

## **Fertility timing and intergenerational income mobility: the case of southern Sweden 1905-2015**

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### **Abstract**

A large literature on intergenerational mobility stress the importance of parental investments on children socioeconomic outcomes. It argued that larger families were detrimental to upward mobility, through aspects related to fertility, and great attention has been devoted to the role of sibship size and birth order. However, issues related to the timing of childbearing for socioeconomic outcomes has largely been neglected in previous research. In this paper, we analyze the relationship between fertility, and especially fertility timing, and intergenerational income mobility, and how this relationship evolved during the 20th century up to 2015. We use longitudinal data for a region in southern Sweden with data on individual income and a number of other sociodemographic variables. Besides analyzing the association between number of siblings and intergenerational income mobility, we study the role of birth order, age of mother, and birth spacing. We argue that the timing of fertility contribute to a better understanding of the mechanisms underlying the persistence of social status across generations as well as how upward economic mobility can be fostered among families of lower economic background.

### **Extended Abstract**

In economics there is a large literature on intergenerational income mobility, often analyzing the associations in earnings between fathers and sons, but more recently also between grandfathers and grandsons, net of the father-son association. Much of the research has focused on cross-country differences and changes over time in income persistence, often using intergenerational elasticities or sibling correlations to measure the importance of family background on earnings (e.g. Björklund and Jäntti 2020; Björklund and Jäntti 2012; Black and Devereux 2011; Blanden 2013; Corak 2013). This research shows considerable intergenerational persistence in earnings all over the Western world, but also that this persistence differs between countries, but has not changed markedly over time, except perhaps in some Nordic countries where mobility appears to have increased in more recent periods (see Black and Devereux 2011).

Theoretically this kind of intergenerational persistence in status (earnings, education or social position) has been related to parental investments in children (Becker and Tomes 1986). Earnings, or socioeconomic status more generally, are determined by inherited and transmitted abilities (genes and “family culture”), as well as investments in human capital by the individual, the parents and by society through public spending. Parents make investments in children’s earnings potentials (abilities, education, etc.) through time allocation, sharing of networks and monetary spending affecting their health, human capital and motivation to succeed. Human capital investments during childhood are of special importance as they are crucial for later development, and in the Becker-Tomes model total human capital is assumed to be proportional to the investments made by parents during childhood. This makes the role of parents crucial for

socioeconomic attainment of children in adulthood, in addition to the inherited abilities and societal investments.

The resources parents can use to invest in their children are mostly finite, for example time and money. The more children a couple have, the less resources they have to invest in each child. Families are faced with a tradeoff between the number of children they have and the amount of resources they can invest in each child (Becker 1960; Becker and Lewis 1974). This *quantity-quality tradeoff* has been used as a main theoretical explanation for the fertility transition, as families during the transition responded to increased returns to education by limiting the number of children they had and invested more in each child.

Extending the theory of the quantity-quality tradeoff to intergenerational income mobility, we would expect families with more children, all other things equal, to have less resources to invest in each child, and therefore that upwards income mobility would be lower, and downward mobility higher in these families than in families with fewer children. This is also the essence of the *resource dilution theory* outlined by Blake (1981, 1989). Parental resources are limited and in larger families they have to be divided among more children, and the quality of the children will be lower.

There are a large number of empirical studies that have analyzed the association between sibship size and socioeconomic outcomes, especially educational attainment (e.g., Blake 1989; Downey 1995; Black et al. 2005), but also occupational attainment (Goodman et al. 2012; Van Bavel 2006; Van Bavel et al. 2011, Bras et al. 2010) and income, or income mobility (e.g., Behrman and Taubman 1986; Björklund et al. 2004; Lindahl 2008; Lindert 1977).

More recently, the resource dilution theory for educational attainment has been qualified somewhat by emphasizing that it is not a general explanation but depends on the societal context, for example in terms of support from governments or civil society (Gibbs et al. 2016). At least to some extent, the gender of the siblings also seems matter for the strength of the dilution effects, with brothers being more detrimental to the educational attainment of their siblings than sisters (Kalmijn and Van der Werfhorst 2016).

Besides sibship size, a number of studies have looked at birth order effects on educational outcomes, income and income mobility (see, e.g., Behrman and Taubman 1986; Björklund et al. 2004; Härkönen 2014; Lindahl 2008), and there has also been some research on the timing of childbearing, including the role of birth spacing and age of mother (Lindert 1977; Kalmijn 2005). However, in comparison with the enormous focus in the literature on the role of the size of the sibship, issues related to the role of the timing of childbearing for socioeconomic outcomes has largely been neglected in previous research.

There are several reasons why the timing of childbearing might have important effects on socioeconomic attainment in addition to the number of children. Early childbearing is associated with relatively few resources and possibly sharper tradeoffs between family life and other aspects of life including working life, with potential ramifications for parental investments in children. There is much empirical support for various negative consequences for children of being born to young mothers (e.g., Kalmijn & Kraaykamp 2005) Closely spaced births will aggravate dilution effects for most resources and parental investments, except possibly those resembling public goods (e.g. reading aloud or instilling values and attitudes through general social interaction in the family). Hence, it could be expected that having younger parents,

especially mothers, and siblings close in age would add to the negative effect of more siblings on achievement.

The aim of this paper is to analyze the relationship between fertility, and especially fertility timing, and intergenerational income mobility, and how this relationship evolved during the 20th century. We use longitudinal data for a region in southern Sweden for which we have individual-level data on income and a number of other sociodemographic variables (Bengtsson et al., 2012). Besides analyzing the association between number of siblings and intergenerational income mobility, we will study the role of birth order, age of mother, and birth spacing.

We study the entire twentieth century, 1905-2015, with continuous information about total labor income from individual tax returns since 1905 as well as various demographic outcomes from which we can derive several fertility variables. Therefore, our sample design consists of two different parts. In the first stage we select all women in reproductive ages (15-49) since 1905 and reconstruct their entire fertility history, based on the total number of children ever born, the age at first birth and subsequent time intervals between parities. Apart from linking mothers and children we also track women's age at marriage and link them to their husbands (fathers).

We estimate lifetime income for fathers<sup>1</sup> and children, which takes the average income between ages 40-49 for both generations. The choice of average in these ages responds to periods of greater stability and when life cycle earnings reached a peak (Böhlmark & Lindquist, 2006). Moreover, as the income information is continuous in terms of observations and in similar age spans for both generations (fathers and children), we do not run the risk of attenuation or lifecycle bias (Chetty et al., 2014).

Our analytical strategy focuses on ten-year birth cohorts of children to measure the impact of father's income. We apply and compare the two main approaches adopted on the international literature on income mobility. On the one hand, we use intergenerational income elasticity (IGE) from regressing the log income of fathers on those of children (Corak, 2013; Lee & Solon, 2009). On the other hand, we apply intergenerational rank correlation (rank-rank slopes), which standardize parents and children in relative terms of their income position in percentiles (Chetty et al., 2014). Hence, in our first model we assess to what extent the income of fathers explain the economic performance of children across cohorts, which means that as higher this association lower the intergenerational income mobility.

Additionally, in the following regressions we include a set of fertility variables in order to assess their influence on aggravating or ameliorating the parental influence on income. First we add variables used in previous research on resource dilution at the family level regarding size, such as sibship size, birth order and gender composition of siblings (Björklund et al., 2010; Goodman et al., 2012; Lersch, 2019; Lindahl, 2008). However, we expand our contribution applying also variables regarding fertility timing, which have been seldom used, as mother's (and father's) age at first birth and the subsequent time interval between births. Following this approach we try to explain as much as possible of the variance in intergenerational income (in)mobility by the fertility and fertility timing (Björklund et al., 2012).

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<sup>1</sup> The reason why we just take fathers income is because women's earnings are not reported separately until 1947, thus we are able to calculate lifetime income for women in all the second generations but not for an important part of the first generation.

Our main premise is that including fertility timing gives additional information about family planning than just sibship size. Hence, in the relationship between total number of siblings and birth order some studies have found different effects in socioeconomic outcomes and mobility. Some authors found first-born performing better on earnings compared to other orders (Becker & Tomes 1986; Black et al. 2005). Conversely, other studies point out later-born children as more advantaged, as they would be less affected by sibship size because older siblings could have emancipated and left home (Härkönen 2014; Iacovou 2008). We hypothesize that interactions between fertility timing and birth order would explain these differentials. Accordingly, while postponing the first birth could explain better outcomes of first-borns, spacing births would be more beneficial to later-born.

Additionally, we also want to assess if both sibship size and fertility timing differ depending on the economic background of individuals and across generations. In this regard, both *quantity-quality tradeoff* and *resource dilution* approaches originally stated that larger number of siblings would be more detrimental for poorer families as their resources were limited (Becker & Lewis, 1974; Blake, 1989). However, recent empirical findings showed that the effects of greater sibship sizes affect actually mainly wealthier families who have most to lose in terms of resources than poorer families for whom more or less children would not change an already limited ability for investing in human capital (Keister, 2004; Downey, 2001).

Thus, in the final section of the paper we target the top and bottom quintiles of the background (parental) income distribution in order to predict the mean income achieved by children across cohorts. In this sense we will test how fertility variables, especially those regarding timing, could influence absolute income mobility. Additionally, we also study how different fertility behaviors could foster or hamper intergenerational income mobility in terms of direction among the lower quintile (upward mobility) and the upper quintile (downward mobility). We hypothesize that income mobility would be shaped by reproductive factors in interaction with the availability of resources. Hence, parents would have distinct aspirations and plan their reproductive behavior accordingly. For instance, a greater impact of a higher age at first birth or length of birth intervals at the bottom of the income distribution would promote upward economic mobility. Conversely, changes in behaviours towards fertility decline would not have clear socioeconomic effects on families at the top economic distribution because beyond certain income thresholds they could ensure a broader and effective social reproduction among all children.

Finally, taking into account the difference between sibship size and the timing of fertility in the long-term, we might expect divergent effects on income mobility. For example, for older generations (e.g. 1880's-1910's) who were young in the final stages of the fertility transition (Bengtsson & Dribe, 2014); just decreasing the sibship size would have had a greater impact on increasing income mobility. Conversely, for the younger generations in the second half of the twentieth century, postponement of the first birth would have been more important for the income of their children as female labor force participation and investment in education would turn be crucial for the economic outcomes of children.

### **Quoted References**

Becker, G. S. (1960). An economic analysis of fertility. In: *Demographic and Economic Change in Developed Countries*. Columbia University Press, pp. 209-240.

- Becker, G. S. & Lewis, H. G. (1974). Interaction between quantity and quality of children. In: *Economics of the Family: Marriage, Children, and Human Capital*, T. W. Schultz (ed.), University of Chicago Press, pp. 81-90.
- Becker, G. S., & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics* 4(3, part 2): S1-S39.
- Behrman, J. R., & Taubman, P. (1986). Birth order, schooling and earnings. *Journal of Labor Economics*, 4, 121–45.
- Bengtsson, T., & Dribe, M. (2014). The historical fertility transition at the micro level: Southern Sweden 1815-1939. *Demographic Research*, 30, 493–534.
- Bengtsson, T., Dribe, M., Svensson, P., & Quaranta, L. (2012). The Scanian Economic Demographic Database: Version 3.0 (Machine-readable database). *Lund: Lund University, Centre for Economic Demography*.
- Björklund, A., Eriksson, T., Jaäntti, M., Raaum, O. & Österbacka, E. (2004). Family structure and labour market success: the influence of siblings and birth order on the earnings of young adults in Norway, Finland and Sweden In *Generational Income Mobility in North America and Europe* (Ed.) M. Corak, Cambridge University Press, Cambridge, pp. 207–25.
- Björklund, A., Lindahl, L., & Lindquist, M. J. (2010). What more than parental income, education and occupation? An exploration of what Swedish siblings get from their parents. *The BE Journal of Economic Analysis & Policy*, 10(1).
- Björklund, A., Jäntti, M., & Roemer, J. E. (2012). Equality of opportunity and the distribution of long-run income in Sweden. *Social Choice and Welfare*, 39(2–3), 675–696.
- Black, S. E., Devereux, P. J. (2011). Recent developments in intergenerational mobility. In: *Handbook of Labor Economics*, Volume 4b. Elsevier.
- Black, S. E., Devereux, P. J. & Salvanes, K. G. (2005). The more the merrier? The effect of family size and birth order on children's education, *Quarterly Journal of Economics*, 120, 669–700.
- Blake, J. (1981). Family size and the quality of children. *Demography*, 18, 421–442.
- Blake, J. (1989). *Family size and Achievement*. Berkeley: University of California Press.
- Bras, H., Kok, J., and Mandemakers, K. (2010). Sibship size and status attainment across contexts: Evidence from the Netherlands, 1840-1925. *Demographic Research* 23(4): 73-104. doi:10.4054/DemRes.2010.23.4.
- Böhlmark, A., & Lindquist, M. J. (2006). Life-cycle variations in the association between current and lifetime income: Replication and extension for Sweden. *Journal of Labor Economics*, 24(4), 879-896.

- Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, 129(4), 1553-1623.
- Corak, M. (2013). Income inequality, equality of opportunity, and intergenerational mobility. *Journal of Economic Perspectives*, 27(3), 79–102.
- Downey, D. B. (2001). Number of siblings and intellectual development: The resource dilution explanation. *American Psychologist*, 56(6–7), 497–504.
- Gibbs, B. G, J. Workman & D. B. Downey (2016). The (Conditional) Resource Dilution Model: State- and Community-Level Modifications, *Demography*, 53, 723–748.
- Goodman, A., Koupil, I., & Lawson, D. W. (2012). Low fertility increases descendant socioeconomic position but reduces long-term fitness in a modern post-industrial society. *Proceedings of the Royal Society B: Biological Sciences*, 279(1746), 4342–4351.
- Härkönen, J. (2014). Birth Order Effects on Educational Attainment and Educational Transitions in West Germany. *European Sociological Review*, 30(2), 166–179
- Iacovou, M. (2008). Family size, birth order, and educational attainment. *Marriage & Family Review*, 42, 35–57.
- Kalmijn, M. & Kraaykamp, G. (2005). Late or later? A sibling analysis of the effect of maternal age on children's schooling. *Social Science Research*, 34, 634–650
- Keister, L. A. (2004). Race, family structure, and wealth: The effect of childhood family on adult asset ownership. *Sociological Perspectives*, 47(2), 161–187.
- Lee, C.-I., & Solon, G. (2009). Trends in intergenerational income mobility. *The Review of Economics and Statistics*, 91(4), 766–772.
- Lersch, P. M. (2019). Fewer Siblings, More Wealth? Sibship Size and Wealth Attainment. *European Journal of Population*, 35(5), 959–986.
- Lindahl, L. (2008). Do birth order and family size matter for intergenerational income mobility? Evidence from Sweden. *Applied Economics*, 40(17), 2239–2257.
- Lindert, P. H. 1977. Sibling Position and Achievement, *Journal of Human Resources*, 12(2), 198-219.
- Van Bavel, J. (2006). The effect of fertility limitation on intergenerational social mobility: The quality-quantity trade-off during the demographic transition. *Journal of Biosocial Science* 38(4): 553-569. doi:10.1017/S0021932005026994.
- Van Bavel, J., Moreels, S., Van de Putte, B., and Matthijs, K. (2011). Family size and intergenerational social mobility during the fertility transition: Evidence of resource dilution from the city of Antwerp in nineteenth century Belgium. *Demographic Research* 24(14): 313-344. doi:10.4054/DemRes.2011.24.14.