Siblings' Fertility Peer Effects:

An Extended Family Causal Estimate

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Introduction

Individuals' fertility decisions are shaped by their own characteristics, their peers, and their family of origin. Not only is fertility intergenerationally correlated, but there is also increasing evidence that it spreads through social ties (Balbo and Mills 2011). However, there is an endogeneity issue to address. Building on studies that have deployed offspring sex composition as a source of exogenous variation in fertility (among others, Angrist and Evans 1998; Conley and Glauber 2006; Cools and Hart 2017), this work extends this approach to the extended, multigenerational family. In particular, I use the grandchildren sex-mix as exogenous variation to study siblings' peer effects for the middle generation. Indeed, preferences for sex-mix remain (Andersson et al. 2006), but the widespread two-child norm might render the extended family the relevant domain for it, thanks to the grandparents' social pressure and support. Using data from the PSID, I expect to find positive siblings peer effects, especially for first births to parents who have at least two nephews or nieces (but not nephews and nieces) and whose parents are still living.

Background and Motivation

The timing of fertility is now in the realm of choice and not chance, and family support may be often crucial for dual-earning couples to mitigate economic uncertainty around the time of childbearing in low fertility societies (Kohler et al. 2002). This occurs primarily within extended families, as the family network influences the formation of fertility intentions (Bernardi 2003) and their realization (Balbo and Mills 2011). Crucially, the family of origin, including parental preferences and siblings' behavior, influences family size preferences (Axinn et al. 1994).

Previous studies address how fertility of members of relevant peer groups such as siblings (Kuziemko 2006; Lyngstad and Prskawetz 2010), co-workers (Hensvik and Nilsson 2010), and friends (Balbo and Barban 2014) influence individual fertility. Lois and Arránz Becker (2013) report three mechanisms to explain through which channels peer fertility behavior influences individual fertility. First, *social learning* occurs when the observation of people who are exhibiting a certain behavior lead to its acquisition. This mechanism is especially prominent for first time parents, as they do not have their own parenting experience as benchmark. Second, peers exercise *social pressure*, which could be seen as a normative "social clock" with explicit or implicit expectations (Bernardi 2003). Third, there are different *social opportunity costs* associated with parenthood. These mechanisms are especially salient for siblings who often remain in contact throughout the life course, exchanging information directly as well as through their parents (Axinn et al. 1994). Indeed, in her qualitative work, Bernardi (2003) shows that grandparents-to-be exercise additional influences on their children based on the overall number, and distribution among siblings, of grandchildren.

Empirically, Lyngstad and Prskawetz (2010) use the Norwegian administrative registrar data and continuous-time hazard models to find relatively strong cross-sibling influences for first births. Both in their paper and in the one by Kuziemko (2006), siblings' effects are strongest in the two years following the birth of the niece or nephew and vanish after. The latter paper also reports stronger effects among siblings who are closer in age and who live in the same state. Balbo and Mills (2011) include both family social capital and intra-familial social interaction in their analyses and show that having a young niece or nephew is associated with a higher probability to realize one's own intention to have a first child.

Taken together, these works find a short-term, curvilinear effect with an individual's risk of childbearing, increasing after the peer under study had a child, peaking 2-3 years later, and then decreasing to zero. However, these studies are not causally identified. Indeed, the consistency of the intergenerational correlation in fertility indicates that children tend to replicate their parents' family size (Murphy 2013), and observed correlation in childbearing timing does not necessarily imply sibling peer effects on fertility (Cools and Hart 2017).

To achieve proper identification of such effects, it is necessary to find a source of exogenous variation. Because children's sex composition is uncorrelated with background characteristics, including family size preferences, and there is a persistent parental preference for a mixed sex composition (Andersson et al. 2006), siblings' sex composition can be used as an instrumental variable (IV) (Cools and Hart 2017). Since it was introduced by Angrist and Evans (1998) to estimate the effect of childbearing on labor supply, this source of exogenous variation has been widely used to study the effect of sibling size on a variety of outcomes, including grade retention (Conley and Glauber 2006), public housing and educational attainment (Currie and Yelowitz 2000), and own fertility (Cools an Hart 2017).

Despite the solidity of the sibling-sex composition instrument, Del Boca et al. (2005) remark on the difficulty to implement it in low fertility countries because of the shrinking number of women with at least two children. Indeed, while in low fertility counties there is still a preference for mixed-sex children (Andersson et al. 2006), third births are becoming increasingly rare, which could compromise the use of the standard Angrist and Evans' (1998) instrumental variable. Supporting this claim, Cruces and Galiani (2007) use children sex-mix exogenous variation to reproduce Angrist and Evans' (1998) results in Mexico and Argentina, but Daouli et al. (2009) fail to do the same with Greek data.

Moving beyond the nuclear family as unit of analysis can address this limitation. Indeed, grandparents can act as the intergenerational link connecting siblings and their fertility. Therefore, they not only constitute an additional information channel between siblings (Axinn et al. 1994), but also exercise further social pressure (Bernardi 2003) and family network support (Balbo and Mills 2011) in the realization of childbearing in general and the desired sex-mix in particular.

Research Question and Contributions

In this work, I focus on siblings' fertility peer effects using the exogenous variation of randomness of sex at birth and the preference for mixed-sex compositions to obtain a causal estimation. My main contribution is to shift the unit of analysis from the nuclear family to the intergenerational and extended family level by including the sex composition of all the grandchildren (i.e. own children and nieces and nephews) in my analysis. My proposed hypothesis is that the preference for a sex mix manifests itself not only at the level of the individual nuclear family, in which having a third child after the birth of two children of the same sex would exceed the now-established two-child norm, but at the level of the grandparents who desire a mixed-sex set of grandchildren.

In order to clarify the generations influenced by this exogenous variation, Figure 1 provides a schematic example of family structures with grandparents (GP), their sibling children (S1 and S2), granddaughters (F), and grandsons (M). In Panel A, S1 is treated under the original instrument and S2 is treated for the siblings peer effects in this work because GP in Panel A only have grandsons.

Conversely, no treatment is present in Panel B. Similarly, no one is treated in Panel D, while the family in Panel C is treated because of the lack of sex-mixed grandchildren.

In summary, peer effects on siblings' fertility are instrumented by the absence of sex-mixed grandchildren. This requires at least two grandchildren before the effect on the third can be studied, but they do not necessarily need to be from the same couple (Panel C). This greatly enhances the applicability of this methodology, especially in low fertility settings where the transitions to parities beyond two are increasingly rare. Given that my outcome of interest is in the siblings' fertility peer effects themselves, this strategy substantially corresponds to the first stage of an instrumental variable estimation.

Data

The data to address this question need to contain at least the following information for three generations: (1) grandparents generation with an indicator for whether they are still alive; (2) parent generation with full set of siblings; (3) grandchildren generation with sex and date of birth for each. The Panel Study of Income Dynamics (PSID) started in 1968 with a nationally representative sample of American households with annual surveys until 1997 and bi-annually since. The key advantage of this dataset over the census is that non co-residing children and siblings are included, as the unit of analysis is not residence, but family dynasty. Indeed, adult children are invited to join the survey once they form their own economically independent households, so that there are now up to four generations included in the sample (PSID website, 2018).

PSID is used for comparable purposes by Kuziemko (2006), who uses it exactly to estimate siblings' fertility peer effects, and by Lundberg (2018), who focuses on cousin correlations. Their analytical sample sizes differ because of their specific research questions, but they constitute a good benchmark to understand how many grandchildren are available in the PSID. Table 1 reports their analytical sample sizes and, given that, unlike Lundberg (2018), my research design does not require an age restriction on the grandchildren, I expect a sufficiently large sample to conduct the following analysis.

Methods

The key assumption underlying this causal estimation is that the assignment to the treatment group, i.e. having same-sex grandchildren instead of mixed set is random. This is a reasonable assumption in developed countries where there is no evidence of severe malnutrition or sex-selective abortion (Almond and Edlund 2008). Once the grandchildren are correctly nested within their parents and grandparents, the only information strictly needed are their sex and order of birth within their dynasty. Then, the methodological approach mirrors the one in the first half of Angrist and Evans' paper (1998) with a strategy based on the grandchildren sex mix in dynasties with two or more grandchildren, assuming preferences for a mixed grandchildren-sex composition. Because the sex-mix is randomly assigned, I use an indicator for whether the first two grandchildren born have the same sex to instrument additional births. This can be estimated by OLS regression as follows:

$$(1)\quad MORETWOGC = \beta_0 + \beta_1 SAMESEXGC + \beta_2 X + \varepsilon$$

Where MORETWOGC is a dummy variable equal to one if a dynasty has three or more grandchildren, SAMESEXGC is a dummy variable equal to one if first two grandchildren born into a dynasty have the same sex, and X is a vector of control variables. In case the third child is born to the same set of parents as the first two, it corresponds to Angrist and Evans' (1998) first stage, but it is the peer effect if it occurs to a sibling.

I can additionally run a number of possible heterogeneity tests by sub-samples: (1) granddaughters vs. grandsons; (2) Same-sex siblings vs. all sisters or all brothers; (3) first births vs. higher parities. Two important factors to keep into consideration when interpreting these peer effects are whether the grandparents are still alive, as it constitute an important theorized mechanism, and time elapsed between births as previous research consistently finds that the effects are stronger in the first 2-3 years and then dissipate.

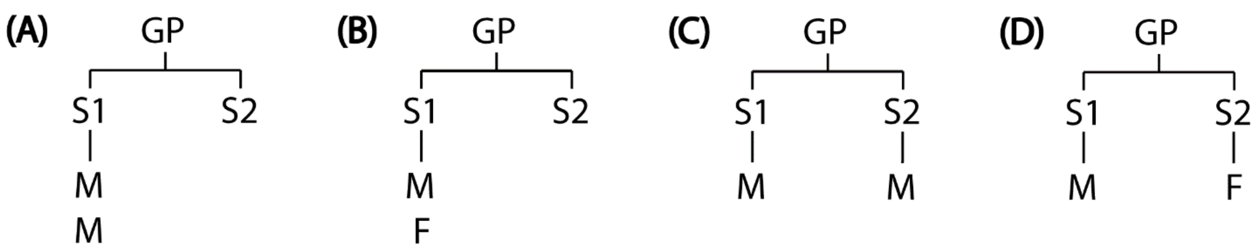
Expected Findings

From a theoretical point of view, I expect to find a positive influence of having only nieces or only nephews (or having only nieces and daughters, or only nephews and sons) on individual fertility, meaning a positive sibling peer effect beyond just homophily.

Based on previous findings, I expect a stronger effect for first births (Lyngstad and Prskawetz 2010) for siblings (especially sisters) who live geographically closer to each other (Kuziemko 2006), and have living parents who could exercise social pressure for sex-mix in the grandchildren pool. Given the recent shifts towards girl preferences in some countries (Andersson et al. 2006), I do not have a priori expectations for the comparisons between granddaughters and grandsons.

Figures and Tables

Figure 1 – Representation of Possible Family Structures



Note: GP is the grandparent generation, whose children are indicated as S1 and S2. S1 and S2 are therefore the siblings whose peer effects I am estimating. M indicates a male grandchild and F a female grandchild, born from the child underneath which they are represented.

Table 1 – PSID Grandchildren Sample Sizes from Previous Studies

	Original Participants (GP)	Children (S) – adult siblings	Grandchildren / nieces and nephews / cousins
Kuziemko	823 households	1,817 persons	3,666 persons
Lundberg – SRC	2,930 HH interviewed in 1968	1,523 HH with descendants in PSID	1,171 HH with grandchildren in PSID
Lundberg	1,872 HH interviewed in 1968	1,100 HH with descendants in PSID	881 HH with grandchildren in PSID

Source: Author's elaboration from Kuziemko (2006) and Lundberg (2018). SRC stands for the Survey Research Center sample within the PSID.

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