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**Family-Size Effects on Earnings**  
**– Definitions Matter**

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# Family-Size Effects on Earnings – Definitions Matter<sup>\*</sup>

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## Abstract

Number of siblings has previously been found to adversely affect earned income. However, we still lack understanding of whether nature or nurture drives this effect. We examine in detail the effects of having different kinds of siblings and find that the number of siblings one grew up with has a strong negative effect on earnings, while the total number of siblings as such has no significant effect. We also find that number of full-siblings has a strong effect irrespective of having grown up together. Hence, both nature and nurture play a role.

**Key words:** family size, birth order, siblings, earnings, nature, nurture.

JEL classification: D31, J12, J31

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## 1. Introduction

Previous research has investigated the effects of family size on earned income. Kantarevic and Mechoulan (2006) and Björklund et al. (2004) find that those with many siblings earn less, while Black et al. (2005) find this result only among middle- and last-borns, and Kessler (1991) finds no effect at all. It has also been shown that first-borns have higher income than later-borns as adults (e.g., Black et al., 2005; Kantarevic and Mechoulan, 2006; Bronars and Oettinger, 2006). Björklund et al. (2004) also find such an effect, although it is small. Kessler (1991), on the other hand, finds no significant birth-order effects. Hence, different studies have reached different conclusions regarding the effects of family size and birth order on a person's earnings, and it is still unclear whether the effects are due to nature or nurture.

Black et al. (2005) and Kantarevic and Mechoulan (2006) take the nature perspective and define siblings based on all births reported by a mother, while Bronars and Oettinger (2006) take a nurture perspective and consider same-household siblings. Taking both perspectives, Björklund et al. (2004) use two different definitions of siblings, biological and "social" (all siblings present in a household) and find only small differences when comparing the effects of siblings according to the two definitions. In another family study, Björklund and Chadwick (2003) find that both nature and nurture affect income correlations between fathers and sons: it is strongest if they lived together and are biologically related, while a nonbiological father with whom the child lived has a greater impact than a biological father with whom the child never lived.

We go one step further and investigate the nature and nurture components in more detail. We use a unique data set with detailed information about various types of siblings. This allows us to examine whether the impacts of family size and of birth order on earnings depend on how siblings are defined, e.g., whether we define siblings as all siblings or siblings one grew up with and whether we distinguish between full and other siblings. We make two contributions: Methodologically we investigate how sensitive the results are to different sibling definitions. Furthermore, we investigate the importance of nature (Do biological siblings have a stronger impact than, e.g., step-siblings?) and nurture (Do siblings one grew up with have a stronger impact than other siblings?). Our results increase our understanding of what drives the effects of number of siblings on earnings: We find that it is not the total number of siblings, as such, that matters but that both nature and nurture are important determinants of siblings' impact on earnings.

## 2. Method and the sample

We conducted a survey in March 2007 by mailing a questionnaire to a representative random sample of 6,000 Swedes, of which 3,000 were born in 1967 and 3,000 in 1982. The net response rate was 42 percent. We asked whether the respondents had siblings, and if so, how many of each kind (we distinguish between full-, half-, and step-siblings), when each sibling was born, and which of them they had shared at least half of their childhood with. Table 1 shows the respective shares and the average conditional numbers of each kind.<sup>1</sup>

Table 1. Shares of the respondents with the different kinds of siblings and average numbers of siblings conditional on having siblings in the respective categories.

	<i>Share of respondents</i>	<i>Conditional number of siblings</i>
All siblings	0.94	2.18
Only-children	0.06	0.00
Full-siblings one grew up with	0.85	1.69
Full-siblings one did not grow up with	0.09	1.66
Half-siblings one grew up with	0.09	1.49
Half-siblings one did not grow up with	0.14	1.77
Step-siblings one grew up with	0.01	1.50
Step-siblings one did not grow up with	0.03	2.14

## 3. Results

We use OLS regressions to see whether the effects of birth order and family size on earnings differ depending on sibling definition. Table 2 shows the results of three regressions of monthly gross earnings in thousands SEK (of employees and self-employed), where the birth order and family-size variables are defined according to three alternative definitions:<sup>2</sup>

Def. 1. All siblings, irrespective of whether they grew up together and whether they are full-siblings.

Def. 2. Nurture definition, i.e., all siblings a person grew up with at least half of one's childhood.

Def. 3. Nature definition, i.e., all full-siblings a person has.

<sup>1</sup> For a more thorough description of the survey and the data, see Lampi and Nordblom (2008).

<sup>2</sup> We also ran the regressions with logarithmic income as the dependent variable. However, the model fit is better in the presented regressions.

Table 2. OLS model with gross monthly earnings (in thousands SEK) as dependent variable with different sibling definitions.

Variable	Income	Income	Income
	<i>Def. 1</i>	<i>Def. 2</i>	<i>Def. 3<sup>a</sup></i>
Birth order and number of siblings according to:			
Constant	28.902***	29.802***	29.335***
First-born	1.577***	1.237**	1.415**
Middle-born	1.011	1.455**	2.039**
Twin	-1.444	-0.928	-0.601
Only-child	-0.755	-1.388	-1.546
Have siblings but did not grow up with any of them		-1.056	
Last-born (reference case)			
No. of siblings	-0.248	-0.642**	-0.886***
Family economy during childhood	0.854***	0.833***	0.851***
Parents lived together	-1.219**	-1.108**	-0.703
Mother's age	0.068	0.050	0.063
Live in big city	3.224***	3.246***	3.128***
Live in small town/countryside	-0.932*	-0.893*	-0.998**
University $\geq$ 3 years	5.606***	5.633***	5.625***
Age group 25 years	-6.309***	-6.248***	-6.139***
Woman	-6.372***	-6.389***	-6.292***
Number of individuals	1620	1620	1502
Adjusted R <sup>2</sup>	0.319	0.319	0.324

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

<sup>a</sup> In this regression we omitted those who grew up with only step- half-, and adoptive siblings.

Table 2 shows that first-borns earn more than both last- and middle-borns in Def. 1, and more than last-borns in Def. 2 and 3. Number of siblings reduces earnings and considering the fact that middle-borns on average have more siblings than first-borns (2.79 versus 1.49 in Def. 2), we conclude that first-borns on average have a significantly higher income than the others in all three definitions. For middle-borns, definition matters. The positive effect of being middle-born on income is insignificant in Def 1, while it is large and significant in Def. 2 and 3.<sup>3</sup> The impact of number of siblings also depends on the definition: Using Def. 1 (all siblings) we do not find a significant effect on income, while using Def. 2 (siblings one grew up with) we do, suggesting that environment is important. Using Def. 3 (all full-siblings), we find a negative and significant effect, which is not significantly different from that linked to Def. 2.<sup>4</sup> Thus, it seems that both nature and nurture are important.

<sup>3</sup> According to the t-tests, the coefficient of middle-born is not larger than that of first-born in the second and third regressions (p-values = 0.748 and 0.377 respectively). Moreover, the coefficients of first- and middle-borns are not statistically different between Definitions 2 and 3 (p-values = 0.817 and 0.555 respectively).

<sup>4</sup> According to the t-test, the coefficient of number of siblings using Def. 3 is not statistically larger than that using Def. 2 (p-value = 0.492).

### *Different definitions of number of siblings*

The definitions of birth order and family size vary across regressions in Table 2. In order to disentangle the effects of the family-size definitions, we will now keep the birth-order definition constant (using Def. 2) and only vary the definition of number of siblings. In the first regression we use Def. 1 and in the second Def. 2 for number of siblings. In the third regression we use all siblings, but analyze full-, half-, and step-siblings separately. Finally, we also distinguish between siblings of various kinds that one did and did not grow up with according to Table 1. Table 3 presents the results.

Table 3 OLS model with gross monthly earnings (in thousands SEK) as dependent variable with different family-size definitions. Birth-order definition held constant.

<b>Variable</b>	<b>Income</b>	<b>Income</b>	<b>Income</b>	<b>Income</b>
Number of siblings according to:	<i>Def. 1</i>	<i>Def. 2</i>	<i>Full, half- and step-siblings.</i>	<i>Full-, half-, and step-siblings divided between those one grew up with/did not grow up with.</i>
Constant	29.585***	29.802***	28.515***	27.404***
First-born <sup>a</sup>	1.229**	1.237**	1.156**	1.140**
Middle-born <sup>a</sup>	0.954	1.455**	1.390**	1.367*
Twin	-1.389	-0.928	-0.928	-0.973
Only-child	-0.945	-1.388	-1.448	-1.432
Have siblings but did not grow up with any of them	-0.072	-1.056	-1.072	-1.023
Last-born (reference case)				
No. of all siblings	-0.249			
No. of siblings one grew up with		-0.642**		
No. of all full-siblings			-0.795***	
No. of full-siblings one grew up with				-0.747***
No. of full-siblings one did not grow up with				-1.099***
No. of all half-siblings			0.435	
No. of half-siblings one grew up with				0.326
No. of half-siblings one did not grow up with				0.507
No. of all step-siblings			0.215	
No. of step-siblings one grew up with				-1.975*
No. of step-siblings one did not grow up with				0.879
Controlling for socioeconomic variables	Yes	Yes	Yes	Yes
Number of individuals	1620	1620	1620	1620
Adjusted R <sup>2</sup>	0.318	0.319	0.324	0.327

<sup>a</sup> Birth order is consequently defined in relation to all siblings one grew up with.

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

We find that when using Def. 1 (all siblings), income is not significantly affected by number of siblings. However, when using Def. 2 (siblings one grew up with), the effect is negative, indicating that nurture is important. In the third specification, the number of full-siblings has a strong negative impact, but the number of half-siblings and number of step-siblings do not have significant effects; hence nature is important. In the last specification, number of full-siblings has a significant effect, irrespective of having grown up together,<sup>5</sup> while number of step-siblings is significant only if one grew up with them.

#### **4. Conclusion**

Thanks to the detailed information in our data set, this study adds important knowledge about the effects of siblings on earnings and shows that sibling definitions matter. We find that the number of siblings one grew up with during at least half of one's childhood has a strong negative effect on earnings, while the total number of siblings as such has no significant effect, indicating the importance of childhood environment. However, when examining in detail all kinds of siblings, we find that number of full-siblings has a strong effect irrespective of having grown up together, indicating that nature is equally important. When it comes to birth order, first-borns have higher incomes than others, irrespective of sibship definition, while the effect of being middle-born depends on definition. Evidently, as new family constellations are becoming increasingly common, it is becoming more important to distinguish between the nature and nurture effects in sibling studies.

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<sup>5</sup> The coefficient of full-siblings one did not grow up with is not significantly different from that of full-siblings one grew up with (p-value = 0.469).

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