

**Title:**Month of Birth and Birth Order effects or bad parental strategies?

**Authors:** Mar C Espadafor & Fabrizio Bernardi

## **Extended abstract**

### **1. Introduction**

There is an extensive literature that studies the impact of family composition on children's educational outcomes. The common finding is that there is a negative association between birth order and children's educational outcomes (Booth and Kee 2009; de Haan 2010; Härkönen 2014). These findings are derived from the so called resource dilution hypothesis. The underlying assumption is that there is a trade-off between quantity and quality and thus, siblings are unlikely to receive equal shares of parental resources (Becker and Lewis 1973; Becker and Tomes 1976). Hence, first-born siblings seem to be at an advantage since they receive greater shares of the family's educational resources both in terms of money (Black, Devereux, and Salvanes 2005; de Haan 2010; Mechoulan and Wolff 2015) and quality time (Monfardini and See 2012; Price 2008). Furthermore, negative influences of birth order seem to be concentrated in socioeconomically disadvantage families (Grätz 2018). Similarly, the confluence model explains the development of intellect by taking into account: family size, birth order and age spacing. It assumes a decrease in the family intellectual environment with increases in family size (Zajonc and Markus 1975). In these sense, first-born advantage is due to them having a better intellectual development since they share a family intellectual environment only with parents. Many of the efforts from this literature have focused on effectively disentangling the true causal effect of birth order from family size, thus accounting for sibling differences in educational outcomes (Zajonc and Markus 1975). In this paper, we investigate whether the month of birth of

second and third born children partially explain the observed negative birth order effect.

There is a large literature that has shown that in those countries with a strict cut-off age of entry in school, those born just before the age limit cut-off date, tend to have lower grades and perform worst in tests when compared to those born just after the cut-off (Bernardi and Boado 2014; Bernardi and Gratz 2015). This cut-off date creates a discontinuity in children's probability to be either relatively old or young around the cut-off date. Children born just after the cut-off date are older among their peers, while children who were born just before the cut-off date are up to a year younger than their peers are.

We further argue that, whereas the birth month of first-borns is at random, following births are not. Precisely, families might develop strategies on children spacing in order to reduce the school years difference between children. Our theory is that these strategies result in second-born children's birth month being disproportionately before the cut-off date for admission. This is because parents might plan the conception of the second child to reduce the gap in school years between siblings.

In this paper, we then investigate a) whether second and third born children are more likely to be born in the months before the cut-off age limit for admission to school b) whether the negative effect of an early school entry age mediates part of the effect of birth order on educational outcomes.

## **2. Data and variables**

To investigate this, we use a novel dataset from the Spanish Labour Force (SLF) survey. The dataset compiles all waves of the SLF survey from year 2014 to the first

two quarters of 2019. This survey is at the household level and includes information for all family members. This is especially useful since we are able to account for both across and within family differences. For all family members above age 16 also we have information on education and labour market outcomes as well as other individual characteristics. For the first sets of analysis, we are able to identify 722,335 sets of siblings. For the second analysis, we restrict our sample of siblings to respondents who are older than 15 years old (N=296,259). We measure educational outcomes by finishing on time i.e., not being retained, in a given educational level.

The number of siblings by household is given by the absolute number of a child's siblings. Birth order is a continuous variable which ranks siblings by sibling's sets and birth spacing is measured by age differences between pairs of siblings within households.

We use two separate indicators of family socioeconomic background. First, parental education is measured by the highest degree obtained by the mother or the father. Similarly, parental class is measured by the highest-class position (EGP class schema) obtained by the mother or the father. Moreover, we include other family characteristics: family structure and size, age and marital status of the parents, age at birth of the mother for each sibling, migration background.

Our empirical strategy relies on an exogenous administrative rule. In Spain, school entry is determined by a cut-off date. All children born between January 1<sup>st</sup> and December 31<sup>st</sup> of a given year start school at the same time. This cut-off date creates a discontinuity in children's probability to be either relatively old or young around the cut-off date. Basically, children born just after the cut-off date are older among their peers, while children who were born just before the cut-off date are up

to a year younger than their peers. For the Spanish case compliance with age at school-entry is perfect since care-givers cannot choose to advance or delay school entry. Moreover, despite the fact that school-entry starts to be mandatory when children turn 6 during the academic year (first year of primary education), attendance to pre-school (age 3-5) is around 92% reaching a 100% in regions such as Balearic Islands, Cataluña, Navarra, Basque Country and La Rioja (cite). Hence, the decision of early or delayed entry is not influenced by any factors that might be also correlated by child's characteristics.

The identification assumption is thus that being born just before or just after the cut-off date can be considered to be at random, i.e., independent of family characteristics. The timing of birth is uncorrelated with family characteristics that might influence children's educational outcomes. Table 1 bellow suggest that indeed, third and fourth-born children are disproportionally born in the latest month of the year.

Table 1: Distribution by birth month and birth order.

Birth Month	Birth order				Total
	1	2	3	4	
1	57670	27431	4691	797	90589
2	50133	25062	3868	660	79723
3	55407	27868	4381	609	88265
4	53881	27533	4539	650	86603
5	56807	29033	4524	812	91176
6	54310	27308	4142	584	86344
7	58089	27740	4574	859	91262
8	55831	26810	4850	840	88331
9	57008	27549	5002	762	90321
10	57273	27656	4931	761	90621
11	54131	27010	4521	841	86503
12	55220	26802	4720	714	87456
Total	665760	327802	54743	8889	1057194

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