



Birth order, family size and educational attainment

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ABSTRACT

This paper investigates the effect of family size and birth order on educational attainment. An instrumental variables approach is used to identify the effect of family size. Instruments for the number of children are twins at last birth and the sex mix of the first two children. The effect of birth order is identified, by examining the relation with years of education for different family sizes separately. No significant effect of family size on educational attainment of the oldest child is found. Birth order has a significant negative effect. Potential mechanisms behind the birth order effects are investigated. The results show that birth order effects are not affected by the average age gap between children. Information on financial transfers shows that earlier born children have a higher probability of receiving money from their parents than later born children, also the amount they receive is higher. These results indicate that the allocation of parental resources is a potential mechanism behind the birth order effects.

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1. Introduction

Many studies indicate that birth order and family size are important determinants of educational outcomes of children. Family size and birth order are strongly related, although family size differs between children from different families, while birth order differs between children within a family. In previous research often no clear distinction between sibship size and birth order is made and estimated effects of sibship size could be picking up the effect of birth order and visa versa. Because of the strong relation between birth order and family size this paper estimates the effects of both family background components on years of schooling, using the Wisconsin Longitudinal Study.

The relationship between family size and educational attainment can be the result of constraints on parental resources. When there are capital market imperfections and parents have many children, they can, for a given income, invest less in each child than if they have fewer

children. This can cause a negative relationship between family size and educational attainment (Becker, 1981). Also numerous empirical studies have found a negative relationship between the number of siblings, and future economic and educational achievements.

This negative relationship between family size and educational achievements is however not necessarily proof of a negative effect of the number of children. The number of children is a choice variable of the parents and it might be that certain characteristics of parents, such as their educational attainments, affect both the number of children as well as the educational attainments of those children.

This paper uses an instrumental variable (IV) approach to identify the effect of sibship size on years of schooling of a first-born child. Two sources of exogenous variation in the number of children are used; twins at last birth, and the preference of parents for a mixed sibling sex composition. Like many studies, this paper finds a negative correlation between the number of children and child's years of schooling. This negative correlation declines however when control variables like parental schooling and birth order dummies are added. This signals that the observed negative correlation might not be causal. The IV results indeed are no longer significantly negative, but positive and

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insignificant. Although the standard errors are not small, these results indicate that exogenous variation in the number of children does not have a significant negative effect on the educational attainment of a first-born child.

Since including birth order dummies makes the coefficient on family size insignificant, it might be that the negative relation between family size and years of schooling was just picking up the impact of birth order. Models from psychology predict a decline in intellectual environment with birth order, which can cause a negative effect of birth order on educational achievements (Zajonc, 1976). Economists emphasize the constraints on available parental time and resources, which can cause children's schooling outcomes to decline with birth order (Becker, 1981; Behrman, 1997).

This paper also identifies the effect of birth order, by estimating the effect on years of schooling separately for families with two, three, four or five children. Family size is correlated with birth order, and not taking this into account would give estimates of the birth order effects which might confound birth order with family size, or with family characteristics that are correlated with family size (Rodgers, 2001). Estimating the effect of birth order separately for families with a different number of children avoids this problem. For all family sizes examined in this paper, birth order turns out to have a significant negative effect on educational attainment. This decline in years of schooling with birth order turns out to be approximately linear.

Recent studies have also looked at the impact of family size (Angrist, Lavy, & Schlosser, 2007; Cáceres-Delpiano, 2006), birth order (Kantarevic & Mechoulan, 2006) or both (Black, Devereux, & Salvanes, 2005; Conley & Glauber, 2006). The findings in this paper are very similar to the findings of most of these papers in the sense that the results also show no significant causal impact of family size on years of schooling but a significant decline in educational attainment with birth order. The main contribution of this paper is that it goes beyond estimating the impact of birth order and family size, by investigating two potential mechanisms behind the estimated effects, competition between closely spaced siblings and the allocation of parental resources.

Different theories predict that birth order effects will be smaller when the time between births is larger. This paper investigates the effect of child-spacing, taking into account the possible endogeneity of the space between births, first by including family fixed effects and secondly by using the presence of twins as instrument.

To investigate whether restrictions on parental resources are behind the birth order effects, this paper exploits information about the amount of money parents report to have given to their children. This information about financial transfers to children makes it possible to investigate whether there is a causal impact of the number of children on the probability that a child receives money from his parents and whether this probability and the amount received vary with the birth order of the child.

The results show that the negative effect of birth order does not vary significantly with the average space between births. This result is robust to including family fixed effects and the use of the presence of twins as instrument. This paper further finds that earlier born children have a higher

probability of receiving money from their parents and they receive a larger amount. These findings indicate that the allocation of parental resources is a potential mechanism behind the birth order patterns observed in children's schooling outcomes.

The plan of the paper is as follows. Section 2 will give an overview of the theoretical and empirical literature. Section 3 continues with a description of the data used. Section 4 gives the results on respectively the impact of family size and birth order. Section 5 investigates potential mechanisms behind the birth order effects and finally Section 6 concludes.

2. Theoretical and empirical background

2.1. Family size and educational attainment

There is an extensive theoretical literature about the trade-off between child quality and quantity, dating back to the models of Becker and Lewis (1973) and Becker and Tomes (1976). The idea behind these theoretical models is that if parents have more children, investing a certain amount in per-child quality, for example their education, is more expensive, than if they have fewer children. When there is an (exogenous) increase in the number of children, the total cost of investing a certain amount per child becomes higher and for a given budget constraint parents will lower the investment in per-child quality. This indicates that there is a negative relation between child quantity and child quality.

However, parents have an influence on child quality not only through investment of resources, but also through transmission of their endowments. If parents with lower endowments have a higher preference for child quantity than parents with higher endowments, and therefore also have more children, this can cause a negative correlation between child quantity and child quality, by way of the effect of parental endowments on child quality. Children of parents with low endowments will in this case have on average more siblings and a lower educational attainment, even though there may be no causal effect of the number of children on educational attainment.

The empirical studies investigating the relation between child quantity and quality usually perform a least squares regression of economic and educational outcomes on sibship size and other socioeconomic background variables. Most of these studies have found a significant negative relation between the number of children and the educational achievements of those children. Examples of these studies are Belmont and Marolla (1973), Blake (1981) and Hanushek (1992).

These studies do however not take the possible endogeneity of the number children into account. Recently the effect of family size on educational achievement is investigated using an instrumental variable approach. Black et al. (2005) use multiple births as instruments for the number of children, to investigate the effect of sibship size on children's education in Norway. They find a negative correlation between family size and educational attainment, but when they include control variables such as birth order dummies, and when they use the twin births as

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