UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

WORKING PAPERS IN ECONOMICS

No 388

Gender and birth-order differences in time and risk preferences and decisions

By

Elina Lampi and Katarina Nordblom

Revised version, June 2011*

ISSN 1403-2473 (print)
ISSN 1403-2465 (online)

*** Revised version of the Working Paper "Sibling and birth-order effects on time preferences and real-life decisions", No. 388, October, 2009, University of Gothenburg**

Department of Economics
School of Business, Economics and Law at University of Gothenburg
Vasagatan 1, PO Box 640, SE 405 30 Göteborg, Sweden
+46 31 786 0000, +46 31 786 1326 (fax)
www.handels.gu.se info@handels.gu.se

Gender and birth-order differences in time and risk preferences and decisions

Elina Lampi and Katarina Nordblom[¤]

Abstract

We study how gender, birth order, and number of siblings are related to stated time and risk preferences and to real-life decisions. We use survey data covering about 2,300 individuals and find that time and risk preferences are significantly correlated among women but not among men. We also find that stated time and risk preferences have clear explanatory power for real-life decisions, but in different ways for men and women. Moreover, risk preferences have stronger explanatory power for males than for females, whose decisions are more related to birth order and number of siblings. For example, the often claimed result that first-borns are more likely to have higher education is found among women only, while risk aversion and patience can explain part of men´s corresponding choice.

Key words: risk preferences; time preferences; gender; birth order;

JEL classification: D10, D81, D90, J10

This paper has been benefited by comments by Fredrik Carlsson, participants at the Third Nordic Workshop in Behavioral and Experimental Economics in Copenhagen, 2008, the 23rd ESPE conference in Seville, 2009, and the seminar participants the University of Gothenburg, the University of Karlstad, and the University of Växjö. Financial support from the Royal Swedish Academy of Sciences, the Helge Ax:son Johnson Foundation, the Wilhelm and Martina Lundgren Foundation, and from the Jan Wallander's and Tom Hedelius' Foundation is gratefully acknowledged.

[¤] Department of Economics, University of Gothenburg, P.O. Box 640, SE 405 30 Göteborg, Sweden; Phone: +46 31 786 00 00;
e-mail: Elina.Lampi@economics.gu.se or Katarina.Nordblom@economics.gu.se

1. Introduction

This paper focuses on how gender, birth order and number of siblings are related to time and risk preferences. Both types of preference are important determinants of decision making. Time preference is a key indicator of self-control. For example, impatient persons might be more eager to make impulsive, possibly harmful, decisions such as taking a high-interest cash advance. Moreover, the choice of education, one of the most important decisions in life, becomes rewarding only after several years and might therefore be influenced by the degree of patience (Kirby et al., 2005). Risk preferences are important to all decisions involving uncertainty. Some studies indicate that these two preferences are not independent. Keren and Roelofsma (1995) showed that a high time preference is mainly a result of risk aversion since a sooner reward decreases the level of uncertainty, and Anderhub et al. (2001) found in an experimental study a significantly negative correlation between the degree of risk aversion and level of discounting, meaning that those with a relatively high degree of risk aversion tend to discount their future more heavily than those who are less risk averse. Thus, a risk-averse person might be more unwilling to postpone a gratification. Similarly, Ida and Goto (2009) found, using survey data, that those with a higher time preference rate and lower risk aversion are more likely to engage in addictive behavior (smoking, drinking and gambling). Dohmen et al. (2010) find that both time and risk preferences are related to cognitive ability; hence, there is a connection between the two kinds of preferences, which may both be endogenous.

Analyzing the determinants of time and risk preferences is thus important and both might depend on gender and childhood parameters. Previous studies (see, e.g., Weber et al., 2002;

Eckel and Grossman, 2008; Dohmen et al., forthcoming), have found that women are more risk averse than men. While Dohmen et el., (2010) found that women are significantly more impatient than women, Harrison et al. (2002), found no significant gender effect in terms of patience. Moreover, Funder and Block (1989) and Skog (2001) claim that patience is a basic trait of a person's character, formed early in life. Shoda et al. (1990) show that those who already at preschool age were able to delay gratification were more likely to exhibit self-control as adolescents. Sulloway (1996, 2001) shows that there are basic differences in personal traits depending on birth order. According to Sulloway (1996) firstborns on average have access to more family resources than laterborns. Therefore, laterborns, can be expected to be more risk seeking. Moreover, some studies have found that later-borns are less risk averse than first-borns (Yiannakis, 1976; Jobe et al., 2006; see also a survey article by Sulloway and Zweigenhaft, 2010). Although most researchers only compare first-borns with "later-borns," Saroglou and Fiasse (2003) claim that it is very important to distinguish between middle-borns and last-borns.[1] The only study we are aware of that investigates the relation between time preferences and siblings is Benjamin et al. (2006), who find that siblings in the same family do not have the same time preferences. However, they do not specifically investigate birth order.

Based on these earlier results, we hypothesize that different birth-order categories have different preferences concerning risk and discounting and that women are more risk averse than men. Moreover, we expect these differences in preferences to spill over on actual behavior. The objective of the present paper is threefold. First, we analyze the interdependence between

[1] They find that middle-borns are the rebels of the family: they are less conscientious, and that they are low in competence and self-discipline but high in impulsiveness and having fantasy compared to their siblings.

stated risk aversion and patience (measured by answers to hypothetical time- and risk-preference questions). We do this by using a survey covering about 2,300 Swedes. Second, we study whether birth order and family size can explain these stated preferences as well as some real-life decisions of intertemporal and uncertain nature. The three distinct real-life decisions we focus on are (i) whether to obtain a university education, (ii) whether to move in with a partner at an early age and (iii) at what age one becomes a first-time parent. We also analyze earned income. Our third objective is to study whether stated time and risk preferences have any explanatory power for the real-life decisions mentioned above. This is in line with Chabris et al. (2008), who find that the discount rate is one of the most important variables to explain individual differences in behaviors such as smoking, drinking, exercising, saving, borrowing, and gambling. On the other hand, Frederick et al. (2002) argue that the correlation between measurements of time preferences and real-life decisions are modest at best and that people's time preferences are not constant but vary with the task. Dohmen et al. (forthcoming) find that stated risk preferences can predict actual behavior concerning, e.g., car driving, financial matters, sports and leisure, and health matters. Anderson and Mellor (2008) found in their laboratory experiment that those who were more risk averse according to a lottery experiment were also more risk averse in terms of, e.g., smoking, heavy drinking, overweight, and seat-belt non-use.

A number of studies have found negative effects of family size on education outcomes.[2] Furthermore, explicit birth-order effects where especially first-borns have an educational advan-

[2] See, e.g., Lindert (1977), Stafford (1987), Blake (1989), Hanushek (1992), Downey (1995), Kaestner (1997), Oettinger (2000), Kantarevic and Mechoulan (2006), and Booth and Kee, (2009).

tage have been identified.[3] First-borns are also found to have higher earnings than later-borns.[4] Moreover, Björklund et al. (2004) and Kantarevic and Mechoulan (2006) find that people with many siblings earn less. In the present paper, we focus on university education, which is more of a deliberate choice than lower level education as studied in many of the aforementioned papers. Our setup and our unique survey enable us to investigate whether any identified birth-order effects on decision making are just that – pure birth-order effects – or whether they are due to people's general level of patience/impatience or risk aversion; that is, whether, e.g., first-borns' higher education can be explained by a higher degree of stated patience or whether it is rather a result of some other specific characteristics. To our knowledge, this has never been studied before.

Our findings show great differences between men and women. Concerning birth-order effects in stated preferences, we find that among women, those who did not grow up with siblings are more patient and more risk averse than others. Among men, middle-borns are less risk averse and less patient. Considering real–life decisions, birth order and number of siblings are found to matter more often among females than among males. On the other hand, risk preferences matter more in the male than in the female subsample. Thus, for example, while the likelihood of having a university education is related to birth order and number of siblings among women, risk aversion can explain part of men´s choice of having a higher education. The astonishing exception to the gender difference is the earnings equations. Although men in general

[3] See, e.g., Behrman and Taubman (1986), Björklund et al. (2004), Black et al. (2005), Kantarevic and Mechoulan (2006), Bonesrønning and Sandgren Massih (2008), and Booth and Kee (2009).

[4] See, e.g.,Kantarevic and Mechoulan (2006), Black et al. (2005), and Bronars and Oettinger (2006).

earn more women, the regression results are surprisingly similar across genders. Finally, our results clearly show that the birth-order results are robust to the inclusion of time and risk preferences with one exception: The finding that middle-born men earn more is not a pure birth-order effect. Instead it can be linked to the risk preference variable – middle-born men are significantly less risk averse and low risk aversion is related to higher earnings.

The remainder of the paper is organized as follows: Section 2 describes the survey design and the descriptive statistics of the variables used in our analysis, Section 3 presents the analyses of time preferences and of real-life decisions, and Section 4 concludes the paper.

2. Survey Design

We conducted a survey by mailing a questionnaire to a representative random sample of 6,000 Swedes, of which 3,000 were 25 and 3,000 were 40 years old. A single reminder was sent out three weeks after the main survey. The net response rate was 42 percent after correcting for those who had moved or for other reasons had not received the questionnaire. By focusing on two distinct age groups rather than having respondents of various ages, we minimize the disturbance from unobserved societal variables while still being able to analyze age or cohort effects. In addition, including more ages would demand a much larger data set. Black et al. (2005) suggest that relations between, e.g., family size and educational achievement may be spurious since the average family size has decreased and the average educational at-

tainment has increased over time. By using two specific cohorts, we can keep variations in such societal factors at a minimum.

In order to capture a person's general time preference, we used a standard set of time-preference questions where respondents were asked to make hypothetical pair-wise choices involving money. More exactly, they were asked to make four choices between immediate money and a varying amount of delayed money. To avoid any fatigue effects and to decrease the cognitive burden, we kept the payment delay constant across the questions and asked only four questions.[5] The questions were formulated as shown in Box 1 below.

Box 1. The questions about time preferences.

Imagine winning a lottery and that the prize can by paid at different points in time. In the first alternative in each choice situation you get the money directly and in the other you need to wait one year to get the money. Mark the alternative you prefer in each choice situation A-D.
A You get SEK 10,000 today You get SEK 10,500 in a year
B You get SEK 10,000 today You get SEK 12,000 in a year
C You get SEK 10,000 today You get SEK 14,000 in a year
D You get SEK 10,000 today You get SEK 16,000 in a year

***** In March 2007, the exchange rate was 1 EUR=9.47 SEK and 1 USD=7.23 SEK.

[5] The fact that only 24 respondents answered in an inconsistent way indicates that the questions were easy to understand. These individuals are excluded from the analysis.

To capture general risk preferences, we used a standard lottery game question (similar to the experiments by Holt and Laury, 2002), where respondents were asked to pick the preferred lottery among five different hypothetical lotteries.[6] In each of the lotteries, one has an equal chance of winning Prize A and Prize B. Both the expected payoff and the difference between the two prizes increase with each lottery as shown in Box 2 below. Hence, the lower the number of the preferred lottery, the more risk averse the respondent.

Box 2. The lottery question.

This table presents five different lotteries (1 to 5). All lotteries are free and have two outcomes: Prize A and Prize B. In each game, you have a 50 % chance of winning A and a 50 % chance of winning B. In the column "Your choice," we ask you to mark **the lottery** you prefer. You should mark only **one** of the lotteries (1-5).

Lottery	Prize A (50 % chance)	Prize B (50 % chance)	Your choice
1	SEK 16,000	SEK 16,000	□
2	SEK 24,000	SEK 12,000	□
3	SEK 32,000	SEK 8,000	□
4	SEK 40,000	SEK 4,000	□
5	SEK 48,000	SEK 0	□

* In March 2007, the exchange rate was 1 EUR=9.47 SEK and 1 USD=7.23 SEK.

In addition to the above choices, the respondents were asked about their highest level of completed education and their personal gross monthly earnings. We also asked about marital status and how old they were when they first moved in with a partner as a cohabitant and/or at what age they got married for the first time. We furthermore asked whether they had children and if so when they were born. The respondents were asked to state whether they were an only-child or had siblings and – if they did have siblings – when they were born.

We define birth order in relation to the siblings with whom one shared at least half of one's childhood, since such siblings are more likely than others to affect one's preferences and be-

[6] We decided to include five lotteries only because we wanted to keep the question simple and avoid possible fatigue effects. The fact that only a handful of the respondents answered in an inconclusive way (these respondents are excluded from the analysis) indicates that the question was easy to understand.

havior.[7] In order to disentangle birth-order effects from other family effects, we asked the respondents about several family-specific characteristics such as economic standard during childhood and whether their parents lived together at least until the respondent turned 15. The latter question is motivated by previous findings that there may be an effect of broken families.[8] The question of birth order is also closely related to that of mother's age; the youngest children tend to have older mothers than the oldest children. While the oldest child in a family might receive more parental attention, the standard of living is often better for the youngest child, making the mother's age a suitable proxy for the childhood family economic standard and level of human capital, i.e., factors that are likely to affect her children's educational choices (Kantarevic and Mechoulan, 2006). Table 1 presents descriptive statistics for the explanatory variables used in all regression analyses.

[7] We asked about the respondents' subjective perception of their birth order, i.e., whether they *felt* like an oldest-, a middle-, or an only-child, etc., and found that the distribution of the siblings a person grew up with (whether biological or not) corresponds better to his/her subjective perception than to the distribution of all the siblings he/she had or to the narrower definition of including biological and adopted siblings only.

[8] A broken-home background has been found to reduce educational achievement (Lindert, 1977; Ginther and Pollak, 2004). However, Hanushek (1992) and Painter and Levine (2000) find no such effect and Björklund and Sundström (2006) conclude that this relation is due to selection and is hence not causal in nature.

Table 1. Descriptive statistics of explanatory variables divided between males and females.

		Males		***Females***	
Variable	**Explanation**	*Mean*	*St.dev.*	*Mean*	*St.dev.*
First-born	= 1 if respondent is an oldest-child	0.341		0.359	
Middle-born	= 1 if respondent is a middle-child	0.198		0.185	
Last-born (reference category)	= 1 if the respondent is a youngest-child	0.352		0.360	
Grew up without siblings	=1 if respondent had siblings but did not grow up with them	0.109		0.096	
No. of siblings	= number of siblings a respondent grew up with	1.560	1.058	1.575	1.093
Space; 2 years	=1 if respondent had siblings within 1-2 years of age	0.290		0.276	
Family's economic standard during childhood	= the subjective perception of one's family's economic standard on a 5-point scale, where 1 means much worse than average and 5 means much better than average.	3.066	0.870	3.050	0.894
Parents lived together	= 1 if respondent's parents lived together at least until he/she was 15.	0.782		0.779	
Mother's age	= age of the mother when respondent was born	27.253	5.544	27.339	5.405
Time preference	=how patient a person is on a 5-point scale, where 0 means most patient and 4 means least patient.	1.683	1.138	1.730	1.115
Risk preference	=how risk averse a person is on a 5-point scale, where 0 means most risk averse and 4 means least risk averse.	1.901	1.382	1.448	1.247
Grew up in big city	=1 if respondent grew up in one of the three biggest cities in Sweden	0.213		0.192	
Grew up in small town	=1 if respondents grew up in small town ≤ 20,000 inhabitants/countryside	0.428		0.392	
Live in a big city	=1 if respondent lives in one of the three biggest cities in Sweden.	0.300		0.299	
Live in a small town	=1 if respondents lives in small town ≤ 20,000 inhabitants/countryside	0.290		0.288	
Age group 25	=1 if respondent is 25 years old	0.420		0.497	
Earnings	= respondent's personal logarithmic gross monthly earnings in thousand SEK*	2.943	0.738	2.677	0.665
University	=1 if respondent has university education ≥ 3 years	0.222		0.285	
Babysitter	=1 if respondent often babysat his/her younger siblings	0.118		0.188	
No. of individuals		871		1295	

* In March 2007, the exchange rate was 1 EUR=9.47 SEK and 1 USD=7.23 SEK.

We categorize the respondents into four distinct categories: first-, middle-, and last-borns, and those who grew up without siblings (i.e., only-children and those who have or had siblings but did not grow up with them).[9] For simplicity, we will henceforth refer to these groups as "birth-order categories." It is also worth noting that a large majority of the respondents have one or at most two siblings. Only about 10 percent have three siblings and 5 percent have more than that. We also created a dummy variable for closely spaced siblings, which takes the value one if a respondent has a sibling within two years of his/her own age. Moreover, from the question about childhood economic standard referred to above, we created a categorical variable from 1 to 5 indicating the respondents' experienced economic standard during childhood, where one means *Much worse than average*, five means *Much better than average*, and the mean value three means *About average*.[10]

Our time-preference variable ranges from zero to four and is created from the answers to the questions in Box 1. Zero implies that a respondent prefers SEK 10,500 in a year to SEK 10,000 today, and four implies that a respondent prefers to have SEK 10,000 today in all four choices, i.e., not even SEK 16,000 is worth waiting for. Hence, a lower number implies more patience. Our risk preference variable also ranges from zero to four and is created from the answers to the question in Box 2. Zero implies that a respondent prefers SEK 16,000 without

[9] We omitted the 46 respondents who are twins because they seem very different from the other categories yet are too few to give us reliable results.

[10] The perception of childhood economic standard is a subjective measure. (The question reads: "As a child, how did you perceive your childhood family's economic standard compared to that of an average family?") Nonetheless, we believe that it is fairly accurate; 23 percent of our respondents perceive that their economic standard was below average during childhood, compared to 28 percent who perceived it was above average and 49 percent who perceive that their childhood family had an average economic standard.

any risk, and four implies that a respondent prefers the lottery that gives 48,000 or nothing, both with 50 % probability. Hence, a lower number means stronger risk aversion.

Our sample is fairly representative of the Swedish population in the two cohorts. The sample mean incomes of both age groups are equal to the population mean income levels of these age groups (Statistics Sweden, 2007a). Similarly, the share of respondents living in one of the three largest cities in Sweden is equal to the share at the national level (Statistics Sweden, 2007b). The share of respondents with a university education corresponds well with the national share in the younger cohort, while the share of older respondents with a university education in our sample (28 %) is larger than at the national level (19 %) (Statistics Sweden, 2007c). Moreover, the share of women is disproportionally large and the response rate is slightly higher in the older cohort.[11] Unfortunately, there are no national statistics available regarding the shares of the population who are first-/middle-/last-borns, and only-children born in 1967 and 1982 in Sweden. However, the shares of the respondents who are first- and last-borns are equal in size in our sample, which suggests that there is no severe selection bias concerning birth order.

[11] All the representativity analyses are done by using the bootstrapping method. One thousand samples were bootstrapped by randomly drawing observations, with replacement, as many times as there are observations in the original sample. By using the percentile method and a 95% confidence interval, it can be shown whether the means significantly differ from those at the national level at the 5% significance level.

3. Analysis

3.1. Time and risk preferences

We start by analyzing the answers to the time and risk preference questions presented in Box 1 and Box 2. Since it is possible that time preferences and risk preferences are correlated (see, e.g., Keren and Roelofsma, 1995, and Anderhub et al., 2001), we estimate a seemingly unrelated bivariate ordered probit model for the time and risk preferences to see what explains these preferences and whether there are significant links between them. Both dependent variables range from 0 to 4. Similar to many previous studies (see, e.g., Weber et al., 2002; Eckel and Grossman, 2008; Dohmen et al., forthcoming), we too find that females are more risk averse than men.[12] Hence, we split the sample and run separate regressions for men and women. However, in line with the results by Harrison et al. (2002), we find that women do not significantly differ from men in terms of patience.

[12] The results are available on request.

Table 3. **Coefficients for time preference and risk preference regressions**. The dependent variable ranges from 0 (most patient) to 4 (least patient) for the time preference variable and from 0 (most risk averse) to 4 (least risk averse) for the risk preference variable. Standard errors in parentheses.

	Females		***Males***	
Variable	*Time preferences*	*Risk preferences*	*Time preferences*	*Risk preferences*
First-born	-0.113	-0.001	0.131	0.141
	(0.078)	(0.079)	(0.096)	(0.097)
Middle-born	0.144	0.021	0.203*	0.250**
	(0.101)	(0.102)	(0.122)	(0.123)
Grew up without siblings	-0.299**	-0.220*	-0.025	0.004
	(0.121)	(0.122)	(0.144)	(0.145)
Last-born	*Reference category*			
Number of siblings	-0.001	-0.027	-0.023	0.001
	(0.037)	(0.037)	(0.047)	(0.047)
Space; 2 years	-0.161**	-0.017	-0.177**	0.128
	(0.069)	(0.069)	(0.086)	(0.086)
Family economy during childhood	0.016	0.033	0.031	0.073
	(0.035)	(0.035)	(0.044)	(0.045)
Parents lived together	0.010	-0.020	-0.202**	-0.065
	(0.075)	(0.076)	(0.092)	(0.093)
Mother's age	-0.021***	0.004	0.004	0.001
	(0.006)	(0.006)	(0.008)	(0.008)
Grew up in a big city	0.007	-0.123	-0.083	0.146
	(0.081)	(0.083)	(0.099)	(0.100)
Grew up in a small town/countryside	0.011	-0.052	-0.144*	-0.100
	(0.066)	(0.067)	(0.082)	(0.083)
University ≥3 years	-0.073	-0.021	-0.256***	0.131
	(0.068)	(0.068)	(0.090)	(0.091)
Log monthly earnings	-0.045	0.085	0.037	0.178***
	(0.051)	(0.051)	(0.055)	(0.056)
Age group 25 years	-0.061	-0.024	0.217***	-0.040
	(0.067)	(0.067)	(0.083)	(0.083)
Rho	0.094		-0.005	
	(0.031)***		(0.038)	
Number of individuals	1291		864	
Log likelihood	-3787.6		-2587.6	

The correlation between the residuals when running the seemingly unrelated bivariate ordered probit model is highly significant for women and insignificant for men, which is one important difference between the genders. The correlation for women is in the same direction as the correlations found by Keren and Roelofsma (1995), Anderhub et al. (2001), and Ida and Goto (2009). However, it is rather low – only 0.09.[13]

[13] The raw correlation between the risk and time preferences is 0.084 for women and -0.014 for men.

We find that women who did not grow up with siblings are both more patient and more risk averse than last-born women. These coefficients are not only significant but also the largest ones in the female regressions, meaning that not growing up with siblings also has economic significance. According to the t-tests between all the sibling categories (results shown in the Appendix), women who grew up without siblings are also more patient than middle-born women. Middle-born women are also less patient than first-born women. Interestingly, we find less significant birth-order differences among men. The only significant results are that middle-born men are both less patient and less risk averse than last-born men. Moreover, both men and women who have closely spaced siblings are more patient, while the age of mother is significant for women only: The older one´s mother, the more patient a woman is according to our results. The other family background variables are insignificant, which is in line with Benjamin et al. (2006). Finally, we find that the 25-years old male respondents are less patient than the 40-years old ones, while there is no significant age difference with respect to stated risk aversion for either gender. This result differs from those by Cook and Bellis (2001) and Dohmen et al. (forthcoming), who find that younger people are less risk averse.

Hence, men and women differ both in terms of time and risk preferences and in what may explain the differences. Next, we analyze whether some real-life decisions are related to those preferences and to birth order and other family-background variables. According to Dohmen et al. (forthcoming), stated risk preferences can be used to predict risk-related actual behavior, and according to Chabris et al. (2008), the same can be concluded concerning time preferences. We therefore also control for stated time- and risk-preference measures to see whether they have any explanatory power and whether potentially observed birth-order differences

work via these preferences. Also the following analysis is made separately for men and women, allowing for potential structural differences between the genders.

3.2 University education

We estimate probit regressions to analyze the dichotomous choice of having at least three years of university education; the results are presented in Table 4. It is a well-known fact that Swedish women attend university to a larger extent than do men, and running a regression with our pooled sample indicates that women are 6.5 percentage points more likely to have a university education than men (p=0.000). Hence, separately for women and men, we estimate the choice first without controlling for time and risk preferences (Columns 1 and 5), then with one of the preferences at a time (Columns 2, 3, 6, and 7), and, finally, when controlling for both types of preferences (Columns 4 and 8).

Table 4. University education. Marginal effects of a probit regression where the dependent variable is one if the person has at least three years of university education. Standard errors in parentheses.

Variable	***Females***				***Males***			
	Basic model (1)	*With time preference (2)*	*With risk (3)*	*With both time preference and risk (4)*	*Basic model (5)*	*With time preference (6)*	*With risk (7)*	*With both time preference and risk (8)*
Constant	-0.425***	-0.385***	-0.421***	-0.378***	-0.527***	-0.439***	-0.553***	-0.462***
	(0.103)	(0.112)	(0.107)	(0.116)	(0.124)	(0.144)	(0.121)	(0.145)
First-born	0.089***	0.088***	0.082**	0.080***	0.045	0.047	0.059	0.062
	(0.033)	(0.033)	(0.034)	(0.034)	(0.038)	(0.038)	(0.039)	(0.039)
Middle-born	-0.044	-0.042	-0.051	-0.049	-0.002	0.007	0.003	0.012
	(0.042)	(0.042)	(0.043)	(0.043)	(0.048)	(0.049)	(0.050)	(0.050)
Grew up without siblings	0.059	0.055	0.061	0.057	0.066	0.062	0.073	0.069
	(0.054)	(0.053)	(0.055)	(0.054)	(0.060)	(0.060)	(0.062)	(0.062)
Last-born	*Reference category*							
Number of siblings	-0.029*	-0.028*	-0.029*	-0.029*	-0.020	-0.021	-0.021	-0.023
	(0.017)	(0.017)	(0.017)	(0.017)	(0.019)	(0.019)	(0.019)	(0.019)
Time preference		-0.016		-0.017		-0.038***		-0.041***
		(0.011)		(0.012)		(0.013)		(0.013)
Risk preference			-0.005	-0.003			0.018*	0.018*
			(0.010)	(0.010)			(0.010)	(0.010)
Space; 2 years	0.039	0.036	0.027	0.024	0.024	0.018	0.014	0.008
	(0.030)	(0.030)	(0.030)	(0.030)	(0.034)	(0.034)	(0.035)	(0.035)
Family economy during childhood	0.040***	0.040***	0.037**	0.037**	0.032*	0.033**	0.034**	0.034**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.017)	(0.017)	(0.017)	(0.017)
Parents lived together	0.075**	0.075**	0.086***	0.087***	0.084***	0.074**	0.079**	0.069**
	(0.030)	(0.029)	(0.030)	(0.030)	(0.032)	(0.033)	(0.033)	(0.034)
Mother's age	0.009***	0.009***	0.009***	0.009***	0.010***	0.010***	0.010***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Grew up in a big city	0.041	0.041	0.033	0.034	-0.052	-0.054	-0.053	-0.055
	(0.035)	(0.035)	(0.035)	(0.035)	(0.034)	(0.034)	(0.034)	(0.034)
Grew up in a small town/countryside	-0.031	-0.030	-0.039	-0.038	-0.068**	-0.071**	-0.062**	-0.066**
	(0.027)	(0.027)	(0.028)	(0.028)	(0.030)	(0.030)	(0.031)	(0.031)
Age group 25 years	-0.036	-0.036	-0.022	-0.023	-0.092***	-0.084***	-0.087***	-0.080***
	(0.025)	(0.025)	(0.026)	(0.026)	(0.027)	(0.027)	(0.028)	(0.028)
Number of individuals	1353	1353	1307	1307	903	903	871	871
Pseudo R^2	0.041	0.042	0.042	0.043	0.054	0.064	0.057	0.068

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

The results differ substantially between men and women. Among women, first-borns are now those who distinguish themselves and are more likely to have a university education.[14] Neither time nor risk preferences are significantly associated with educational choice among women, and the coefficients for the birth-order variables are insensitive to the inclusion of these two categorical variables. Hence, the reason why first-born females are highly educated is clearly not related to time and risk preferences as measured by our variable. Instead, first-born women seem to have special characteristics that make them more likely to achieve a higher level of education than others. They might for example be more conscientious than later-borns as claimed by Sulloway (1996), Paulhus et al. (1999), and Healey and Ellis (2007) and/or may be more mature and responsible as discussed by Suitor and Pillemer (2007).

Moreover, the more siblings a female respondent has, the less likely she is to have a university education.[15] However, the effect of being first-born is much larger than the counteracting effect of having many siblings. In fact, a first-born female needs at least three more siblings than a last-born before the positive effect of being a first-born is outweighed. Since only 5 percent of our female respondents grew up with that many siblings, the positive effect of being a first-born is very strong.

The results for the male subsample are quite different. There, we observe no significant differences concerning birth order or number of siblings. Instead, both time and risk preferences

[14] Table 4 reports that they are more likely to have at least three years of university education than are last-borns, and in the Appendix it is shown that, according the double-sided t-tests, they are also significantly more likely to have a university education than middle-borns.

[15] That family size reduces children's educational performance confirms the theory of resource dilution (see, e.g., Blake, 1989, and Downey, 1995; 2001), i.e., that family resources are diluted as the sibship size increases.

have explanatory power; the more patient and the more risk averse a man is according to our hypothetical questions, the more likely he is to have a university education.[16] The effect is also of quite large magnitude: for the least patient person compared to the most patient, the effect of the time preference variable is actually larger than most other explanatory variables. Dohmen et al. (2010) conclude that both risk aversion and time preferences vary systematically with cognitive ability, so that higher cognitive ability is correlated with lower risk aversion and stronger patience, although they did not analyze the connection between the two kinds of preferences. Hence, one might suspect that these variables capture cognitive ability rather than time and risk preferences per se. However, then we would expect them to have an effect in the female subsample as well.[17] It is important to notice, though, that we do not claim causal effects. It may well be the case that causality is reversed, as in Becker and Mulligan (1997), where investment in own education reduces ones discount rate.

Also family background variables are important: Having parents who lived together during one´s childhood increases the likelihood of having a university education quite substantially for both genders. Moreover, the better the childhood family economic standard, and the older the mother, the more likely respondents are to have a higher education, regardless of gender.[18] Thus, the effects of these childhood family background variables are of the same sign and of

[16] Kirby et al. (2005) also find a positive correlation between education and degree of patience.

[17] Also, according to Frederick (2005) and Shamosh and Gray (2008), lower time preferences are positively correlated with cognitive ability. However, although Benjamin et al. (2006) found low discount rates among those with higher cognitive ability, there were also substantial levels of high discount rates among the most cognitively able individuals. Thus, cognitive ability cannot be the only explanation to impatience.

[18] That mother's age has a positive impact on children's educational attainment has also been found by, e.g., Booth and Kee (2009) and Kantarevic and Mechoulan (2006).

about equal size regardless of respondent gender, while number of siblings and birth order matter significantly only for women´s decision to get a university education and degree of patience and risk aversion matters only for the probability of having a university education among men.

3.3. Earnings

Earned income is linked to education, and several studies have found that birth order has explanatory power also for earnings.[19] Moreover, it is probably not independent of stated time and risk preferences. A lower degree of risk aversion is likely to be associated with higher earnings, as found by, e.g., Donkers at el. (2001) and Hartog et al. (2002), while it is unclear whether the prior should be that patience is associated with higher or lower earnings. Dohmen et al. (2010) and Tanaka et al. (2010) find a negative relationship between impatience and earnings, although one could alternatively imagine that impatient people are more eager to make money. To shed light on this, we analyze how stated time and risk preferences are associated with earnings and also whether birth order and other family background variables have any explanatory power. We estimate ordinary least squares regressions with logarithmic personal gross monthly earnings as the dependent variable and present the results in Table 5. Gross monthly wages are lower for women than for men (21,100 SEK compared with 27,500

[19] See, e.g., Kantarevich and Mechoulan (2006) and Bronars and Oettinger (2006).

SEK). The regressions include all respondents who are employed or self-employed,[20] and the regressions are corrected for heteroskedasticity.

[20] Since unemployed people and those on sick leave temporarily earn less than normal, it is not meaningful to investigate whether differences in earnings among these respondents are correlated with birth order.

Table 5. Logarithmic gross monthly earnings in SEK, OLS. Standard errors in parentheses.

Variable	***Females***				***Males***			
	Basic model	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*	*Basic model*	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*
Constant	3.138***	3.160***	3.098***	3.130***	3.438***	3.472***	3.415***	3.442***
	(0.094)	(0.092)	(0.097)	(0.094)	(0.105)	(0.109)	(0.109)	(0.114)
First-born	0.025	0.025	0.023	0.022	0.049	0.050	0.037	0.038
	(0.029)	(0.029)	(0.029)	(0.029)	(0.036)	(0.036)	(0.037)	(0.037)
Middle-born	0.052	0.054	0.040	0.043	0.082*	0.086*	0.059	0.062
	(0.037)	(0.037)	(0.038)	(0.037)	(0.045)	(0.045)	(0.045)	(0.044)
Only-child/ Did not grow up with one's siblings	-0.076	-0.079*	-0.079*	-0.085*	-0.082	-0.083	-0.098*	-0.098*
	(0.047)	(0.048)	(0.048)	(0.043)	(0.058)	(0.058)	(0.058)	(0.058)
Last-born	*Reference category*							
Number of siblings	-0.029*	-0.030*	-0.028*	-0.028*	-0.061**	-0.061**	-0.060**	-0.060**
	(0.017)	(0.017)	(0.014)	(0.017)	(0.027)	(0.027)	(0.028)	(0.028)
Time preference		-0.010		-0.015		-0.019		-0.015
		(0.010)		(0.010)		(0.013)		(0.012)
Risk preference			0.023***	0.024***			0.023**	0.023**
			(0.008)	(0.008)			(0.011)	(0.011)
Space; 2 years	0.010	0.008	0.017	0.014	0.041	0.039	0.037	0.035
	(0.027)	(0.027)	(0.027)	(0.027)	(0.033)	(0.033)	(0.033)	(0.033)
Family economy during childhood	0.033**	0.033**	0.033**	0.030**	0.047***	0.048***	0.046**	0.047**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.018)	(0.018)	(0.018)	(0.018)
Parents lived together	0.00004	0.0004	0.001	0.002	-0.084**	-0.087**	-0.069**	-0.073**
	(0.029)	(0.029)	(0.030)	(0.030)	(0.033)	(0.034)	(0.033)	(0.034)
Mother's age	-0.001	-0.001	-0.00009	-0.0003	0.003	0.003	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Grew up in a big city	0.016	0.018	0.003	0.005	0.0001	0.001	-0.010	-0.010
	(0.037)	(0.037)	(0.037)	(0.037)	(0.048)	(0.048)	(0.049)	(0.049)
Grew up in a small town/countryside	0.004	0.005	0.008	0.008	-0.035	-0.037	-0.025	-0.027
	(0.029)	(0.029)	(0.030)	(0.029)	(0.033)	(0.033)	(0.032)	(0.032)
Live in a big city	0.088***	0.086***	0.089***	0.086***	0.107**	0.105**	0.111**	0.110**
	(0.030)	(0.030)	(0.030)	(0.030)	(0.043)	(0.043)	(0.044)	(0.044)
Live in a small town/countryside	-0.079**	-0.079**	-0.087***	-0.087**	0.002	0.0004	-0.014	-0.015
	(0.032)	(0.032)	(0.032)	(0.032)	(0.035)	(0.035)	(0.035)	(0.035)
University≥ 3 years	0.246***	0.245***	0.240***	0.238***	0.182***	0.178***	0.181***	0.178***

	(0.022)	(0.022)	(0.023)	(0.023)	(0.032)	(0.032)	(0.033)	(0.033)
Age group 25 years	-0.252***	-0.252***	-0.251***	-0.252***	-0.243***	-0.238***	-0.248***	-0.243***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.029)	(0.030)	(0.030)	(0.030)
Number of individuals	901	901	870	870	688	688	661	661
Adjusted R^2	0.249	0.249	0.255	0.256	0.184	0.185	0.199	0.200

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

Although women on average have lower earnings than men, the regression results for male and female earnings are surprisingly similar, especially when considering the previous regression about university education that showed very clear gender differences. For earnings, we find no significant effects of the time-preference variable, while the less risk averse a respondent is, the higher the earnings. When investigating the relationship between earnings and birth order, we find that those who grew up without siblings, regardless of gender, generally have lower earnings than others.[21] Also, respondents with many siblings earn less than those with few, and the magnitude of the coefficient is twice as large for men than for women. The positive correlation between a respondent´s personal earnings and childhood family income is also strong across all the regressions.

There is an indication that middle-born men earn more than other men. However, this effect is only significant if we do not control for risk preferences. Hence, the reason why middle-born men earn more than last-born men is linked to their higher risk preference.

3.4 Family decisions

Other important real-life decisions, such as the timing of moving in with a partner and the timing of becoming a first-time parent, are also decisions that are likely to be associated with time and risk preferences. Although these issues are not analyzed as often as education and earnings, they are indeed important decisions and do affect people's everyday lives. Since family building may be inspired by one's own family experience, these decisions are also, at least partly, likely to be associated with birth order and other family variables. We first ex-

[21] The results of t-tests between those who grew up without siblings and all other birth-order categories are shown in the Appendix.

amine what explains whether the respondents moved in together with a partner early in life, as married or as cohabitating. The median age of moving in together is 21 years for women and 23 years for men in our sample, so we define *Early* as moving in earlier than that. We estimate probit models where the dependent variable takes the value one if the individual moved in early and zero otherwise.[22] The resulting marginal effects are found in Table 6. Then we analyze the age at which one had his/her first child conditional on having at least one. The OLS results corrected for heteroskedasticity are shown in Table 7.

[22] Those who are single and have never lived together with a partner are categorized as zeros.

Table 6. Moving in with a partner early. Marginal effect of probit model: The dependent variable is one if the person got married or cohabited early (< age 21 for women and < 23 for men).

Variable	***Females***				***Males***			
	Basic model	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*	*Basic model*	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*
Constant	0.184**	0.172**	0.235**	0.220*	0.149	0.136	0.101	0.081
	(0.078)	(0.084)	(0.112)	(0.116)	(0.099)	(0.105)	(0.099)	(0.123)
First-born	-0.039	-0.038	-0.043	-0.042	-0.045	-0.046	-0.036	-0.038
	(0.036)	(0.036)	(0.036)	(0.036)	(0.043)	(0.043)	(0.044)	(0.044)
Middle-born	-0.038	-0.039	-0.043	-0.044	-0.035	-0.037	-0.033	-0.036
	(0.046)	(0.046)	(0.047)	(0.047)	(0.055)	(0.055)	(0.056)	(0.056)
Grew up without siblings	-0.052	-0.051	-0.059	-0.057	-0.063	-0.062	-0.075	-0.075
	(0.053)	(0.053)	(0.054)	(0.054)	(0.062)	(0.062)	(0.062)	(0.062)
Last-born	Reference category							
Number of siblings	0.002	0.002	0.002	0.002	0.003	0.003	0.001	0.001
	(0.017)	(0.017)	(0.017)	(0.017)	(0.021)	(0.021)	(0.021)	(0.021)
Time preference		0.006		0.006		0.009		0.012
		(0.012)		(0.012)		(0.015)		(0.015)
Risk preference			-0.020*	-0.020*			0.032***	0.032***
			(0.011)	(0.011)			(0.012)	(0.012)
Space; 2 years	0.027	0.028	0.034	0.035	-0.078**	-0.077**	-0.079**	-0.077**
	(0.032)	(0.032)	(0.032)	(0.033)	(0.038)	(0.038)	(0.039)	(0.039)
Family economy during childhood	- 0.028*	- 0.028*	- 0.028*	- 0.028*	-0.021	-0.021	-0.020	-0.020
	(0.016)	(0.016)	(0.016)	(0.016)	(0.020)	(0.020)	(0.020)	(0.020)
Parents lived together	-0.114***	-0.115***	-0.107***	-0.106***	-0.080*	-0.078*	-0.079*	-0.076*
	(0.035)	(0.035)	(0.036)	(0.036)	(0.042)	(0.043)	(0.043)	(0.043)
Mother's age	-0.011***	-0.011***	-0.011***	-0.011***	-0.010***	-0.011***	-0.011***	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Grew up in a big city	-0.054	-0.054	-0.060	-0.060	-0.010	-0.009	-0.015	-0.014
	(0.037)	(0.037)	(0.037)	(0.037)	(0.046)	(0.046)	(0.046)	(0.046)
Grew up in a small town/countryside	0.038	0.038	0.029	0.029	0.056	0.057	0.068*	0.070*
	(0.030)	(0.030)	(0.031)	(0.031)	(0.037)	(0.037)	(0.038)	(0.038)
University ≥ 3 years	-0.063**	-0.062**	-0.070**	-0.070**	-0.100**	-0.097**	-0.103***	-0.100**
	(0.030)	(0.030)	(0.031)	(0.031)	(0.039)	(0.039)	(0.040)	(0.040)
Age group 25 years	0.023	0.023	0.025	0.027	0.050	0.064*	0.068*	0.065*
	(0.028)	(0.028)	(0.028)	(0.028)	(0.031)	(0.034)	(0.035)	(0.035)
Number of individuals	1319	1319	1278	1278	877	877	846	846
Pseudo R^2	0.034	0.034	0.035	0.035	0.033	0.033	0.038	0.039

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

Regarding birth order, we get no significant results. The decision to move in with a partner early seems not to be related to time preferences. It does seem to be linked to risk preferences, however, even if the relationship interestingly is opposite for men and women: Women who are more risk averse and men who are less risk averse are more likely to have moved in with a partner early. The effect is also more significant and of larger magnitude for men than for women: The probability of moving in together early increases by 12 percentage points if a male respondent is the least risk averse instead of the most risk averse man.

Other childhood socio-economic variables have different effects on women and men as well. The better the economic standard during childhood, the less likely a woman is to move in with a partner early, while we do not find any such effect among men. For a man, the probability of moving in with a partner early decreases by around 8 percentage points if he has siblings close in age, while we do not find any such effect for women. However, similarly as in the case of having a university education, both mother´s age and having grown up in an intact family increase the likelihood for a respondent to make more patient choices: The older one´s mother the less likely a respondent is to have moved in with a partner early and this result holds for both men and women. Similarly, both women and men whose parents lived together during the respondent´s childhood are less likely to move in with a partner early.

The last decision we analyze is the timing of the first birth. The dependent variable is the age when one had the first child and the regressions are run on the subsample of respondents with children. The results are presented in Table 7.

Table 7. The coefficients of OLS model. The dependent variable is *The age of a respondent when having his/her first child conditional on having children.* Standard errors in parentheses.

Variable	***Females***				***Males***			
	Basic model	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*	*Basic model*	*With time preference variable*	*With risk variable*	*With both time preference and risk variable*
Constant	25.498***	26.470***	25.337***	26.307***	30.396***	30.632***	29.482***	29.630***
	(1.421)	(1.479)	(1.449)	(1.507)	(1.619)	(1.663)	(1.686)	(1.745)
First-born	0.741	0.714	0.772	0.736	-0.202	-0.190	-0.464	-0.460
	(0.477)	(0.478)	(0.484)	(0.484)	(0.632)	(0.635)	(0.643)	(0.645)
Middle-born	0.454	0.520	0.616	0.676	-0.889	-0.870	-1.155	-1.147
	(0.583)	(0.577)	(0.587)	(0.580)	(0.717)	(0.719)	(0.744)	(0.745)
Grew up without siblings	-0.782	-0.871	-0.794	-0.887	-1.123	-1.120	-0.865	-0.863
	(0.713)	(0.711)	(0.727)	(0.725)	(0.922)	(0.925)	(0.928)	(0.929)
Last-born	Reference category							
Number of siblings	-0.461**	-0.439**	-0.423**	-0.393**	-0.170	-0.168	-0.206	-0.205
	(0.195)	(0.188)	(0.194)	(0.187)	(0.319)	(0.320)	(0.325)	(0.325)
Time preference		-0.375***		-0.382***		-0.118		-0.069
		(0.143)		(0.146)		(0.206)		(0.206)
Risk preference			0.088	0.099			0.447***	0.447***
			(0.137)	(0.136)			(0.163)	(0.163)
Space; 2 years	-0.341	-0.401	-0.233	-0.297	0.111	0.094	0.056	0.046
	(0.415)	(0.415)	(0.419)	(0.419)	(0.508)	(0.509)	(0.523)	(0.524)
Family economy during childhood	- 0.122	- 0.111	- 0.107	- 0.094	0.382	0.388	0.332	0.335
	(0.190)	(0.190)	(0.195)	(0.194)	(0.251)	(0.251)	(0.262)	(0.262)
Parents lived together	0.344	0.347	0.363	0.368	0.738	0.722	0.967*	0.957*
	(0.409)	(0.405)	(0.412)	(0.408)	(0.583)	(0.586)	(0.582)	(0.585)
Mother's age	0.053	0.043	0.049	0.039	-0.012	-0.012	-0.019	-0.019
	(0.038)	(0.038)	(0.038)	(0.038)	(0.044)	(0.043)	(0.044)	(0.044)
Grew up in a big city	-0.558	-0.537	-0.465	-0.443	0.232	0.230	0.111	0.110
	(0.500)	(0.497)	(0.512)	(0.509)	(0.638)	(0.639)	(0.637)	(0.637)
Grew up in a small town/countryside	-0.307	-0.309	-0.217	-0.212	-0.048	-0.082	0.124	0.101
	(0.365)	(0.364)	(0.373)	(0.372)	(0.372)	(0.507)	(0.512)	(0.528)
University ≥ 3 years	2.514***	2.491***	2.645***	2.604***	2.642***	2.611***	2.542***	2.521***
	(0.426)	(0.424)	(0.436)	(0.435)	(0.546)	(0.546)	(0.562)	(0.561)
Babysitter	-0.550	-0.651	-0.691	-0.776	-1.578**	-1.608**	-1.719**	-1.733**
	(0.500)	(0.498)	(0.513)	(0.510)	(0.684)	(0.688)	(0.734)	(0.737)
Age group 25 years	-4.153***	-4.179***	-4.164***	-4.205***	-5.270***	-5.238***	-5.183***	-5.153***
	(0.305)	(0.304)	(0.307)	(0.307)	(0.470)	(0.459)	(0.504)	(0.498)
Number of individuals	676	676	649	649	420	420	398	398
Adjusted R^2	0.180	0.187	0.184	0.190	0.152	0.151	0.162	0.160

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

Also when it comes to the age of becoming a first-time parent, the results for men and women are completely different, both in terms of sibling variables and in terms of time and risk preferences: Women with many siblings have children earlier than other women. However, we do not find any significant sibling differences for males. The results are also robust for inclusion of time and risk preferences. Concerning time preferences, the more impatient a woman is the younger she tends to be when having her first child: A woman who is in the least patient category has her first child on average 1.5 years earlier than the most patient woman. On the other hand, the stated time preference and timing of the first child have no significant relationship among men. For men, the risk preference is instead an important indicator, so that less risk-averse men have their first child later than more risk-averse men. One possible explanation why time preferences matter for women but not for men is the fact that women´s timing of having a first child depends more on biological factors than does men´s timing. However, also nurture seems to play a role: If a man used to babysit younger siblings, he had his first child on average more than one and a half years earlier than other men.

4. Conclusions

In this paper we analyze the relationships between time and risk preferences, real-life decisions and birth order. We look at men and women separately and find large gender differences. Stated time and risk preferences are interrelated among women, but not men. Concerning birth-order differences in stated preferences, middle-born males are found to be the least patient and the least risk averse. Among women, those who grew up without siblings are the ones found to be both more patient and more risk averse. Birth order and number of siblings are found to matter more often among females than among males when it comes to real-life

decisions. However, in the earnings regressions are the signs and magnitudes of the birth order and number of sibling variables surprisingly similar for men and women.

Another strong result is that the stated time and risk preferences in general have clear explanatory power for real-life decisions; the estimated coefficients are both highly significant and of substantial size. Interestingly, the risk preference variable has explanatory power more often than the time preference variable. Moreover, the risk preferences matter more in the male than in the female subsample. For example, while the likelihood of having a university education is related to birth order and number of siblings among women, risk aversion and patience can explain part of men´s choice of having a higher education. Moreover, with the exception of earnings, the results of time and risk preferences differ between the genders: Less risk-averse men and more risk-averse women on average are more likely to move in together with a partner early in life. Moreover, the timing of the first child is related to time preferences among women but to risk preferences among men; less patient women and more risk-averse men have their first child earlier than others.

Finally, our results clearly show that the birth-order results are robust to the inclusion of time and risk preferences with one exception: The finding that middle-born men earn more is not a pure birth-order effect. Instead it can be linked to the risk preference variable – middle-born men are significantly less risk averse and low risk aversion is related to higher earnings.

Most socio-economic childhood variables are stable across genders and issues. Having an older mother makes people more likely to behave patiently: It increases the probability of

having a higher level of education and it decreases the probability of moving in with a partner early for both men and women. Moreover, both men and women who were well-off financially during childhood are more likely to have a university education and higher earnings as adults. Women with a higher economic standard during childhood are also less likely to move in with a partner early.

In summary, this paper has found that both stated preferences concerning time and risk and actual behavior are indeed associated with siblings and birth-order variables, yet in different ways for women and men. We have thus contributed a small piece to the giant puzzle of how our early years of life, our preferences, and our behavior are linked together, and we have also shed light on differences between men and women in this respect. We have furthermore analyzed whether, e.g., birth-order differences can be explained by differences in time and risk preferences. More research is, however, needed to investigate possible explanations to why first-born, later-born, and those who did not grow up with siblings make different real life choices and to understand how time and risk preferences are connected and why they differ between men and women.

Acknowledgements:

This paper has been benefited by comments by Fredrik Carlsson, participants at the Third Nordic Workshop in Behavioral and Experimental Economics in Copenhagen, 2008, the 23rd ESPE conference in Seville, 2009, and the seminar participants the University of Gothenburg, the University of Karlstad, and the University of Växjö. Financial support from the Royal Swedish Academy of Sciences, the Helge Ax:son Johnson Foundation, the Wilhelm and Mar-

tina Lundgren Foundation, and from the Jan Wallander's and Tom Hedelius' Foundation is gratefully acknowledged.

References

Anderhub V., W. Güth, U. Gneezy, and D. Sonsino (2001), On the interaction of risk and time preferences: An experimental study, *German Economic Review*, 2(3), 239-253.

Anderson L. R. and J. M. Mellor (2008), Predicting health behaviors with an experimental measure of risk preference, Journal of Health Economics, 27(5), 1260-1274

Becker, G. S. and C. B. Mulligan (1997), The endogenous determination of time preference, *The Quarterly Journal of Economics* 112(3), 729-758.

Behrman J. R. and P. Taubman (1986), Birth order, schooling, and earnings, *Journal of Labor Economics*, 4 (3), Part 2, S121-S145.

Benjamin D. J., S. A. Brown, and J. M. Shapiro (2006), Who is "behavioral"? Cognitive ability and anomalous preferences, Working Paper, Available at SSRN: http://ssrn.com/abstract=675264

Björklund, A., Eriksson, T., Jäntti, M., Raaum, O., and E. Österbacka (2004), Family structure and labor market success: the influence of siblings and birth order on the earnings of young adults in Norway, Finland, and Sweden, in Corak, M. (ed.) *Generational Income Mobility*, Cambridge University Press.

Björklund, A. and M. Sundtröm (2006), Parental separation and children's educational attainment: A siblings analysis on Swedish register data, *Economica* 73, 605-624.

Black. S., P. Devereux and K. Salvanes (2005), The more the merrier? The effect of family size and birth order on children's education, *Quarterly Journal of Economics*, 120 (2), 669-700.

Blake J. (1989), Family size and achievement. Los Angeles, CA: University of California Press.

Bonesrønning H. and S. Sandgren Massih (2008), Birth order effects on young student's academic achievement, Mimeo, Uppsala University.

Booth A. and H. Joo Kee (2009), Birth order matters: The effect of family size and birth order on educational attainment, *Journal of Population Economics*, 22 (2), 367-397.

Bronars S. G. and G. S. Oettinger (2006), Estimates of the return to schooling and ability: evidence from sibling data, *Labour Economics*, 13, 19-34.

Chabris, C. F., D. Laibson, C. L. Morris, J. P. Schuldt and D. Taubinsky (2008), Individual laboratory-measured discount rates predict field behavior, *Journal of Risk and Uncertainty* 37 (2-3), 237-269 .

Cook P.A. and M.A Bellis (2001), Knowing the risk: Relationships between risk behavior and health knowledge, *Public Health*, 115, 54-61.

Dohmen T., A. Falk, D. Huffman, and U. Sunde (2010), Are risk aversion and impatience related to cognitive ability?, *American Economic Review* 100(3), 1238-1260.

Dohmen T., A., Falk, D. Huffman, U., Sunde, J. Schupp, and G. G., Wagner (forthcoming), Individual risk attitudes: Measurement, determinants and behavioral consequences, *Journal of European Economic Association.*

Donkers B., B. Mellenberg, and A. Van Soest (2001), Estimating risk attitudes using lotteries: A large sample approach, *The Journal of Risk and Uncertainty*, 22(2), 165-195.

Downey D. B. (1995), When bigger is not better: Family size, parental resources, and children's educational performace, *American Sociological Review*, 60, 746-761.

Downey D. B., (2001), Number of siblings and intellectual development: the resource dilution explanation, *The American Psychologist*, 56, 497-504.

Eckel C.C. and P.J. Grossman (2008), Men, women and risk aversion: Experimental evidence, in *Handbook of Experimental Economic Results*, Ed. Charles Plott and Vernon Smith, Amsterdam, Elsevier.

Frederick, S., G. Loewenstein, and T. O'Donoghue (2002), Time discounting and time preference: A critical review, *Journal of Economic Literature*, XL, 351-401.

Frederick S. (2005), Cognitive reflection and decision making, *Journal of Economic Perspective*, 19(4), 25-42.

Funder D. C. and J. Block (1989), The role of Ego-Control, Ego-Resiliency, and IQ in delay of gratification in adolescence, *Journal of Personality and Social Psychology*, 57 (6), 1041-1050.

Ginther D. K. and R. A. Pollak (2004), Family structure and children's educational outcomes: Blended families, stylized facts, and descriptive regressions, *Demography*, 41 (4), 671-696.

Hanushek E. A. (1992), The trade-off between child quantity and quality, *The Journal of Political Economy*, 100 (1), 84-117.

Harrison, G. W., M. I. Lau, and M. B. Williams (2002). Estimating Individual Discount Rates in Denmark: A Field Experiment. *American Economic Review*, 92(5): 1606–1617.

Hartog J., A. Ferrer-i-Carbonell, and Nicole Jonker, (2002), Linking measured risk aversion to individual characteristics, *Kyklos*, 55 (1), 3-26.

Healey M. D. and B. J. Ellis (2007), Birth order, conscientiousness, and openness to experience. Tests of the family-niche model of personality using a within-family methodology, *Evolution and Human Behavior* 28, 55-59.

Holt C.A. and S.K. Laury (2002), Risk aversion and incentive effects, *The American Economic Review*, Vol. 92 (5), 1644-1655.

Ida T. and R. Goto (2009), Interdependency among addictive behaviours and time/risk preferences: Discrete choice model analysis of smoking, drinking, and gambling, *Journal of Economic Psychology* 30, 608-621.

Jobe J.B., S.H. Holgate, and T.A. Scrapansky (2006), Risk taking as motivation for volunteering for a hazardous experiment, *Journal of Personality*, 51 (1), 95-107.

Kaestner R. (1997), Are brothers really better? Sibling sex composition and educational achievements revisited, *The Journal of Human Resources*, 32 (2), 250-284.

Kantarevic J. and S. Mechoulan (2006), Birth order, educational attainment and earnings, an investigation using the PSID, *The Journal of Human Resources*, 41 (4), 755-777.

Keren G. and P. Roelofsma (1995), Immediacy and certainty in intertemporal choice, *Organizational Behavior and Human Decision Processes*, 63, 105-116.

Kirby, K. N., G. C. Winston and M. Santiesteban (2005), Impatience and grades: Delay-discount rates correlate negatively, *Learning and Individual Differences* 15, 213–222.

Lindert P. H. (1977), Sibling Position and Achievement, *Journal of Human Resources*, 12 (Spring 1977), 198-219.

Oettinger G.S. (2000), Sibling similarity in high school graduate outcomes: Causal interdependency or unobserved heterogeneity?, *Southern Economic Journal*, 66, 631-648.

Painter G. and D. I. Levine (2000), Family structure and youths' outcomes: Which correlations are causal?, *Journal of Human Resources*, 35 (3), 524-549.

Paulhus D. L., P. L. Trapnell, and D. Chen (1999), Birth-order effects on personality and achievements within families, *Psychological Science*, 10 (6), 482-488.

Saroglou V. and L. Fiasse (2003), Birth order, personality, and religion: a study among young adults from a three-siblings family, *Personality and Individual differences,* 35, 19-29.

Shamosh N. A. and J. R. Gray (2008), Delay discounting and intelligence: A meta-analysis, *Intelligence*, 36, 289-305.

Shoda Y., W. Mischel, and P.K. Peake (1990), Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions, *Development Psychology*, 26 (6), 978-986.

Skog O-J. (2001), Theorizing about patience formation – The necessity of conceptual distinctions, *Economics and Philosophy*, 17, 207-219.

Stafford F. P. (1987), Women´s work, sibling competition, and children's school performance, *The American Economic Review,* 77, 972-980.

Statistics Sweden, (2007a), Household finances 2007, Accessed at homepage: www.scb.se, May 2009.

Statistics of Sweden, (2007b), Population in the country, counties and municipalities on 31/12/2007 and Population Change in 2007, Accessed at homepage: www.scb.se, May 2009.

Statistics Sweden, (2007c), Swedish Population (16-74 years) education level, gender and age 2007, Accessed at homepage: www.scb.se, May 2009.

Suitor J.J., and K. Pillemer (2007), Mothers´ favoritism in later life: The role of children's birth-order, *Research on Aging*, 29 (1), 32-55

Sulloway F. J. (1996), *Born to Rebel: Birth Order, Family Dynamics, and Creative Lives*. New York. Pantheon.

Sulloway, F. J. (2001). Birth order, sibling competition, and human behavior. In H. R. Holcomb III (Ed.), *Conceptual challenges in evolutionary psychology: Innovative research strategies* (pp. 39-83). Dordrecht, the Netherlands: Kluwer Academic.

Sulloway F. J. and R. L. Zweigenhaft (2010), Birth order and risk taking in athletics: A meta-analysis and study of major league baseball, *Personality and Social Psychology Review* 14(4), 402-416.

Tanaka T., C. F. Camerer, and Q. Nguyen (2010), Risk and time preferences: Linking experimental and household survey data from Vietnam, *American Economic Review*, 100:1, 557-571.

Weber E.U., A-R. Blais, and N.E. Betz, (2002), A Domain-specific Risk-Attitude Scale: Measuring risk perceptions and risk behaviors, *Journal of Behavioral Decision Making*, 15, 263-290.

Yiannakis A. (1976), Birth order and preference for dangerous sports among males, *Research Quarterly*, 47, 62-67.

Appendix A.

Table A1. The results of the two-sided t-tests estimated from the regressions which controlled for both the risk and time preferences.

Birth order categories	**Time preferences**	**Risk preferences**	**Time preferences**	**Risk preferences**	**University education**		**Earnings**		**Move in together early**		**Age at the first child**	
	Differences between the coefficients/marginal effects											
	Females	Females	Males	Males	Females	Males	Females	Males	Females	Males	Females	Males
First-born – Last-born	-0.113	-0.001	0.131	0.141	0.080***	0.062	0.023	0.038	-0.042	-0.038	0.736	-0.460
Middle-born – Last-born	0.144	0.021	0.203*	0.250**	-0.049	0.012	0.043	0.062	-0.044	-0.036	0.676	-1.147
Grew up without siblings – Last-born	-0.299**	-0.220*	-0.025	-0.004	0.057	0.069	-0.085*	-0.098*	-0.057	-0.075	-0.887	-0.863
First-born – Middle-born	-0.256**	-0.022	-0.073	-0.109	0.129**	0.050	-0.021	-0.024	0.002	-0.002	0.060	0.687
First-born – Grew up without siblings	0.187	0.219	0.156	0.145	0.023	-0,007	0.107**	0.136**	0.015	0.037	1.623**	0.403
Middle-born – Grew up without siblings	0.443***	0.241	0.229	0.254	-0.106	-0.057	0.128**	0.160**	0.013	0.039	1.563*	-0.284