The results show that the elasticity decreases with birth order for a given family size, but the decrease is smaller compared to the labor-income analysis. For sons of four-child families, the birth-order pattern has completely disappeared. For fathers and daughters, there is no pattern in the elasticity for individuals in different birth-order positions.

To summarize, a traditional analysis that measures the average elasticity of labor income (table 3), shows an elasticity of 0.29 for fathers and sons and 0.21 for fathers and daughters. Allowing for family-size effects does not greatly alter these results, but allowing for birth-order effects within each family size leads to estimates that decrease with birth order, especially in the labor income analysis. For fathers and sons, the estimates of first-born children are twice the size of those for last-born children in large families, and these estimates are significantly different from each other. The results for fathers and daughters are similar but weaker.

As mentioned in section 4.2, the intergenerational income elasticity tends to rise with the average age of the children in the sample. Thus it is not impossible that the elasticity varies with the age of the fathers, too. In the birth-order and family sixe analysis, the father's age varies depending on the child's birth-order position because fathers of children with high birth order are, on average, older than fathers of first-born children. To find out if the results are sensitive to the age of the fathers, regressions are run based on samples excluding both the youngest and oldest fathers. The results are not sensitive to the exclusion of fathers who were age 50 or older in 1975, or the fathers who were age 35 or younger in 1975. A related problem might occur if the size of the standard deviations of the income variable differs between the two generations. Tables 1 and 2 show that the standard deviation of the income variable for sons is larger than for fathers. The income variable of the fathers is averaged over three years, which generally reduces the standard deviation.[10] To check if the results are sensitive to varying standard deviations, the intergenerational correlation is estimated based

[9] In the labor-income analysis, fathers who have experienced unemployment are included as long as a positive income is reported for at least one of the income years.

[10] The standard deviation of the fathers' income in 1970, 1975, and 1980 is around 130,000, while the standard deviation of the average income over those years is 116,000.

on standardized income data.[11] The results show that the correlation decreases with birth order for a given family size and the differences are significantly different from each other, in the same way as in the elasticity analysis. So the results are not sensitive to varying standard deviations. The results based on correlations are available upon request.

6.3 Testing hypotheses about the birth-order pattern

This section tries to understand why income elasticity tends to decrease with birth order for a given family size. The data allow some of the hypotheses discussed in section 2 to be tested. The separation hypothesis suggests that the tendency of income elasticity to decrease with birth order may be explained by the incidence of parental separations, because they are likely to affect the later-born children the most. In the case where the children are separated from the father, a weaker income relation between the father and the later-born children may be expected. Björklund and Chadwick (2002) analyze income elasticities in both intact and separated families. They find that sons who always lived with their biological fathers have a labor income elasticity of 0.25. Sons who sometimes lived with their biological fathers have an elasticity of 0.20-0.23, while sons who never lived with their biological fathers have a very low elasticity not significantly different from zero. To test the separation hypothesis, an analysis is made exclusively on children who lived with their fathers in 1970 and 1975, when they were ages 6-8 and 11-13, respectively. If the income elasticity would not decrease with birth order in the analysis that only includes individuals from intact families, this would be in line with a separation hypothesis. Table 6 presents the results for sons and daughters who lived with their fathers in 1970 and 1975 and where the fathers' labor income is required to be positive for at least one of the income years. The elasticity of sons without siblings, is larger compared with the estimate in table 4, where the separated families were included. Thus there is a stronger income relation in one-child families between fathers and sons who have lived together during the son's upbringing. In families with more than one child, this effect is not present. For sons in two-child families, there is no change in the elasticity for first-borns compared to the results in table 4, while the elasticity is smaller for last-borns. The estimates for sons in three-child families show that first-borns have larger elasticity than before, while the elasticity of middle-born children is unchanged. The elasticity of last-born children has increased compared to the results in table 4; this result is weakly in line with the

[11] Income measurement and specification are the same as in table 4.

assumptions of a separation hypothesis. In families with four or more children, the elasticity of last-born children is unchanged.

In the analysis of fathers and daughters, it is shown that daughters without siblings, who have grown up with their fathers, have a stronger income relation to their fathers. As in the analysis of fathers and sons, this effect is not present in families with more than one child. The rest of the elasticities are more or less unchanged. To summarize, the results for sons from three-child families are weakly in line with a separation hypothesis, while the results for sons from other family sizes and for fathers and daughters are not. Therefore it is impossible to draw strong conclusions about a separation hypothesis.

Cultural factors suggest potential reasons why birth order would affect an individual's future outcome, for example, the old tradition that the eldest son inherits the farm or the family company. To the extent that this tradition continues, one may expect higher income elasticity among first-born children.[12] The results in this paper are to some extent in line with this prediction. Table 4 shows that the estimate for first-born sons from three-child families is much larger than the estimates for middle-born and last-born sons. One way to approach this problem is to find out if there is an abundance of first-born children among the self-employed. Table 7 shows the fraction of self-employed children in different birth-order and family-size categories: there is no abundance of self-employed among first-born sons or daughters. Rather, the small differences indicate the opposite pattern. So the results are not in line with this hypothesis.

7. Conclusion

The main finding of this paper is that there seems to be patterns in the transmission of economic status between fathers and children. The income elasticity tends to decrease with birth order for a given family size, especially in the labor-income analysis of fathers and sons. The present paper estimates an average 0.28 labor-income elasticity of fathers and sons. An analysis that allows for birth-order and family-size variation in the elasticity finds that the elasticity is up to 14 percentage points higher than the average elasticity for first-born children, and up to 12 percentage points lower than the average for last-born children in

[12] There may, however, be problems when measuring income of farmers and the self-employed. For example, self-employed people may not report income as wages.

large families. Although family size does not seem to have a large impact on the intergenerational income elasticity.

The results on birth order are partly in line with one of the predicted birth-order effects that is suggested in section 2. The separation hypothesis predicts a weaker income relation between an absent father and later-born children; the results for sons from three-child families are weakly in line with this hypothesis. The results for sons from other family sizes and for fathers and daughters are not in line with a separation hypothesis.

There still remain birth-order differences in the results that need to be accounted for. Perhaps psychological factors lead to these differences, such as the hypothesis that younger children regard older siblings as role models and are influenced by them rather than their fathers. This may generate weaker income relations between fathers and later-born children compared to first-borns or an only child.

Future research might investigate if the results in the paper can be replicated with other data sets and identify central mechanisms behind the dynamic process of income transmission between different family members.

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Table 1. Annual labor income of sons in 1999 (SEK 1000s)

Variable	Mean	St. dev.	Min.	Max	N
Pooled sample	256	182	0	13,134	25,073
Income by birth order and family size:					
Sons without siblings	256	135	0	965	1,561
Sons from two-child families	264	198	0	13,134	11,334
1st	269	172	0	3,724	6,106
2nd	258	225	0	13,134	5,228
Sons from three-child families	257	181	0	8,180	7,803
1st	263	205	0	8,180	2,742
2nd	258	190	0	6,822	2,720
3rd	250	133	0	2,097	2,341
Sons from four- or more child families	236	152	0	5,333	4,375
1st	252	233	0	5,333	769
2nd	234	151	0	2,912	848
3rd	235	120	0	1,047	1,062
4th	229	121	0	1,492	1,696

Note: The individuals in the samples are required to have positive income in 1999. The minimum value of 0 in the table indicates an income below SEK 500 and these values were rounded down to 0 (the income data are expressed in SEK 1000s). The share of an only child is smaller than the share in the Swedish population. This is due to the sampling procedure used by Statistics Sweden, which makes random draws based on individuals rather than households, leading to the over-representation of large families.

Table 2. Sample characteristics of fathers

Variable	Mean	St. dev.	Min.	Max	N
Pooled sample:					
Labor income (SEK 1000s)	232	116	1	2,089	25,073
Age in 1975	41.7	5.9	26.0	55.0	25,073
Labor income by number of children:					
Fathers of one child	217	87	1	981	1,561
Fathers of two children	235	106	1	1,652	11,334
Fathers of three children	239	125	1	2,089	7,803
Fathers of four or more children	220	132	1	1,703	4,375
Age in 1975 by number of children:					
Fathers of one child	42.3	6.3	29.0	55.0	1,561
Fathers of two children	41.0	5.6	28.0	55.0	11,334
Fathers of three children	41.6	5.8	28.0	55.0	7,803
Fathers of four or more children	43.6	6.1	26.0	55.0	4,375
Age in 1975 by birth-order position of child:					
Fathers of first-born children	39.0	5.3	26.0	55.0	11,178
Fathers of children who are no. 2	42.5	5.1	30.0	55.0	8,796
Fathers of children who are no. 3	45.4	5.0	30.0	55.0	3,403
Fathers of children who are no. 4+	47.8	4.6	33.0	55.0	1,696

Note: Income measure: average annual income during the years 1970, 1975, and 1980. 'Children who are no. 4+' refers to children who have birth-order position 4 or higher.

Table 3. Estimated average intergenerational income elasticities

Variable	Labor income	Total income
	Fathers and sons	
Positive income for at least one year	.277	.268
	(.011)	(.010)
	25,072	*26,157*
Positive income for all years	.300	.285
	(.012)	(.011)
	23,534	*24,883*
	Fathers and daughters	
Positive income for at least one year	.208	.160
	(.012)	(.010)
	23,885	*24,987*
Positive income for all years	.235	.169
	(.014)	(.010)
	22,337	*23,724*

Note: Standard errors in parentheses; sample sizes in italics.

Table 4. Estimated intergenerational elasticities in labor income for sons and daughters born between 1962 and 1964

No. of children in family	Birth order									
	Fathers and sons					Fathers and daughters				
	1	2	3	4+	All	1	2	3	4+	All
1	.227				.227	.231				.231
	(.048)				(.048)	(.057)				(.057)
	1,560				*1,560*	*1,434*				*1,434*
2	.286	.275			.284	.203	.190			.198
	(.014)	(.017)			(.026)	(.026)	(.028)			(.019)
	6,105	*5,227*			*11,333*	*5,891*	*4,899*			*10,791*
3	.422	.254	.206		.291	.238	.247	.138		.205
	(.034)	(.032)	(.030)		(.019)	(.039)	(.039)	(.034)		(.021)
	2,741	*2,719*	*2,340*		*7,804*	*2,645*	*2,464*	*2,354*		*7,465*
4+	.322	.252	.269	.160	.235	.176	.122	.249	.174	.196
	(.061)	(.055)	(.048)	(.037)	(.031)	(.063)	(.058)	(.053)	(.042)	(.026)
	768	*847*	*1,061*	*1,695*	*4,375*	*707*	*799*	*1,036*	*1,647*	*4,192*

Note: Standard errors in parentheses; sample sizes in italics. The measure of income is log labor income (annual wages before taxes, sickness benefits, parental allowances, and income from farming activity). Income is measured in 1999 for sons and daughters and in 1970, 1975, and 1980 for fathers. A positive income for at least one year is required for fathers.

Table 5. Estimated intergenerational elasticities in total income for sons and daughters born between 1962 and 1964

No. of children in family	Birth order									
	Fathers and sons					Fathers and daughters				
	1	2	3	4+	All	1	2	3	4+	All
1	.372				.372	.180				.180
	(.049)				(.049)	(.046)				(.046)
	1,641				*1,641*	*1,510*				*1,510*
2	.277	.247			.265	.125	.178			.150
	(.021)	(.021)			(.015)	(.022)	(.022)			(.015)
	6,360	*5,428*			*11,789*	*6,138*	*5,123*			*11,262*
3	.324	.265	.213		.269	.188	.175	.179		.183
	(.031)	(.030)	(.027)		(.017)	(.030)	(.028)	(.031)		(.017)
	2,850	*2,826*	*2,429*		*8,107*	*2,767*	*2,572*	*2,452*		*7,793*
4+	.268	.184	.255	.215	.227	.175	.131	.132	.084	.124
	(.053)	(.052)	(.038)	(.029)	(.020)	(.047)	(.048)	(.044)	(.029)	(.020)
	810	*890*	*1,123*	*1,791*	*4,617*	*745*	*838*	*1,086*	*1,747*	*4,419*

Note: Standard errors in parentheses; sample sizes in italics. The measure of income is log total income (annual labor income, pensions, unemployment benefits, capital income (including capital gains), and income from real estate property). Income is measured in 1999 for sons and daughters and in 1970, 1975, and 1980 for fathers.

Table 6. Estimated intergenerational elasticities in labor income of children who shared households with their fathers at least in 1970 and 1975

No. of children in family	Birth order									
	Fathers and sons					Fathers and daughters				
	1	2	3	4+	All	1	2	3	4+	All
1	.283				.283	.308				.308
	(.055)				(.055)	(.067)				(.067)
	1,389				*1,389*	*1,272*				*1,272*
2	.285	.244			.267	.213	.212			.214
	(.024)	(.027)			(.018)	(.029)	(.030)			(.021)
	5,544	*4,680*			*10,225*	*5,314*	*4,401*			*9,716*
3	.448	.256	.245		.314	.249	.224	.132		.198
	(.037)	(.036)	(.033)		(.020)	(.041)	(.041)	(.036)		(.022)
	2,587	*2,520*	*2,133*		*7,247*	*2,471*	*2,291*	*2,144*		*6,908*
4+	.268	.219	.282	.168	.221	.184	.130	.247	.176	.200
	(.067)	(.058)	(.050)	(.038)	(.025)	(.066)	(.066)	(.054)	(.043)	(.027)
	726	*801*	*984*	*1,541*	*4,055*	*676*	*744*	*960*	*1,492*	*3,875*

Note: Standard errors in parentheses; sample sizes in italics. The measure of income is log labor income (annual wages before taxes, sickness benefits, parental allowances, and income from farming activity). Income is measured in 1999 for sons and daughters and in 1970, 1975, and 1980 for fathers.

Table 7 Fraction of self-employed children in different birth-order and family-size categories

No. of children in family	Birth order									
	Sons					Daughters				
	1	2	3	4+	All	1	2	3	4+	All
1	.056				.056	.031				.031
2	.048	.054			.051	.026	.030			.028
3	.055	.054	.068		.059	.034	.037	.034		.035
4+	.058	.070	.062	.065	.064	.031	.033	.024	.023	.026

Appendix

Table A1: Annual total income of sons in 1999 (SEK 1000s)

Variable	Mean	St. dev.	Min.	Max.	N
Pooled sample	271	254	0	13,693	26,154
Income by birth order and family size:					
Sons without siblings	272	209	0	5,215	1,642
Sons from two-child families	277	239	0	13,693	11,790
1st	282	237	0	6,382	6,361
2nd	271	240	0	13,693	5,429
Sons from three-child families	275	291	0	11,863	8,108
1st	279	275	0	8,772	2,851
2nd	274	279	0	9,983	2,827
3rd	270	321	0	11,863	2,430
Sons from four- or more families	250	233	0	7,301	4,618
1st	256	229	1	5,306	811
2nd	246	191	0	2,912	891
3rd	248	150	0	2,634	1,124
4th	251	287	0	7,301	1,792

Note: The individuals in the samples are required to have positive income in 1999. The minimum value of 0 in the table indicates an income below SEK 500 and these values were rounded down to 0 (the income data are expressed in SEK 1000s). The share of an only child is smaller than the share in the Swedish population. This is due to the sampling procedure used by Statistics Sweden, which makes random draws based on individuals rather than households, leading to the over-representation of large families.

Table A2. Annual labor income of daughters in 1999 (SEK 1000s)

Variable	Mean	St. dev.	Min.	Max	N
Pooled sample	168	96	0	2,575	23,886
Income by birth order and family size:					
Daughters without siblings	177	102	0	885	1,435
Daughters from two-child families	172	96	0	2,575	10,792
1st	174	96	0	1,217	5,892
2nd	169	97	0	2,575	4,900
Daughters from three-child families	167	100	0	2,113	7,466
1st	169	97	0	1,022	2,646
2nd	169	101	0	1,282	2,465
3rd	164	102	0	2,113	2,355
Daughters from four- or more child families	156	85	0	944	4,193
1st	162	90	0	944	708
2nd	157	80	0	460	800
3rd	155	84	0	531	1 037
4th	153	85	0	819	1,648

Note: The individuals in the samples are required to have positive income in 1999. The minimum value of 0 in the table indicates income below SEK 500 and these values were rounded down to 0 (the income data are expressed in SEK 1000s). The share of an only child is smaller than the share in the Swedish population. This is due to the sampling procedure used by Statistics Sweden, which makes random draws based on individuals rather than households, leading to the over-representation of large families.

Table A3. Annual total income of daughters in 1999 (SEK 1000s)

Variable	Mean	St. dev.	Min.	Max	N
Pooled sample	185	298	0	43,066	24,988
Income by birth order and family size:					
Daughters without siblings	189	104	0	1,086	1,511
Daughters from two-child families	188	141	0	7,946	11,263
1st	189	133	0	6,946	6,139
2nd	186	150	0	7,946	5,124
Daughters from three-child families	189	500	0	43,067	7,794
1st	185	130	0	4,820	2,768
2nd	186	105	0	1,714	2,573
3rd	198	873	0	43,066	2,453
Daughters from four- or more child families	172	89	0	2,087	4,420
1st	178	107	0	2,087	746
2nd	170	74	0	657	839
3rd	173	87	0	1,065	1,087
4th	170	89	0	2,046	1,748

Note: The individuals in the samples are required to have positive income in 1999. The minimum value of 0 in the table indicates income below SEK 500 and these values were rounded down to 0 (the income data are expressed in SEK 1000s). The share of an only child is smaller than the share in the Swedish population. This is due to the sampling procedure used by Statistics Sweden, which makes random draws based on individuals rather than households, leading to the over-representation of large families.

Table A4. Estimated elasticities in labor income with respect to father's income. Positive income in all income years required.

No. of children in family	Birth-order											
	Fathers and sons					Fathers and daughters						
	1	2	3	4	All		1	2	3	4	All	
1	.293				.293		.286				.286	
	(.060)				(.060)		(.066)					
	(.066)											
	1 470				*1 470*		*1 360*				*1 360*	
2	.333	.288			.314		.217	.234			.227	
	(.026)	(.029)			(.019)		(.030)	(.032)				
	(.022)	*5 791*	*4 951*			*10 743*		*5 559*			*4 649*	*10 209*
3	.413	.299	.237		.314		.295	.249	.158		.233	
	(.037)	(.036)	(.035)		(.021)		(.0243)	(.043)	(.040)			
	(.024)											
	2 579	*2 573*	*2 188*		*7 342*		*2 482*	*2 325*	*2 186*		*6 995*	
4	.239	.370	.174	.197	.232		.160	.098	.271	.211	.212	
	(.077)	(.064)	(.053)	(.044)	(.028)		(.078)	(.066)	(.059)	(.053)		
	(.031)	*701*	*772*	*980*	*1 520*	*3 976*		*652*	*735*	*942*	*1 438*	*3 770*

Note: Standard errors in parentheses. Sample sizes in italics. The measure of income is log labor income (annual wages before taxes, sickness benefit, parental allowance, income from farming activity). Income is measured in 1999 for sons and daughters and in 1970, 1975 and 1980 for fathers.