The Impacts of Family Size on Investment in Child Quality.*

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Abstract

Using multiple births as an exogenous shift in family size, I investigate the impact of the number of children on child investment and child well being. Using data from the 1980 US Census Five-Percent Public Use Micro Sample, 2SLS results demonstrate that parents facing a change in family size reallocate resources in a way consistent with Becker's *Quantity & Quality* model. A larger family generated by a twin on a later birth reduces the likelihood that older children attend private school, reduces the mother's labor force participation, and increases the likelihood that parents divorce. The impact of family size on measures of child well being, such as educational attainment is less clear. The results indicate that for both measures of child investment and child well being, the 2SLS estimates are statistically distinguishable from OLS estimates indicating an omitted variables bias in the single equation model.

1 Introduction

The relationship between family size and children's outcomes is conventionally addressed in what is known as the "Quantity-Quality" model (QQ) (Becker, 1960; Becker and Lewis, 1973; Becker and Tomes, 1976). Becker's QQ model is a model of investment where households decide the level of resources allocated per child (quality). The model assumes these investments lead to higher levels of child quality but the direct implication of the model is a trade–off between child investment and number of children in the family.

In the empirical literature, however, the negative influence of family size on child outcomes has been often studied but the direct influence on investments in children has received little attention. Often scholastic achievements (Rosenzweig and Wolpin, 1980a; Blake, 1981; Hauser and Sewell, 1986; Hanushek, 1992; Hill and O' Neill, 1994; Black, Devereux and Salvanes, 2005; Conley and Glauber, 2005) or cognitive development (Belmont and Morolla, 1973; Wolfe, 1982) are used as measures of child quality. In general, these studies find that children from larger families have lower academic performance than children from smaller families. A second line of research has used labor outcomes, such as wages or labor force participation as measures of quality (Duncan, 1968; Wachtel, 1975; Brittain, 1977; Olneck and Bills, 1979; Kessler, 1991). The main assumption behind these studies is that child quality is directly linked to future labor market success. Therefore, children from households with more siblings would be more likely to have lower wages and lower labor force participation. These studies find little evidence of an impact of family size on wages or labor force participation.

A more direct test of the QQ model would be to examine whether the inputs are determined by exogenous shocks to family size. Focusing on inputs is a more powerful test than using outcomes since inputs are one step closer to assessing the effects of family size in the causal chain, and reducing the chance of Type II errors. Outcomes such as educational attainments or future labor market outcomes are produced with many inputs, home production being one. In fact, the introduction of home production and therefore the division of time between home and market activities introduces an additional ambiguity to the overall impact of family size; parents facing an exogenous increase in family size may reduce market based investment in children while at the same time increasing home based investment. To some degree this substitution may offset some of the lower levels of market based investment that come from resource constraints that parents with larger families face[1].

Distinction between inputs and outputs may explain to some degree differences among studies that have used similar measures of quality and source of variation in family size. Rosenzweig and Wolpin (1980a) and Black, Devereux and Salvanes (2005) both examine educational outcomes and use a similar identification strategy, but come to different conclusions on the trade–off between the number of children and educational attainments. While Rosenzweig and Wolpin find that family size has a negative impact on education, Black et al. find no impact. The major differences in these papers is that Rosenzweig and Wolpin use data from a developing country, India, while Black et al. use data from a developed county, Norway. One potential way that these disparate results may be reconciled within the QQ framework is recognizing that the potential for substituting market investment for home investment in children may differ considerably across countries at differing stages of development. When a family in an underdeveloped country, like India, is pushed towards subsistence, substitution out of food to protect child education in the face of a large family size may not be feasible. On the other hand in a developed country, like Norway, families have more ways to reallocate resources to protect child quality. This higher degree of freedom among different types of investments make the link between a change in family size and child wellbeing less clear.

[1]Different channels through which quantity might act on child wellbeing can be proposed, making the over all impact of family size on child welfare even more ambiguous. For example, Zanjonc (1976) formalizes an alternative relationship. Family size does not matter per se but rather the predominant interaction within family's members.

This paper advances the literature in four ways. First, I make explicit the distinction between variables that measure child investments from those that measure child outcomes such as the traditionally used measures of educational outcomes. While educational outcomes can be easily linked to child wellbeing, they do not necessarily reflect the allocation of resources by parents or other household members. Second, by using data from the 1980 US Census 5-percent Public Use Micro Samples, I increase the evidence about a shock in family size on these two types of outcomes for a developed country where the link between investment and well-being should be weaker. Black et al. and Conley and Glauber use data for Norway and USA and focus on educational outcomes. Following Rosenzweig and Wolpin (1980a,1980b), I use multiple births as source of variation in family size to measure impacts on child investments and child outcomes. In particular, and similar to Black et al., I make use of an event of multiple births on the second or higher birth order as an exogenous shock to family size. Third, the results of the paper show that parents who have experienced an exogenous change in family size re-allocate resources consistent with Becker's QQ model. An additional younger sibling reduces the likelihood that older siblings attend a private school, reduces their mother's labor force participation, and increases the likelihood that their parent's divorce. In contrast to the results linking family size to investments, I find little evidence that an exogenous change in family size effects educational achievement such as highest grade completed and grade retention. This suggests that while larger families induce parents to rearrange child inputs, parents do this in a way that may not affect child outcomes. Fourth, I do find evidence that single equation estimates of the quantity/quality trade–off in both the child investments and child well being models are subject to omitted variable bias. In nearly all cases, the 2SLS estimates of the impact of family size on child investments and outcomes are statistically distinguishable from their OLS counterparts.

The paper is organized as follows. Section 2 explains the empirical methodology used to address the problem of identification, and describes how the variables and samples have been constructed providing a descriptive analysis. Section 3 presents the results and section 4, the conclusions.

2 Data and Empirical Methodology

The primary data for this paper is the 1980 Census Five-Percent Public Use Micro Sample (PUMS). The following bivariate regression model represents a simpler version of the causal relationship I want to estimate, $y_i = \alpha + \gamma n_i + \varepsilon_i, \quad i = 1, \ldots, T$, where y_i represents a measure of child investment (inputs into the production of child quality) or a measure of child wellbeing, n_i represents family size, i indexes observation, and for simplicity in the exposition other covariates are left implicit.

It is difficult to define and measure what is meant by child quality, y_i, a subjective concept, and one that is multidimensional. Likewise, there are numerous types of investments or expenditures that parents make on children in hopes of improving their chances of success in education, the job market, the marriage market, etc. The distinction between inputs and outcomes is essential for my analysis and as a result, I estimate models with two different sets of outcomes. The first group are variables that I associate with child investment (inputs for child quality). These variables reflect allocation of resources to children. The second group are variables that I associate with child wellbeing (outputs of child quality), and they are not necessarily able to capture changes in allocation of resources by household members, because for example other factors like ability play an important role.

I define four measures of inputs to child quality. While their relationship with child wellbeing is not always clear, these measures are under the control of the parents and reflect allocation of resources to children. The first variable, "Attends Private School," is a dummy variable that takes a value equal to one if a child between 6 and 18 years of age attends a private institution or church related school, and zero otherwise. Numerous authors have demonstrated that educational outcomes are better for students that attend private school[2]. Although there is some question about whether this impact is causation or correlation, there is no question that parents who enroll their children in private schools are the ones with higher income.

The second and third measures of investment are the mother's labor force participation and weekly usual hours of work. As was mentioned above, the impact of mother's labor force participation on child wellbeing is ambiguous. Working mothers may spend less time with their children but have more income that could be allocated to child investment. Independent of this ambiguity an important aspect of these two variables is the information provided about the substitution from market goods to home production.

The fourth measure of child investment is the dummy variable "Divorce" that takes a value one if the child's mother is currently divorced, separated or is in their second or higher marriage, and zero otherwise[3]. To ensure that I capture the impact of increasing family size on family structure I restrict the sample to children that were born while their parents were married.

Because of data limitations in the Census PUMS, there are only two variables that measure child wellbeing. The first is the "Highest Grade" which is the highest grade completed for those currently not enrolled in school or the current grade for those currently in school. This outcome is defined for all children between six and eighteen years old. The second output variable "Behind" is a dummy variable that equals one if the child's highest completed grade is lower than the mode of highest grade completed by age in years, quarter of birth and state, and zero otherwise[4]. "Behind" identifies whether children are progressing in school with their cohort and is a measure of educational

[2]For example, see Evans and Schwab, 1995.

[3]Empirical evidence has long shown that children of divorced parents have lower achievement than children from intact families. See Manski et al. (1992), McLanahan and Sandefur (1994), Haveman and Wolfe (1995) and Ginther and Pollak (2003) among others.

[4]The idea of using as reference the mode by age and state, is to capture the heterogeneity in the rules about when a child can start school. These rules differ among states and they are usually a function of the quarter of birth of the child.

attainment. Children who repeat a grade are often at risk of dropping out of high school.

The number of children in a family, n_i, is defined as the number of children younger than eighteen years old that have the same non step mother. This number of children in the home can be lower than the number of children ever born since I do not observe older siblings who are no longer living at home. In order to mitigate this problem, for those children with mother older than 30 years, I restrict the sample to children living in families where the number of children ever born is equal to the total number of children in the home. I also delete families where it is not possible to identify the biological mother in the household. This restriction avoids the problem that blended families may have two children with the same age and quarter of birth that "look" like twins in the data but have different mothers.

The impact of family size on the different outcomes is measured by γ. The intuition of Becker's Quality and Quantity model suggests that OLS estimates of this equation may be subject to an omitted variable bias since the $cov(n_i, \varepsilon_i)$ is not zero[5]. Following Rosenzweig and Wolpin (1980a, 1980b), I use multiple births as source of variation in family size. Specifically I use the event of multiple births on the second or higher birth as an exogenous change in family size. Women who experience a multiple birth have some ability to adjust their subsequent fertility. For example, a mother that would like four children may simply quit having children if on her third birth she delivers twins. Given the limited size of most families in the US, however, multiple births will shift the number of children for most families. Therefore multiple births would not only provide a shift in the number of children in the family but also should be orthogonal to the child quality preferences[6].

[5]For the simplest bivariate case where child quality depends only on family size, we may expect that OLS over–estimates the trade–off. Families that have more children are not only families that face a higher shadow price for child quality but are also families with a higher relative preference for family size over child quality. Simultaneously, families with fewer children are the ones with a lower price for child quality but are also the ones with a higher preference for child quality reinforcing the impact on child quality where this last impact is captured by ε. However, for a more general case where child quality depends not only on family size more assumptions are required to sign the bias.

[6]There are two types of twins, the most common of the multiple pregnancy: identical (*monozygotic*) and fraternal (non–identical, *dizygotic*). Identical twins have the same genetic makeup and its incidence is equal in all races, ages

Following Bronars and Grogger (1994) and Angrist and Evans (1998), I identify multiple births by exploiting the fact that the 1980 census reports age in years as of April 1, 1980 (the first day of the second quarter) plus the quarter of birth. If two or more children in the household have the same age, quarter of birth and non step mother, I assume that these children are twins. Since multiple births are rare, I need a large sample in order to have adequate statistical power which is provided by the 5% census sample. Using the algorithm outlined above, I classify 1.8% of these children as multiple births of which 1.77% are twins (Table 1)[7].

However, the way that I use multiple births limits the sample I use in the analysis. I restrict attention to the oldest child in the household who is not a multiple birth child but has at least one younger sibling. These children are all from families that planned on having a second child, but may not have banked on having a third. More importantly, by focusing our attention on the oldest child, we examine children affected by multiple births through family size rather than through others factors directly related to being part of a multiple birth. For example, among twins and higher order multiple birth children, i.e. triplets, quadruplets, etc., rates of low birth weight and infant mortality are 4 to 33 times higher compared to singleton births. Moreover, twins and other higher order multiple births are more likely to suffer life–long disabilities when they survive (National Vital Statistics Report, 1999). Therefore, the sample is restricted to oldest siblings in the household that are not from a multiple birth since being part of a multiple birth or being a younger sibling of twins or other higher order multiple birth is conditional on the occurrence of

groups and countries (3.5 per 1000 births). The occurrence of fraternal twins, unlike identical twins, varies and there are several risk factors that may contribute. First, the incidence is higher among the Afro–American population. Second, non–identical twin women give birth to twins at rate of 1 set per 60 births, which is higher than the rate of 1 of every 90 births, at the national level. Fourth, women between 35 to 40 years of age with four or more children are three times more likely to have twins than a woman under 20 without children. Finally, multiple births are more common among women who utilize fertility medication. Given the period under analysis(where fertility drugs are not an issue), the most concerning of these factors, in our case, is the hereditary factors for which I cannot control (American Society for Reproductive Medicine, 2004). However, there is not priori information that women are acting differently based in this hereditary information or that hereditary factors are associated to a particular group of the population.

[7] These percentages are quite close to numbers reported by the National Vital Statistical Service (NVSS) showing that 1.95% of births over the 1962 to 1968 period were twins and 1.86% of births for the period 1971 to 1979.

multiple births in the household (post-treatment).

Despite the fact that the orthogonality assumption is non-testable, the random nature of multiple births, the choice of the observational unit under analysis (oldest child in the household that does not belong to a multiple birth), the selection of the 1980 US Census as data set[8], the inclusion of other variables that are correlated with the incidence of multiple births such as age of the mother, race and parents' education (Table 2), as well as the analysis of the impact of twining in a specific birth make it more likely that this assumption holds.

To study potential heterogeneity in the impact of the number of children, I construct two sub-samples: oldest children with one or more siblings and oldest children with two or more siblings[9]. For the first of these sub-samples the instrument is defined as mb_i_2, and takes a value equal to one if the second birth in the family is a multiple birth and zero otherwise. For the sub-sample of children who belong to families with three or more children, the instrument is defined as mb_i_3, and takes a value equal to one if the third pregnancy in the household is a multiple birth and zero otherwise.

Tables 3 presents the descriptive statistics for the different samples and variables used in the analysis. For the variables used as inputs to child quality I find that when the sample is restricted

[8]Heckman (1997) calls attention to the role of the heterogeneity and the sensitivity of IV to assumptions about how individuals internalize this heterogeneity in their decisions of being part of the treated group (i.e. the selection of family size). Imbens and Angrist (1994) have shown that IV estimates can be interpreted as "Local Average Treatment Effects" (LATE) in a setting with heterogeneity in the impacts and with individuals that act recognizing this heterogeneity. Although multiple births can be considered as a random event, it has been shown that the use of fertility drugs increases the likelihood of this event. Additionally, it can be argued that the use of fertility drugs could be associated with households with a higher preference for children and their quality. Under this last assumption, the LATE estimate associated with multiple births would be measuring the average impact for this specific group of households rather than the impact of family size for a more representative group of households. In fact there is a broad acknowledgement that the rate of multiple births has increased in the last two decades, which has been attributed jointly to a higher use of fertility drugs and a change in the timing of the first birth. A closer look at the evolution of the twin ratio (total twin births over total number of births, per 1000), reveals that the explosive increase in multiple births did not begin before 1985 (Martin and Park, 1999). Therefore, since we are working with children that were younger than eighteen years old in 1980, i.e. born between 1962 and 1980, it seems reasonable to rule out that multiple births were mainly associated with households that had been using fertility drugs and therefore with a greater preference for children quality.

[9]Specifically the samples are defined in terms of numbers of births. The definition with number of children makes no difference for the sample of families with two or more children, since it does not include twins at first birth, but it changes slightly the composition of the sample of households with three or more children.

to larger family sizes there is a reduction in the proportion of students attending private or church related schools (15.1% to 12.7%)[10], and lower maternal labor force participation (52% to 47%). Nevertheless, it does not appear that constraining the sample to bigger family size affects the "*probability*" of divorce. We also observe that there is a slightly increase in highest grade completed when we constraint the sample to bigger family size. This last observation is explained for the fact that oldest child in bigger families are older than the ones in families with fewer siblings.

3 Results

Table 4 presents the first stage regression of the number of children on multiple births with and without covariates. The top half of the table provides the results for the full sample of children (two or more children), while the bottom half reports the results for families with three or more children. The point estimates for the impact of multiple births in the second pregnancy (mb_2) are between 0.76 and 0.93 depending on samples. The impacts of multiple births in the third pregnancy (mb_3) are slightly higher, but not statistically different than the impacts of multiple births in the second pregnancy. For both mb_2 and mb_3 the t-statistics are over 40. Children that belong to families with multiple births either in the second or third pregnancy have on average almost one sibling more than other children.

The finding that multiple births in the third pregnancy have a slightly larger impact on family size than in the second pregnancy is likely related to the fact that the sample of households with two or more children include *some* households whose desired family size is not being affected by multiple births. For these households multiple births in the second birth affect only the timing of the third or fourth child. However, when the sample is restricted to households with three or more children, the

[10] These proportions are similar to the 13% nationwide enrollment in private institutions for the year 1980 in grades k-12 (*Digest of Education Statistics*).

likelihood that multiple births are changing family size is higher. Rosenzweig and Wolpin (1980b), and Bronars and Grogger (1994) find that the impact of multiple births disappears as the sample is constrained to older mothers. Unlike these previous studies that used twining in the first pregnancy, in our analysis the impact of multiple births is limited to the second and third pregnancy, where multiple births are more likely to affect family size.

Tables 5 presents OLS and 2SLS estimates of the impact of the number of children on the four variables that I characterize as inputs and on the two variables that I define as measures of wellbeing. In general OLS support the conventional wisdom that more siblings in a family have a negative impact on educational outcomes. For the "Highest Completed Grade" and for the dummy variable "Behind", OLS estimates reveal a 0.3 to 0.5 percentage points reduction in the highest completed grade and an increase of 1.2 to 1.9 percentage points in the probability of having a grade lower than the mode by age and state. For the group of outcomes that I consider closer to investment measures, however, OLS results are less intuitive. On the one hand, the results for maternal labor force participation and hours at work are consistent with previous studies that have detected a statistically significant and negative impact of childbearing on these outcomes. On the other hand, however, the OLS estimate for the number of children variable in the "Private School" equation shows that, contrary to the prediction of the QQ model, the number of children has a positive impact on the probability of attending private school by approximately 1 to 2 percentage point, and OLS estimates for divorce suggest that more children reduce the probability of getting divorced by approximately 2 percentage points for the sample of households with two or more children and by 1.6 percentage points for the sample of households with three or more children.

Using multiple births as source of variation, the findings reveal the lower power that we face when testing the QQ model based on investment outcomes rather direct measures of investment. The 2SLS estimates do not show any statistically significant impact of number of children on the

"Highest Completed Grade" and on the dummy variable "Behind" in any of the samples. On the other hand, the group of variables that I relate to child investment, shows results consistent with Becker's model. First, the estimates for outcomes related to mother's employment confirm a negative and statistically significant impact of family size but lower than OLS estimates. Second, using multiple births as a source of variation, the results for the probability of attending a "Private School" or of "Divorce" reveal a completely different impact of family size than the OLS analysis reveals. An exogenous increase in the number of children generated by a multiple birth reduces the probability of attending a private school by approximately 1.3 percentage point for children that live in families with two or more children. Therefore, treating family size as an exogenous as the OLS analysis does produces an inconsistent estimate and faulty inference. The positive coefficient on the number of children in the OLS model may be due to the fact that many private schools are religious schools, and more religious families are both more likely to have larger families and enroll their children in these private schools.

When I use multiple births as a source of variation in family size I find that an additional child increases the probability of divorce by statistically precise 1.8 percentage points in the sample of households with two or more children. Differences with OLS estimates might come from the fact that more stable families are the ones that choose to have more children or in other words, in order to have more children couples need more time together. This finding, and given previous evidence that shows that children with divorced parents have lower achievements than children that live in traditional nuclear families, suggest that probably one of the channels through which family size is impacting child wellbeing may be through family structure[11].

[11] Brown and Flinn (2002) propose an alternative channel. An increase in family size makes it more likely of getting divorced because the lower investment in child quality reduces the cost of splitting up. The reduction in the cost comes from the reduction in utility that parents perceive at the moment of getting divorced since they spend less time with the children. Then they would perceive less consumption of child's quality that is an argument in the utility function simultaneously because of the higher probability of divorce, parents will have a weaker incentive to invest in their children.

Moreover, the Durbin–Wu–Hausman test[12] shows that 2SLS estimates for family size impact on almost all outcomes and samples are statistically different from the OLS estimates.

In order to analyze the robustness of the previous results and to study potential differences in treatment associated with multiple births[13], I divide the sample by mother's age: 32 years old or younger and older than 32 years. Table 6 presents the results for the sample of children with "*younger mothers*" (32 years old or younger) for whom the desired family size not necessarily has been reached, and the results for the sample of children with "*older mothers*" for whom it is more likely that the desired family size has been reached. This analysis shows that in qualitative terms our previous results are robust to division by mother's age and what is important is that these results are not just driven by the sample of families with younger mothers for whom it is more likely that multiple births are just changing timing of children.

4 Conclusion

This paper, using US census data shows that families allocate resources in a way consistent with Becker's QQ model. An exogenous increase in family size makes that parents rearrange child investment (quality) in the household. When we go one step further in the causal chain, however, the results do not support a negative impact of number of children in the family on the group of variables that I think are closer to child wellbeing such as educational attainments. These

[12]In a framework with heterogeneity in the impact of family size the interpretation of the Durbin–Wu–Hausman test is not straightforward. OLS and 2SLS estimates would measure a potential *trade–off* between family size and child investment in different parts of the distribution (Heckman and Vytlacil, 2001).

[13]We do not observe the desired family size but instead, the current number of children that a family has at the time of the census. While multiple births are likely to increase family size for women who experience a twin birth later in life, multiple births earlier in a woman's life might only affect the timing of their third (fourth) child for the sample of households with two (three) or more children. Even if I constrain the sample to households for whom multiple births affect family size I will not be able to avoid the double treatment (increment in number of children and reducing the timing), but at least I ensure that the results are not driven only by changes in timing. I already showed that the event of multiple births affects family size not only for *older mothers* but also for *younger mothers*. Nevertheless, the shift in family size may have a different impact in the short run, when the desired family size has not been reached, to the one that would have in the long run when it has been reached or is close to be reached

results are consistent with models of household production where families facing an exogenous change in family size reallocate different types of child investment in order to minimize the impact on child wellbeing. In fact, previous evidence that has found a negative impact of family size on child achievements, mainly in developing countries, can be explained by a lower capacity of some households in reallocating resources. Thus it is reasonable to think that a trade–off between number of children and different types of investments as a reality that all household face but a trade–off between family size and child wellbeing is restricted to those households that have fewer degrees of freedom to reallocate resources. Under this evidence, family planning programs that focus the attention only on reducing family size would not necessarily produce an improvement in the child achievements (wellbeing) if other factors that limit the ability of the household members to reallocate resources are not solved. Nevertheless defining these potential factors that limit the ability of families to minimize a potential negative impact on child wellbeing is the tougher one.

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Table 1: Multiple Births Frequency.

Type of birth in the population	Frequency	%
Singletons	2,678,550	98.20
Twins	48,266	1.77
Triples	705	0.03
Quadruples	12	0.00
Quintuples	10	0.00
Total	2,727,543	100.00

Table 2: Means differences between children that do not have twin siblings and whom do it.

	2+			3+		
	$\overline{X}(mb_2=0)$	$\overline{X}(mb_2=1)$	$\overline{X}(mb_2=0)-\overline{X}(mb_2=1)$	$\overline{X}(mb_3=0)$	$\overline{X}(mb_3=1)$	$\overline{X}(mb_3=0)-\overline{X}(mb_3=1)$
Age	10.238	10.180	0.058	12.111	12.133	-0.022
			[0.063]			[0.086]
Mother's Age	32.887	33.296	-0.409 **	34.038	34.104	-0.065
			[0.078]			[0.112]
Mother's years of education	12.435	12.535	-0.100 **	12.067	12.001	0.066
			[0.033]			[0.054]
Number of Siblings	2.536	3.354	-0.818 **	3.417	4.291	-0.874**
			[0.011]			[0.017]
White	0.828	0.815	0.014 **	0.792	0.747	0.045**
			[0.005]			[0.009]
Black	0.068	0.091	-0.022 **	0.082	0.117	-0.035**
			[0.003]			[0.006]
Asian	0.019	0.013	0.006 **	0.019	0.015	0.004
			[0.002]			[0.003]
Hispanic	0.077	0.072	0.005	0.098	0.111	-0.013 *
			[0.004]			[0.006]

Standard errors in brackets; * significant at 5%; ** significant at 1%

2+ and 3+ stand for the samples of children living in families with two and three or more children, respectively.

$\overline{X}(s)$: sample mean for the subset s.

Table 3: Descriptive Statistics: Oldest Children that do not belong to a Multiple Birth.

		All Mothers		Younger Mothers <= 32		Older Mothers > 32	
	All	2+	3+	2+	3+	2+	3+
Age	8.464	10.237	12.111	7.072	8.734	13.143	14.16
	[5.332]	[4.596]	[3.992]	[3.300]	[3.021]	[3.589]	[2.992]
Mother's Age	31.791	32.891	34.039	28.216	28.91	37.183	37.152
	[6.541]	[5.696]	[5.171]	[3.111]	[2.755]	[3.854]	[3.564]
Mother's Years of Education	12.513	12.436	12.066	12.071	11.544	12.771	12.383
	[2.424]	[2.423]	[2.491]	[2.216]	[2.303]	[2.552]	[2.547]
Number of Children	2.015	2.544	3.425	2.397	3.319	2.678	3.49
	[1.002]	[0.843]	[0.779]	[0.704]	[0.657]	[0.933]	[0.838]
White	0.825	0.828	0.792	0.812	0.754	0.843	0.815
Black	0.073	0.069	0.083	0.076	0.099	0.062	0.073
Asian	0.019	0.019	0.019	0.014	0.014	0.023	0.022
Hispanic	0.076	0.077	0.098	0.091	0.123	0.065	0.083
Mult. Births 2nd Pregnacy	0.006	0.009	0.023	0.008	0.028	0.009	0.021
Mult. Births 3rd Pregnacy	0.002	0.004	0.009	0.003	0.009	0.004	0.009
Mult. Births	0.009	0.014	0.037	0.012	0.04	0.016	0.035
Highest Completed Grade	7.143	7.216	7.557	6.103	6.162	7.895	8.276
	[1.765]	[1.798]	[1.921]	[0.453]	[0.569]	[1.965]	[1.976]
Behind Cohort	0.052	0.068	0.108	0.013	0.03	0.118	0.155
Mother's LFP	0.543	0.516	0.471	0.452	0.38	0.575	0.526
Mother's Hours at work	16.232	15.171	13.486	12.864	10.374	17.3	15.382
	[18.440]	[18.098]	[17.625]	[17.557]	[16.523]	[18.328]	[18.002]
Private School	0.174	0.151	0.127	0.168	0.12	0.137	0.131
Parents divorced	0.233	0.212	0.216	0.217	0.239	0.207	0.202
N. Obs.	935389	655970	239363	340010	98522	315960	140841

Standard deviations between brackets. The standard deviations for proportion is not presented.
2+ and 3+ stand for the samples of children living in families with two and three
or more children, respectively.

Table 4: Impact of Multiple Births on Number of Children at Home.

			Younger Mothers <= 32		Older Mothers > 32	
	(1) Uncond.	(2) Cond. (a)	(3) Uncond.	(4) Cond. (a)	(5) Uncond.	(6) Cond. (a)
2+						
mb_2	0.829**	0.835**	0.885**	0.888**	0.760**	0.788**
	[0.009]	[0.009]	[0.012]	[0.012]	[0.014]	[0.014]
N. of Obs.	655970	655970	340010	340010	315960	315960
R2	0.01	0.16	0.01	0.14	0.01	0.13
3+						
mb_3	0.873**	0.864**	0.922**	0.911**	0.839**	0.831**
	[0.014]	[0.014]	[0.021]	[0.021]	[0.019]	[0.018]
N. of Obs.	239363	239363	98522	98522	140841	140841
R2	0.01	0.11	0.02	0.11	0.01	0.1

Robust standard errors in brackets; + significant at 10%; * significant at 5%; ** significant at 1%.
(a) Covariates in the model are dummies by age (measured in quarters), state,
education of the parents, race, mothers age and sex.
2+ and 3+ stand for the samples of children living in families with two and three
or more children, respectively.

Table 5: OLS and 2SLS Estimates of Child Input and Output Equations. Parameters Estimates [Standard Errors] and {Hausman Test Statistic}.

	2+				3+				
	S. Mean	OLS	IV		S. Mean	OLS	IV	IV (a)	
Highest Completed Grade	7.22	-0.021**	-0.002	{5.7}	7.56	-0.036**	0.001	0.002	{8.5}
		[0.001]	[0.008]			[0.002]	[0.013]	[0.008]	
Behind Cohort	0.07	0.012**	0.005	{4.1}	0.11	0.019**	0.009	0.005	{2.1}
		[0.001]	[0.004]			[0.001]	[0.007]	[0.005]	
Mother's LFP	0.52	-0.099**	-0.048**	{43.2}	0.47	-0.081**	-0.048**	-0.048**	{7.6}
		[0.001]	[0.008]			[0.001]	[0.012]	[0.008]	
Mother's Hours at work	15.17	-3.217**	-1.752**	{29.1}	13.49	-2.564**	-1.311**	-1.428**	{7.8}
		[0.026]	[0.257]			[0.042]	[0.388]	[0.284]	
Private School	0.15	0.012**	-0.013*	{20.5}	0.13	0.017**	0.002	-0.005	{3.6}
		[0.001]	[0.005]			[0.001]	[0.008]	[0.006]	
Parents divorced	0.21	-0.024**	0.018**	{38.2}	0.22	-0.016**	0.014	0.013+	{8.1}
		[0.001]	[0.007]			[0.001]	[0.010]	[0.007]	

Robust standard errors in brackets; + significant at 10%; * significant at 5%; ** significant at 1%.

The Hausman test statistic is for the null hypothesis that OLS and 2SLS are identical. The test is distributed as chi-square with one degree of freedom and 95% critical value of 3.84. Others covariates in the model are dummies by age (measured in quarters), state of residence, education of the parents, race, parents age and sex.

(a) The sample includes all older siblings previous a multiple birth.

2+ and 3+ stand for the samples of children living in families with two and three or more children, respectively.

Table 6: OLS and 2SLS Estimates of Child Input and Output Equations. Heterogeneity by Mother's Age.

	Younger Mothers (<= 32)				Older Mothers (> 32)			
	2+		3+		2+		3+	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Highest Completed Grade	-0.018**	-0.003	-0.026**	-0.004	-0.027**	0.000	-0.039**	0.001
	[0.001]	[0.009]	[0.003]	[0.016]	[0.001]	[0.012]	[0.002]	[0.018]
Behind Cohort	0.009**	0.001	0.015**	0.008	0.015**	0.009	0.020**	0.01
	[0.001]	[0.003]	[0.001]	[0.008]	[0.001]	[0.007]	[0.001]	[0.011]
Mother's LFP	-0.126**	-0.074**	-0.090**	-0.069**	-0.087**	-0.024*	-0.078**	-0.037*
	[0.001]	[0.011]	[0.002]	[0.018]	[0.001]	[0.011]	[0.002]	[0.016]
Mother's Hours at work	-3.328**	-2.292**	-2.246**	-1.604**	-3.304**	-1.112**	-2.728**	-1.135*
	[0.038]	[0.314]	[0.065]	[0.504]	[0.035]	[0.410]	[0.054]	[0.564]
Private School	0.005**	-0.002	0.011**	0.026*	0.017**	-0.023**	0.019**	-0.015
	[0.001]	[0.008]	[0.001]	[0.012]	[0.001]	[0.008]	[0.001]	[0.011]
Parents divorced	-0.029**	0.012	-0.019**	0.022	-0.022**	0.023*	-0.016**	0.009
	[0.001]	[0.009]	[0.002]	[0.017]	[0.001]	[0.009]	[0.001]	[0.013]

Robust standard errors in brackets; + significant at 10%; * significant at 5%; ** significant at 1%.

Parameters Estimates [Standard Errors] and {Hausman Test Statistic}

The Hausman test statistic is for the null hypothesis that OLS and 2SLS are identical. The test is distributed as chi-square with one degree of freedom and 95% critical value of 3.84. Others covariates in the model are dummies by age (measured in quarters), state of residence, education of the parents, race, parents age and sex.

2+ and 3+ stand for the samples of children living in families with two and three or more children, respectively.