The Demand for Stepsons

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Abstract

Literature has shown that firstborn girls (as opposed to firstborn boys) increase the probability of parental divorce or living without a father in the United States. In this paper, I present evidence that firstborn girls also reduce the probability for their mothers of finding a new partner. That is, firstborn girls are more likely to be living without a stepfather in the United States. Men not only show a stronger demand for biological sons, they also show a greater preference for stepsons (as opposed to stepdaughters). Instead, stepmothers do not have any preference for the sex of their stepchildren.

Keywords: step-fatherhood, gender, re-partnering
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1. Introduction

Literature has shown the existence of a relationship between the probability of divorce or lone-parenthood and the sex of the firstborn in a family. According to the results by Dahl and Moretti (2008), Ananat and Michaels (2008), Bedard and Deschênes (2005) for the United States, firstborns are more likely to live without a father and cohabit with a divorced mother if they are girls. Different interpretations have been given to these results. First, it has been considered that fathers could simply be *gender biased* and have a stronger preference for boys (Dahl and Moretti, 2008). Second, the *role model hypothesis* establishes that fathers may believe that sons suffer more than daughters if they do not cohabit with them and hence, they are more likely to stay with their children.[2] Third, the so-called *technological reasons* establish that men could be more efficient at raising sons than daughters so that the price of a boy is lower if the father is present (Dahl and Moretti, 2008). Fourth, a possible *income effect* (also called *differential cost*) by which the monetary (or time) cost of raising girls could be higher than that of raising boys (Ben-Porath and Welch, 1976). And, finally, the *compensatory behavior hypothesis* that assumes that boys are harder to look after than girls (and have more health problems) so fathers feel more obliged to stay given that they care for their children (Angrist and Lavy, 1996).

And while the literature has not yet reached an agreement on the reasons for the higher probability of household dissolution in firstborn girls' families, it has been vastly documented that having an absentee father has negative consequences for children outcomes. Exposure to unilateral divorce early in life is correlated with lower educational attainment and higher school dropout. Children who grow up without their biological fathers view themselves as having less academic potential. They are also more likely to be in poverty during their childhood and have lower family income in adulthood. Lone-parents are more likely to be unemployed, in unstable job positions or rely on welfare benefits. Living apart from a biological father it is expected to affect children's future life chances and the ability to move up the income ladder. Single-parent households are less likely to own their home and move more often. Children raised in divorced households are more likely to marry earlier, divorce more often and have more children and more often out of wedlock. Females growing up with a single parent and males experiencing an unstable family become parents earlier, particularly to non-residential fatherhood. It has also been found that children from divorced parents have more behavioral problems (delinquency, substance abuse, early sexual activity, teenage pregnancy or suicide) and show a lower general satisfaction with the family and the childcare received. Children from lone-parents households have also received less health investments. See Biblarz and Raftery (1999), Argys et *al.* (1998), Gruber (2004), Amato and Keith (1991), Cherlin et *al.* (1998), Hofferth and Goldscheider (2010), McLanahan and Percherski (2008) and references within.[3]

[2] The 'pathology of matriarchy' theory establishes that the lack of a man could be particularly detrimental for boys (Biblarz and Raftery, 1999). King (2006) suggests that boys benefit more than girls from close relationships.

[3] Literature has shown that girls and boys may receive different investments even in intact families. Lundberg and Rose (2002b) and Choi, Joesch and Lundberg (2008) show that men are more likely to increase their working hours if they have a son than a daughter in the US and in Germany. Also, parents are more likely to invest in education for boys than girls.

Thus, if families with firstborn girls are more likely to have an absentee biological father, it is immediately apparent that girls are more often suffering some of the mentioned negative outcomes. However, an important percentage of separated parents will find a new partner after family dissolution that can compensate for some of the disadvantages that are associated with single parenthood. The presence of a stepfather has important consequences for the mother and the children in different domains but especially so in terms of economic well-being. Much of the disadvantage associated with single parenthood relates to income thus, cohabiting with a stepfather may result in an important gain in economic security as the new husband or spouse is likely to contribute to the family budget (Ginther and Pollak, 2004; McLanahan and Sandefur, 1994). The presence of a stepfather may mean the difference between living above or below the poverty line. Page and Stevens (2004) estimate that family income falls by 41% and food consumption by 18% in the year after divorce. Six years following the divorce, for children cohabiting with an unmarried parent, family income is still 45% lower than it would have been if divorce had not taken place. Instead, among children whose primary parent remarried, income is the same that it would have been if the parents would not have split up.

And positive outcomes are not only restricted to the family economic well-being. At the emotional or psychological level, having a stepfather gives children the opportunity to cohabit with a father figure and tells about the chances for mothers to engage in a new relationship after partnership dissolution. Stepfathers may provide different resources than mothers do. As argued by King (2006), a close relationship with a stepfather is associated with better adolescent outcomes (being this relationship even more influential than the child-nonresident father relationship). Having a father in the household is associated with lower disability prevalence and low grade repetition (Angrist and Lavy, 1996).[4] Also, two-parent families monitor and control their children more than single parents do (Forste and Jarvis, 2007; Pears et *al.* 2005). A father figure may be an important link to the public sphere: parental connections and exposure to knowledge on how to translate education into occupational success (Biblarz and Raftery, 1999). From all these different perspectives, the presence of a stepfather is regarded as positive for all household members.[5]

[4] However, Angrist and Lavy (1996) show that these effects are again explained by higher incomes in two-parent household (except in the case of learning disabilities and emotional disturbances that remain statistically significant even when controlling for family income).

[5] Admittedly, having a stepfather may not necessarily imply the same positive outcomes that cohabiting with both birth parents in all domains. Literature has shown that stepparents invest less in their stepchildren than biological parents do towards their natural children. Stepparents engage in less monitoring than biological fathers (Hetherington et *al.* 1998; Hoffert and Anderson, 2003). Case and Paxson (2001) show that children cohabiting with a stepmother (as opposed to a birth-mother) are less likely to have routine doctor and dentist visits. Also they are less likely to have a place for usual medical care or to wear seatbelts. Case, Lin and McLanahan (2001) find that children raised by stepmothers received one year less of schooling than do the birth children of the same woman (thought they point to the fact that it could be due to scarring or stress by stepchildren rather than the investment strategy of the stepparent). Case, Lin and McLanahan (2000) find that households in the US spend less in food when a child is raised by a non-biological mother. And, Daly and Wilson (1985) show that stepparents are more likely to maltreat or abuse their stepchildren compared with children living with both natural parents (though their results refer to a small sample of a midsize Canadian city). Another strand of the literature goes further and points to the possibility that a stepparent in the household may result in similar or worst children'outcomes than singleparenthood (see Case, Lin and McLanahan, 1999, 2001; McLanahan, 1998; McLanahan and Sandefur, 1994; Beller and Chung, 1992). It is argued that being raised by a single mother is better than being raised by a birth mother and a stepfather because the child has to compete for

But, are the chances of new family formation after partnership dissolution irrespective of the sex of the children? In this paper I study if the sex of a mother's firstborn influences the probability that there is a stepfather in the household given that the biological father is absent. Previous literature with data from the Censuses has always compared the situation of households with an absentee father against that of households with a father figure irrespective of him being the biological father or not (see Dahl and Moretti, 2008). As a result, little is known about the influence of the sex of the firstborn on the probability for the mother of finding a new partner after partnership dissolution, and therefore, of the child living with a stepfather.

With this purpose in mind, and following Sartori (2003), I build an econometric model that studies the influence of gender on the probability for a firstborn to have a stepfather given that his biological father is absent –or, similarly, the probability for a mother to find a new partner after dissolution. As explained below, the model takes into account that the sample is selected in the sense that the probability of having a stepfather is only observed if the biological father is absent, and that selection and outcome equations are affected by identical factors. Data is from the United States for 1990 and 2000.

My results indicate that not only firstborn girls are more likely to live without their biological father they are also more likely to be without a stepfather. Mothers of firstborn girls are less likely to find a new partner in the United States. Men exhibit not only a stronger demand for sons but also for stepsons (rather than stepdaughters). Children in firstborn girl families suffer the negative consequences of single-parenthood both because of the absence of the biological father but also because of the increased difficulties of finding a new father figure. In comparison, women do not exhibit any preference for the sex of their stepchildren.

The paper is organized as follows. Section 2 following this introduction presents the data set and definitions. Section 3 explains the methodology used. Section 4 shows the results and the sensitivity analysis carried out. And, finally, conclusions are given in Section 5.

2. Data and definitions

Data is from the United States Census for years 1990 and 2000 made available to researchers through the Integrated Public Use Microdata Series (IPUMS-USA) (see Ruggles et *al.*, 2010).[6] Previous Censuses are not included because no distinction is made between biological, adoptive and stepfathers. Data is drawn from the 5% sample and this is important because as pointed out by Lundberg (2005), the use of large data sets in the field of family economics is necessary and permits more precise estimates of small child-gender impacts and allows control for possible selection bias from family structure choices or gender-biased fertility decisions.

The sample is restricted to mothers between the ages of 18 and 40 whose eldest child has 13 years of age or less. This methodological decision intends to provide conservative results as median age at leaving home in the United States exceeded the

mother's time and attention. Evenhouse and Reilly (2004) find that in 10 out of 33 well-being indicators, children in stepfather families fare worst than in mother-only households.

[6] Data from the 2010 Census is not yet available to researchers.

age of 20 in 1990 according to Gutmann, Pullum-Piñón and Pullum (2002) using the same data set. Also I computed that the average spacing between the first and second child is of 3.4 years (with a median of 3) for people under the age of 20. Thus, with the 13-year cutoff, I minimize the possibility that a mother's eldest child has already left the parental home when observing the household.[7] Widowed parents are left out of the analysis as well as adoptive parents and firstborn multiple births households.[8] I drop few observations if the age at first child was before 13 as I believe they are rather errors or exceptions. The same decisions have been taken for the fathers sample when studying the probability for children of having a stepmother. For the regressions, observations are pooled and weighted.

Differently from Dahl and Moretti (2008), I include all mother-firstborn links even if the mother is not the household head or spouse.[9] For example, if a woman that has a baby lives with her father who is the household head, I include the mother-baby link in the sample. As a matter of fact, children in a household that are not sons or daughters of the household head (or spouse) have a much higher probability to have an absentee biological father so ignoring them would exclude some of the cases that are of greatest interest for this paper.[10]

Throughout the paper, I will assume that the sex of the first child is random. The debate about whether couples can influence the sex of their children seems to be never ending. In the 70s, Shettles (1970) popularized a theory that related intercourse timing and reproductive environment with the sex of couples' offspring.[11] However, the majority of studies later on have found not such a correlation (see Wilcox et *al.*, 1995; Weinberg et *al.*, 1995; Gray, 1991; France et *al.*, 1992).[12] Neither high-tech sex selection was available to the majority of couples in the US for the studied period.

Graph 1 provides a description of the trend for the percentage of children under the age of 14 that do not cohabit with their biological father in the US and the proportion of those that cohabit with a stepfather (given the absence of their biological father). Data is from the Censuses for 1990 and 2000 and is completed with the American Community Survey from 2008-2012. The line with a circled marker shows that 1 out of 4 children lived without their biological father and that such number has increased over the

[7] Dahl and Moretti (2008) use a 12-year cutoff for the period between 1960 and 2000. However, in this paper I considered that a 13-year cutoff is more suitable since the median age at leaving home has increased more than a year since the 60s.

[8] I exclude widow parents as partnership dissolution is (normally) not the result of a decision. Also, adoptive parents are not included because the sex of the first child may not be random in these households. Adoptive parents could only be identified for 2000.

[9] As I use child-mother links, I will talk irrespectively of a woman having a partner or a child having a step or biological father.

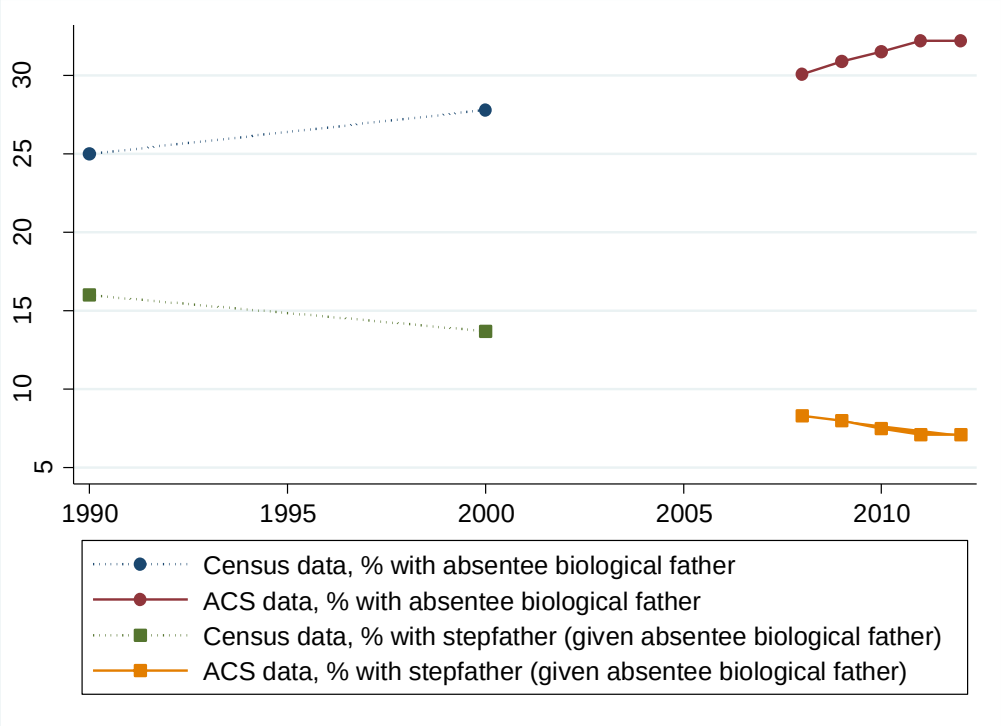
[10] I have checked that the mother is classified as the household head or spouse in 98% of the cases for firstborns living with both biological parents. Instead, if an absentee biological father, the percentage of mothers being household heads or spouses goes down to 75%.

[11] The method has been published in several books and editions. See a revised and updated version in Shettles and Rorwik (2006).

[12] Weinberg et *al.* (1995) established that there may be a correlation between the sex of the baby and the follicular phase (time between menstruation and ovulation). Shorter follicular phases are slightly related to male babies and longer ones with female babies. However such a theory has also been rejected by Gray et *al.* (1998). A more recent theory hypothesizes that women having a dominant personality are more likely to conceive male infants (Grant, 2001). Once more, such a hypothesis has not been confirmed in the literature. Rather, most of the evidence points to the impossibility for a woman to induce the sex of her children.

analyzed period up to 32% in 2012. Moreover, around 16% of children with an absentee biological father had a stepfather in 1990.[13] Such percentage has decreased during the 20-year period (with a minimum in 2012 of 7.1%) which helps explaining the overall increase in the number of children living in lone-parent households.

Graph 1. Percentage of all children under the age of 14 living with an absentee biological father and percentage living with a stepfather (given an absentee father) in the US, 1990-2000 and 2008-2012



Source: U.S. Census from 1990 and 2000 and American Community Survey from 2008-2012. Sample is restricted to children under the age of 14 living with their biological mother. Widow and adoptive parents have been excluded. Weighted results.

Importantly, note that the gender effects found in the paper will refer only to firstborn children in order to avoid problems of endogeneity between parental dissolution and fertility decisions. As explained by Dahl and Moretti (2008), focusing on the sex of the first child allows obtaining the cleanest causal effect.

3. Methodology

The econometric technique for the study of the probability that firstborns live with a stepfather needs to take into account that such a possibility is only observed if the child does not live with the biological father. As already established in the literature, we need to consider that firstborn girls are less likely to cohabit with their biological father otherwise their probability of having a stepfather would be overestimated. Thus, a Heckman selection type of model must be applied (see Heckman, 1979). In the first step, a probit for the probability of not having a biological father should be estimated

[13] I have considered that someone is a child's stepfather if he is the 'spouse of mother' or an 'identified stepfather', according to the variable's description in the Census data.

and in the second one, one for the probability of having a stepfather given an absentee biological father (Van de Ven and Van Praag, 1981).

However, in order for a Heckman model to be identified, the selection equation should include an extra variable (normally called *exclusion restriction*) that is not in the outcome equation: a variable that influences the probability that a given mother is not in partnership with her child's biological father that does not exert any influence on the probability of having found a new partner. In the context of this study, it can be argued that such a variable does not exist because identical factors influence the selection and the outcome equations. What I am modelling is whether a woman has a partner with the difference that he may be her children biological father or not. The mother's characteristics that influence the probability to be together with her children father are likely to be identical to those that explain the probability of being together with a new partner. For example, mother's difficult personality can very well explain why the children biological father is not present in the household and, at the same time why the mother does not have a new partner.

For the cases with identical explanatory variables, Sartori (2003a) proposes the estimation of a maximum-likelihood model with dichotomous dependent variables based upon the additional identifying assumption that the error term for an observation is the same in the two equations.[14] That is, given that the same variables influence both the selection and the outcome equations, it can be assumed that unobserved heterogeneity is nearly identical in both specifications.[15]

Sartori (2003a) establishes that there are three conditions under which errors are likely to be similar. First, "processes that involve similar decisions or goals are more likely to have similar error terms than are unrelated phenomena" (Sartori, 2003a: 117). In the present context, both outcome and selection equations analyze the probability for a woman to have a partner thus it is reasonable to assume that identical unmeasured factors influence both decisions. Second, "errors are likely to be similar when selection and the outcome of interest have the same causes" (Sartori, 2003a: 117). That is, when the explanatory variables included in both equations are identical, it is because both phenomena are caused by the same factors. Also, if part of the error term can be attributed to omitted variables, and such variables are likely to influence both outcomes, then the error terms are strongly correlated. As commented, and as an example, if a woman is not together with her children biological father given that she suffers high levels of neuroticism, such a personality trait could easily explain why she does not have a new partner. Finally, "errors are more likely to be similar when the decisions are

[14] The classical Heckman selection model can be estimated with identical explanatory variables but the results rely merely on the distributional assumptions made about the residuals (and not upon the variation in the explanatory variables). Instead, "the [Sartori's] estimator allows the researcher to avoid the painful choice between identifying from distributional assumptions alone and adding a theoretically unjustified variable to the selection equation in a mistaken attempt to "boost" identification" (Sartori, 2003a: 111). I refer the interested reader to Sartori's (2003a) article for a full econometric illustration of the estimator and its properties. See also its companion paper (Sartori, 2003b).

[15] Sartori (2003a) admits that "the identifying assumption rarely will be perfectly true, but it is likely to be reasonable exactly when the researcher believes that identical explanatory factors influence selection and the subsequent outcome of interest" (Sartori, 2003a: 112). As shown below, the identical errors assumption is an approximation but a good one in the present context.

close together in time and space" (Sartori, 2003a: 117).[16] A report from the US Census Bureau establishes that median duration to remarriage after divorce has remained between 3 and 4 years since the fifties (see Kreider, 2006). In the life time of an adult, it can be agreed that decisions taken 3 to 4 years apart are reasonably close together. Moreover, according to the Census variable on the number of years ago that each person had moved into the dwelling unit, 35% of the stepfathers of children under the age of 14 had moved in during the census year or the previous one, 45% did so between 2 and 5 years ago and 13% between 6 and 10.

Formally, the model can be specified as follows:

$$no\_biological\_father_i = (x_i\beta_1 + u_{1i} > 0) \quad \text{[selection equation]} \quad (1)$$
$$step\_father_i = (x_i\beta_2 + u_{2i} > 0) \quad \text{[outcome equation]} \quad (2)$$

$$u_{1i} = u_{2i} \quad \forall i$$
$$u_1, u_2 \sim N(0,1)$$
$$corr(u_1, u_2) = \rho = -1$$

Reasonably, in this study, one can expect ρ to be (nearly perfectly) negative meaning that unobservables that make a mother more likely to be without her children biological father also make her less likely to be with a new partner. Note that differently from a classical Heckman selection model, Sartori's estimator is computed in one single step. Thus, three random variables are defined:

$$Y_{0i} = \begin{cases} 1 & if\ no\_biological\_father = 0 \\ 0 & otherwise; \end{cases}$$

$$Y_{1i} = \begin{cases} 1 & if\ no\_biological\_father = 1\ and\ step\_father = 0 \\ 0 & otherwise; \end{cases}$$

$$Y_{2i} = \begin{cases} 1 & if\ no\_biological\_father = 1\ and\ step\_father = 1 \\ 0 & otherwise. \end{cases}$$

With a likelihood function defined as,[17]

$$L^* \equiv lnL \propto \sum_{i=1}^{n} \sum_{j=0}^{2} Y_{ji} lnP_{ji}$$

with $P_{ji} \equiv prob(Y_{ji} = 1)$.

For the estimation, I use the ado files `sartsel` and `sartpred` made available by Anne Sartori to Stata© users through her personal web page.[18] Covariates, apart from the sex of the firstborn, are mother's age as a third-order polynomial, race, educational attainment, employment status, age at first birth (and its second-order polynomial), linguistically isolated, Census year and region.

[16] Sartori (2003a) adds that "[…] the estimator is often a good choice if the first two conditions are met, even if the two decisions are farther apart in time and space" (Sartori, 2003a: 117).
[17] The notation draws heavily upon Sartori (2003a).
[18] I modified Sartori's Stata code simply to allow for sampling weights in the maximum likelihood function and I called the new program `sartselw`.

4. Results

In the following, I first show the results related to the probability of having a stepfather given an absentee biological father and next those referred to stepmothers. As explained in Dahl and Moretti (2004), it is important to keep in mind when reading the results that the "estimates are likely to reflect the effect of having daughters on *marginal* marriages. Happy marriages are unlikely to result in a divorce only because the birth of a daughter, even if parents are gender biased" (Dahl and Moretti, 2004: 13). The same is true for decisions on becoming a stepparent.

4.1. Stepfathers

Table 1 shows the results for the gender effect from the dichotomous dependent variables selection model using Sartori's estimator for the probability of living with a stepfather conditioned on the probability of an absentee biological father for firstborn children. As shown, firstborn girls are more likely to have an absentee biological father. These results simply confirm those already well established in the literature: biological fathers are more likely to live together with their firstborns if they are boys (as opposed to girls). Marginal effects show that being a girl increases, *ceteris paribus*, the probability of not cohabiting with the biological father by 0.68%.[19]

Table 1. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator

	SELECTION EQUATION Probability of living without the biological father		OUTCOME EQUATION Probability of living with a stepfather	
	Coefficient (standard error)	Marginal effect (%)	Coefficient (standard error)	Marginal effect (%)
Firstborn girl	0.024*** (0.0023)	0.68	-0.020*** (0.0036)	-0.56
Observations	1,816,010			
rho	-1 (fixed)			

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, second order polynomial for age at first birth, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

The results of the outcome equation are new to the literature. As shown, not only firstborn girls are more likely not to be with their biological father they are also less likely to have a stepfather. In other words, mothers of firstborn girls are less likely to find a new partner in the event of an absentee biological father. Men not only have a greater demand for their biological sons (as opposed to daughters), they also have a greater preference for stepsons (as opposed to stepdaughters). All else being equal, firstborn girls with an absentee biological father are 0.56% less likely to be with a

[19] In the literature, Diekmann and Schmidheiny (2004) are amongst the few authors that do not find support for the hypothesis that sons contribute more to marital stability than daughters. However, note that they use data from the Fertility and Family Surveys and their sample size is really small.

stepfather than firstborn boys.[20] This means that if in 2000, there were 2.8 million firstborn girls with an absentee biological father, 15,000 more would have had a stepfather if they were boys. I view this result as a very large number because the absence of a father figure not only affects the firstborn but also all her brothers and sisters.

For comparative reasons, I have run also a Heckman selection model with identical variables while assuming that the distributional assumptions about the residuals are correct –that is, error terms being jointly normally distributed with zero mean and unit variance. The same conclusions are reached. Coefficients are only different at the third decimal while standard errors are much smaller in the Heckman selection model which implies more conservative results using Sartori's estimator. Moreover, results from the Heckman selection model show that the correlation is as negative as -0.933 indicating that the assumption of rho being (nearly) -1 is not perfect but appropriate (or reasonable exactly).[21]

Moreover, a single probit for the probability of having a stepfather among households with an absentee biological father yields a positive and significant coefficient for 'firstborn girl' which is the opposite of what has been found in the selection type of models just presented. Not controlling for selection would lead us to the wrong conclusions.

As for the rest of the explanatory variables (see Table A.1 in the Appendix), mother age reduces the probability of an absentee biological father but at the same time reduces the probability of a stepfather in the household (though both effects loose importance as age increases). Having a mother from Asian origin reduces the probability for children of an absentee biological father compared to Whites while Blacks, American Indian or Alaska Natives and Other, increase it. As a matter of fact, having a Black mother increases the probability of an absentee biological father by 26%, one of the strongest results obtained. Moreover, all races increase the probability of a stepfather as opposed to Whites. As regards mother's educational attainment, having completed grade 9 to 11 is positively related with an absentee biological father in the household while more than 2 years of college is negatively associated with it, compared to someone with no schooling. Educational attainment from grade 9 to two years of college reduces the probability for the mother to have found a new partner while having more than 3 years of college increases the chances of a stepfather in the household. An unemployed mother increases the probability that in the household the biological father is absent but at the same time is positively related with cohabiting with a stepfather. Instead, not being in the labor force is both negatively associated with an absentee biological father and the presence of a stepfather. Mother's age at first child decreases the probability of an absentee biological father and increases the probability of a stepfather (both signs reverse as age increases) (see Lehrer, 2008). Coming from a linguistically isolated

[20] Note that this is an overall effect that includes also indirect effects caused by subsequent fertility decisions (as discussed below).

[21] Since I do not know how accurately the Heckman assumption on the error terms represents the data-generating process, the results obtained with Sartori's estimator are my preferred ones. Using simulation techniques, Sartori (2003a) shows that her estimator performs better even if the Heckman estimator's functional form assumption is met and the assumption on identical errors in her estimator is far from the truth. Actually, the Heckman selection model only performs better when there is almost no selection bias. The author argues that her estimator is the right choice if the correlation between the errors is high (either positive or negative) as I believe is the case in this work.

household reduces the probability of an absentee biological father and increases the likelihood of a stepfather. Finally, in Southern regions, households are less likely to have an absentee biological father and also less likely to have a stepfather which is consistent with more traditional family pathways (Goldscheider and Waite, 1991).

Additional direct and indirect effects

As commented, focusing on the sex of the first child allows obtaining the cleanest causal effect however, it is important to take into account that it is also the result of *direct* and *indirect* effects related to family structure, fertility decisions, gender birth order or gender mix. In what follows, I try to disentangle some of these effects.

First, I want to assess whether the gender effect just discussed is actually confound with the effect for the number of children in the household. For example, if firstborn girls are more likely to have brothers or sisters and future stepparents are less willing to cope with a greater number of stepchildren, it could be that we are mistaking the gender effect for a family structure one. To assess this possibility, Table 2 shows the results using the same specification than before but distinguishing between families that have only one child from those that have two or more and three or more. Each row is a separate regression.

Results go in the same direction: firstborn girls are more likely to live with an absentee biological father and less likely to have a stepfather regardless of the family structure. Results for one child families give evidence that when no other observable factor as for family structure intervenes the child gender effect persists (albeit less strong). This is an important result because it is a clean effect: the results are not mediated by family size or structure (number of siblings) that could interfere in the male decision to become a stepfather.

Firstborn girls in families with at least two children show a smaller probability of an absentee biological father (in comparison with all families) but a much stronger negative effect on the probability of having a stepfather –being the highest marginal effect found in families with three children. Results are indicative of the obvious fact that a biological father is more likely to be present in families (also in firstborn girl families) that have more children as fertility decisions are taken if a father is present.[22] But, in the event of an absentee biological father, mothers of firstborn girls are less likely to find a new partner the more children there is in the household. Stepfathers are less inclined to take the responsibility of a firstborn girl, the larger the number of children.

[22] Results for families with more than one child should not be interpreted as causal because of endogeneity. The number of children after the firstborn is not anymore random since estimates just showed that there is more instability in firstborn girl families. The gender effect in the last rows does not include couples that already divorced because they have had a girl as a first child. Moreover, as the sample size becomes smaller the results should be seen as suggestive and not conclusive.

Table 2. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator by number of children in the household

	SELECTION EQUATION Probability of an absentee biological father		OUTCOME EQUATION Probability of living with a step father	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
BY NUMBER OF CHILDREN				
Families with one child				
Firstborn girl	0.025*** (0.0036)	0.89	-0.027*** (0.0066)	-0.38
Families with one or more children (all families)				
Firstborn girl	0.024*** (0.0023)	0.68	-0.020*** (0.0036)	-0.56
Families with two children				
Firstborn girl	0.023*** (0.0038)	0.48	-0.015*** (0.0055)	-0.70
Families with two or more children				
Firstborn girl	0.020*** (0.0031)	0.44	-0.017*** (0.0043)	-0.72
Families with three children				
Firstborn girl	0.017*** (0.0063)	0.39	-0.018** (0.0081)	-0.96
Families with three or more children				
Firstborn girl	0.016*** (0.0055)	0.38	-0.015** (0.0071)	-0.77

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, second order polynomial for age at first birth, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

Second, and in order to complement the commented results, I have also run the same model for families with two or more children while controlling for birth and sex order.[23] Results in Table 3 indicate that as long as the firstborn in a family is a girl, the probability of an absentee biological father is higher –being especially so when the first and second child are females. For them, the probability increases by 0.65% compared to a boy-boy family. Similarly, the probability of living with a stepfather decreases for girl-girl and girl-boy families compared to boy-boy. Instead, there are not precisely estimated differences in neither of the probabilities between boy-boy families and boy-girl ones.

[23] Results for families with three or more children and the different sex and birth order combinations are not shown, neither commented, as they draw from a small number of observations compared with the results in the rest of the paper.

Table 3. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator by number of children in the household and sex and birth order

	SELECTION EQUATION Probability of an absentee biological father		OUTCOME EQUATION Probability of living with a step father	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
BY SEX AND BIRTH ORDER OF CHILDREN				
Families with two or more children				
Girl, Girl	0.030*** (0.0044)	0.65	-0.020*** (0.0062)	-0.86
Boy, Girl	0.005 (0.0044)	-	-0.004 (0.0062)	-
Girl, Boy	0.016*** (0.0044)	0.34	-0.018*** (0.0061)	-0.76
Families with two children				
Girl, Girl	0,037*** (0.0054)	0,77	-0,019** (0.0080)	-0.74
Boy, Girl	-0,022*** (0.0053)	-0,47	0,018** (0.0078)	0.70
Girl, Boy	-0,011** (0.0053)	-0,23	0.000 (0.0078)	-

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, second order polynomial for age at first birth, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

However, note that the results for families with two or more children could be cofounding the effect of number of siblings. Angrist and Evans (1998) have suggested an association between having a male child and a reduced childbearing at higher parities: women with a boy and a girl are less likely to go on to the third child while mothers of two girls are more likely compared to mothers of two boys. In order to avoid confounding the effect of a third or more children, I have also computed the results for families with exactly two children which unavoidably are a selected group that may have achieved their ideal number of children. Results clearly show a demand for variety for this group: sex mix reduces the probability of an absentee father –especially if a boy is born first.[24] The boy-girl combination also increases the likelihood of a stepfather in the household while the girl-girl reduces it. Thus, stepfathers show a preference for the sex mix only in those cases where a boy is born first.

Third, I want to assess whether there is some timing in the gender effects. Table 4 shows the results controlling for the firstborn age.[25] As shown, the probability of an

[24] A simple Wald test of equality of parameters shows that actually comparing the boy-girl combination against girl-boy, differences are statistically significant at 5% level.

[25] This regression does not include age at first child and its square in order to avoid problems of multicollinearity with child and mother ages.

absentee biological father increases with the child age. The interaction term between firstborn sex and age indicates that also the gap between girls and boys increases with child age. As established by Dahl and Moretti (2008), "... parents learn over time about their preferences for sons versus daughters" (Dahl and Moretti, 2008: 1098). However, the same is not true in the case of the conditional probability of having a stepfather. The likelihood decreases with child age and the gender effect persists but the interaction term is not statistically significant. That is, a given number of men prefer a stepson over a stepdaughter, but such a sex preference does not increase neither decrease as child ages.

Table 4. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator controlling for age of first child

	SELECTION EQUATION Probability of an absentee biological father		OUTCOME EQUATION Probability of living with a step father	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
All families (controlling for age of first child)				
Firstborn girl	0.009* (0.0045)	0.24	-0.020** (0.0091)	-0.54
Firstborn age	0.074*** (0.0025)	4.89	-0.132*** (0.0048)	-3.65
Firstborn girl x firstborn age	0.002*** (0.0005)	0.06	-0.0004 (0.0009)	-

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

Finally, my last robustness check takes into account the possibility that the gender effect could be fading away as time goes by (see Pollard and Morgan, 2000). If the society is becoming more gender neutral, it could be expected that the effect of firstborn girls on the probability of partnership dissolution and on new family formation disappears. To assess this possibility, I have interacted the gender effect with the Census year. Results shown in Table 5 suggest that there is not an attenuation of the gender effect across the analyzed decade, neither among biological parents nor among (potential) stepparents. The interaction effect is not precisely estimated in none of the equations which indicate that the gender effect has not increased but neither decreased across time.

Alternative hypotheses

As discussed at the Introduction of this paper, different hypotheses have been suggested to try explaining the higher probability of divorce or lone-parenthood in firstborn girl families (as opposed to firstborn boy). The same hypotheses can be applied when trying to understand the lower probability for males to become stepfathers of female infants.

Table 5. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator by

	SELECTION EQUATION Probability of an absentee biological father		OUTCOME EQUATION Probability of living with a step father	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
Firstborn girl	0.028*** (0.0032)	0.78	-0.022*** (0.0049)	-0.60
Year 2000	0.138*** (0.0033)	3.80	-0.278*** (0.0051)	-0.77
Firstborn girl x year 2000	-0.0073 (0.0047)	-	0.0026 (0.0072)	-

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

First, it could be that men are simply gender biased and have a stronger preference for raising male children both in the case of natural and stepchildren.[26] To the best of my knowledge, there is not a survey that would interview (potential) stepfathers on the sex preference of their (future) stepchildren. However, different Gallup polls indicate that the male preference for raising boys than girls has not faded across time in the US. In 2011, 49% of men declare to have a preference for a boy if they were to have only one child, 22% a girl and 28% answered that it did not matter to them or they had no opinion. The percentages are similar to those in previous polls. Instead, women are much more neutral about their preference for the sex of their children: 31% favor a boy, 33% a girl and 36% do not have an opinion or preference.

Another interpretation of the results in the literature has been the *compensatory behavior* hypothesis by which it is said that boys are harder to look after than girls and have more health problems so fathers feel more obliged to stay or postpone divorce. In order to test this hypothesis, I make use of the information available in the 2000 Census data for cognitive, ambulatory, self-care and vision or hearing difficulties for children above the age of 4.[27] Sample size is smaller therefore results are not directly comparable with those presented above. Around 5.4% of the firstborn in the sample suffer from one or more of the mentioned difficulties –being the percentage almost 7% for boys and 4%

[26] Ben-Porath and Welch established already in 1976 that "the interest in the sex of children may be rooted in tastes" (Ben-Porath and Welch, 1976: 285). However, the hypothesis may be completely different in different contexts. Fuse (2013) argues that in Japan there may be the perception that girls require less financial, psychological and time investment than boys. "It is possible that the Japanese are unenthusiastic about raising boys because of all the pressure associated with raising a son successfully" (Fuse, 2013: 1031). Men in the Japanese society strive to succeed in a competitive economy. The competition to enter top universities or get a good job puts psychological stress, time constraints and economic pressure on parents to ensure that their son succeeds.

[27] In the Census data, cognitive difficulties refer to learning, remembering or concentrating problems that last six months or more. These variables are not available in the 1990 Census.

for girls. For the remaining, I define as disabled a child that suffers at least one of the mentioned difficulties.[28]

Table 6. Results for the probability of living with a stepfather (outcome) given an absentee biological father (selection) using Sartori's estimator by the child disability status

	SELECTION EQUATION Probability of an absentee biological father		OUTCOME EQUATION Probability of living with a step father	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
All families (controlling for disability status of first child)				
Firstborn girl	0.029*** (0.0023)	0.80	-0.023*** (0.0036)	-0.63
Disable status	0.354*** (0.010)	9.71	-0.127*** (0.0143)	-3.51
Firsborn girl x disability	-0.016 (0.0179)	-0,43	0.063*** (0.0244)	1.75

Source: Data is from the US Census for 2000 and limited to children above the age of 4. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

As shown in Table 6, firstborn children with emotional, physical or mental difficulties are 9.7% more likely to have an absentee father and 3.5% less likely to have a stepfather. The found effect as for the sex of the firstborn persists when controlling for child disabilities but the interaction term indicates that the probability of an absentee biological father does not increase nor reduce differently for disabled girls than boys as the coefficient is not statistically significant. Instead, the probability of having a stepfather increases for girls with difficulties as opposed to boys having the same problems.[29] According to these results, the compensatory behavior hypothesis cannot be confirmed neither rejected for biological fathers while it can be rejected for stepfathers.[30]

With the data set at hands, little more can be said about the *role model*, the *technological reasons* or the *income effect* hypotheses that have been used before to explain the higher probability of partnership dissolution in firstborn girl families. Either

[28] Having a father in the household is associated with lower disability prevalence but this effect appears to be explained by higher incomes in two-parent families (Angrist and Lavy, 1996). Boys are more likely to be reported as having any disability except sight problems. And the relationship between sex and disability is stronger for speech problems.

[29] The interaction term was not statistically significant in separate regressions for each difficulty however we need to take into account that the percentage of children suffering each of the difficulties is less than 1% of the sample.

[30] Dahl and Moretti (2008) using data from the National Health Interview Survey find results that are inconsistent with the compensatory behavior hypothesis. Actually they find that boys with a health condition are more likely to live without a father and the effect for boys is not different than the effect for girls (however, they cannot control for birth order).

the Census data contains variables that could be used to test the hypotheses in the case of stepparents. Finally, it is also possible to think that mothers are thinking to protect their children, especially girls, from maltreatment, physical or sexual child abuse when considering the possibility of re-partnering. However, this hypothesis is unlikely to drive all the results.

4.2. Stepmothers

Given previous results, next question is to assess whether similar evidence is found when it is actually women who are to become stepmothers. Importantly, note that only 4.7% of children under the age of 14 did not live with their biological mother in the US in 1990. The percentage increased to 7.4% in 2000 and has reached a maximum in 2012 with 10.4% –according to the American Community Survey. Amongst those with an absentee biological mother cohabiting with their biological father, 4.2% had a stepmother in 1990, percentage that has stabilized around 1-2% during the period between 2000 and 2012. The percentages are relatively small which means that the model is identified with a smaller number of observations than in the previous analyses –even though, I count on more than 1.2 million father-child linked observations.

Now, does the sex of the first child also have an influence on the probability to have a stepmother given that the biological mother is absent? That is, do women also show a stronger demand for stepsons than stepdaughters? Table 7 confirms that this is not the case. While again results show that firstborn girls are more likely to be living with their biological mother, they are neither more nor less likely to have a stepmother (in the event of absence of the biological mother). In other words, the sex of the firstborn does not have any influence on the probability that a man finds a new couple in those households where there is not a biological mother. As commented, Gallup polls indicate that women are much more indifferent towards the sex of their children. Indeed, according to the evidence found, stepmothers do not favor boys or girls.

Table 7. Results for the probability of living with a stepmother (outcome) given an absentee biological mother (selection) using Sartori's estimator in the US

	Probability of living without the biological mother		Probability of living with a stepmother	
	Coefficient (standard error)	Marginal effect	Coefficient (standard error)	Marginal effect
Firstborn girl	-0.048*** (0.0038)	-0.32%	-0.011 (0.014)	-
Observations	1,245,059			
rho	-1 (fixed)			

Source: Data is from the US Census for 1990 and 2000. Marginal effects are computed using the deltha method. Control variables include third-order polynomial for age, race, education, region, employment, linguistically isolated and Census year. Weighted results. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%.

5. **Conclusions**

This paper shows that not only there is a *demand for sons* in the United States but also a *demand for stepsons* (as opposed to stepdaughters). Using Census data for 1990 and 2000 and drawing results from a selection type of model proposed by Sartori (2003), I find that not only firstborn girls (as opposed to firstborn boys) increase the probability of an absentee biological father they also worsen their mother's chances of finding a new partner. Instead, women that are the stepmothers of young children in the US do not show any preference for the sex of their stepchildren. As a result, more girls in the US (compared to boys) grow up without a father figure with the consequences this has at all domains.

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Appendix

Table A.1. Sartori's selection model results for the probability of living with a step father conditioned on the probability Explanatory variables refer to mother's characteristics.

	Selection equation: Probability of living without the biological father			Probit equation: Probability of living with a stepfather		
	Coefficient	(Std. Error)	Marginal effect (%)	Coefficient	(Std. Error)	Marginal effect
Firstborn girl	0.025***	(0.002)	0.66	-0.020***	(0.004)	-0.50
Age	-0.296***	(0.016)	-7.82	-0.647***	(0.029)	-18.40
Age^2	0.008***	(0.000)	0.20	0.018***	(0.001)	0.52
Age^3	-0.000***	(0.000)	-0.00	-0.000***	(0.000)	-0.00
Race (ref. White)						
Black	0.950***	(0.036)	26.12	0.336***	(0.007)	9.28
American Indian or Alaska Native	0.382***	(0.012)	10.48	0.061***	(0.018)	1.61
Asian	-0.234***	(0.008)	-6.53	0.172***	(0.014)	4.92
Other	0.112***	(0.005)	3.02	0.112***	(0.008)	3.19
Education (ref. No schooling)						
Nursery school to grade 4	-0.063**	(0.025)	-1.65	-0.014	(0.045)	-0.41
Grades 5 to 8	-0.014	(0.016)	-0.37	-0.003	(0.029)	-0.00
Grade 9	0.170***	(0.016)	4.72	-0.065**	(0.029)	-1.75
Grade 10	0.256***	(0.016)	7.13	-0.102***	(0.028)	-2.79
Grade 11	0.275***	(0.016)	7.68	-0.103***	(0.028)	-2.97
Grade 12	0.011	(0.015)	0.42	-0.147***	(0.027)	-4.14
1 year of college	-0.005	(0.015)	-0.00	-0.142***	(0.027)	-4.13
2 years of college	-0.157***	(0.015)	-4.20	-0.069***	(0.027)	-2.10
4 years of college	-0.447***	(0.016)	-12.12	0.118***	(0.027)	2.94

5+ years of college	-0.477***	(0.016)	-12.92	0.134***	(0.029)	3.34
Employment status (ref. works)						
Unemployed	0.238***	(0.005)	6.55	0.016**	(0.009)	0.51
Not in the labor force	-0.285***	(0.002)	-7.87	-0.013**	(0.004)	-0.26
Age at first birth	-0.179***	(0.002)	-5.00	0.133***	(0.005)	3.90
Age at first birth^2	0.002***	(0.000)	0.06	-0.000**	(0.000)	-0.00
Linguistically isolated	-0.216***	(0.006)	-5.95	0.341***	(0.011)	9.51
Year (ref. 1990)						
2000	0.134***	(0.002)	3.81	-0.027	(0.004)	-0.89
Region (ref. New England)						
Middle Atlantic	-0.041***	(0.006)	-1.15	-0.027**	(0.011)	-0.65
East North Central	-0.060***	(0.006)	-1.69	-0.179***	(0.011)	-4.77
West North Central	-0.109***	(0.007)	-3.01	-0.165***	(0.012)	-4.40
South Atlantic	-0.117***	(0.006)	-3.24	-0.221***	(0.011)	-6.00
East South Central	-0.133***	(0.007)	-3.69	-0.267***	(0.012)	-7.19
West South Central	-0.117***	(0.006)	-3.24	-0.272***	(0.011)	-7.33
Mountain	-0.066***	(0.007)	-1.83	-0.192***	(0.012)	-5.13
Pacific	-0.010*	(0.006)	-2.96	-0.175***	(0.011)	-4.75
Log-likelihood						
ρ	-1					
Observations	1,860,010					

Source: US Census data for 1990 and 2000. ***Statistically significant from 0 to 1% level, ** from 0 to 5% and * from 0 to 10%. Weighted results. ‘Asian’ includes Chinese, Japanese, Other Asian and Pacific Islander. In the 2000 Census, individuals detailed having two or more major races but as the variable was not asked in 1990, they have been all coded as ‘Other’. As for education, the category ‘No schooling’ includes also ‘Not Available’ for persons younger than 3 which does not apply given the using sample. The number of years of college has been assigned according to the number of years it typically takes to complete a certain degree (e.g. 2 years of college for an associate’s degree). Linguistically isolated identifies households in which either no person age 14+ speaks only English at home, or no person age 14+ who speaks a language other than English at home speaks English "very well". ‘Age at first birth’ was computed by subtracting the age of the eldest child in the family from mother’s age.