The effect of a sibling's gender on earnings and family formation☆

Noemi Peter [a],[*], Petter Lundborg [b],[d], Sara Mikkelsen [b], Dinand Webbink [c],[d],[e]

[a] *Faculty of Economics and Business, University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands*
[b] *Department of Economics, Lund University, P.O. Box 7082, Lund SE-220 07, Sweden*
[c] *Erasmus School of Economics Rotterdam, Burgemeester Oudlaan 50, PA Rotterdam 3062, The Netherlands*
[d] *Institute of Labor Economics (IZA), Germany*
[e] *Tinbergen Institute, The Netherlands*

ARTICLE INFO

ABSTRACT

We examine how the gender of a sibling affects labor market outcomes and family formation. Identification is complicated by parental preferences: if parents prefer certain sex compositions over others, children's gender affects not only the outcomes of other children but also the existence of potential additional children. We employ two empirical strategies that both address this problem. First, we use a large sample of singletons to estimate whether first-borns are affected by the gender of their second-born sibling. Second, we look at a sample of dizygotic (i.e. non-identical) twins. We find that a same-sex sibling increases men's earnings and family formation outcomes (marriage and fertility), as compared to an opposite-sex sibling. The results for women are similar but the effects are smaller in magnitude and less robust. We argue that the income result for men could be driven by competition between brothers, as we find that men with brothers choose higher paying occupations. For women, we find suggestive evidence that the income premium may come partly from lower unemployment, which could be due to shared job search networks. The effects on family formation might stem from differential parental treatment for men, and from competition between sisters for women.

1. Introduction

Siblings play a significant role in most people's lives. They influence the environment in which children grow up and often remain important figures in adulthood. They provide reference points to each other and also alter interactions with parents (Adams, 1999; Keim et al., 2009; McHale et al., 2003). Given that siblings affect family environment along several dimensions, they may contribute to individuals' motivation, conformity to social norms and access to different types of information. While these observations suggest that siblings have a big potential to have an impact on various long-term outcomes, evidence on causal effects in sibling relationships is still scarce.[1] We try to shed more light on

the role of siblings by studying the impact of one particular factor: we examine how the gender of a sibling affects individuals' labor market outcomes and family formation.

We expect gender to be a relevant factor because having a brother implies a different family environment and peer relationship than having a sister. Research on family conditions shows that parents are more likely to gender-differentiate their parenting in case of opposite-sex children than in case of same-sex children (McHale et al., 2003). Differential parental treatment is also present in adulthood. In particular, parents support the family formation of daughters more than the family formation of sons, for example by providing more informal childcare (Danielsbacka et al., 2011; Pollet et al., 2009). In addition to the parental

---

[1] This literature is small but emerging, with studies such as Altonji et al. (2017); Bingley et al. (2017); Black et al. (2017); Dahl et al. (2014); Joensen and Nielsen (2018); Nicoletti and Rabe (2014) and Breining (2014). Another related literature is the one on birth order effects (see e.g. Black et al., 2005; Booth and Kee, 2009; de Haan, 2010; Breining et al., 2017 and Breining and Doyle, 2015).

treatment channel, siblings can have direct effects as well. These effects can differ by the gender composition of the sibship as same-sex sibships may be more competitive (Conley, 2000). Brothers and sisters also provide different reference points to their siblings because of gender differences in general. For example, women typically marry and have children at a younger age, work in different type of jobs and have lower earnings than men on average. In sum, those with a sister are exposed to different influences than those with a brother. We examine whether this has an impact on individuals' labor market outcomes and family formation. We focus on these outcome variables as many gender differences relate to these domains.

We investigate this question with two different empirical strategies. First, we look at singletons who have at least one younger sibling. Specifically, we analyze how the gender of the second-born sibling affects the outcomes of the first-born. We examine men and women separately, thus, we compare first-born men (women) who have a second-born brother to first-born men (women) who have a second-born sister. For this strategy we make use of the Swedish Multigenerational Register which contains family links for the entire population of Sweden. This enables us to create a large sample of first-born singletons (around 1 million observations for men and women altogether). We also have access to background variables which we use to validate our identification assumption empirically, that is, that the sex of the sibling is as good as randomly assigned. In addition, we use high-quality data from various registers to investigate not only the main effects but also provide insights about factors such as occupational choice, unemployment and heterogeneity in the effect of a sibling's gender. In this additional analysis we provide suggestive evidence about potential underlying mechanisms.

Our second empirical strategy is to look at twins and analyze how the gender of a co-twin affects the outcomes of the other twin. We compare men (women) who have a co-twin brother to men (women) who have a co-twin sister. For this strategy we make use of data from the Swedish Twin Registry which contains information on twins' zygosity. This information is important for our purposes because only the sex of dizygotic (i.e. non-identical) co-twins is random; the sex of monozygotic (i.e. identical) twins is always the same as the sex of their co-twin (see Section 2). Therefore, estimates on the sample of all twins could suffer from "zygosity bias". That is, the coefficient of the co-twin's gender could pick up potential differences between dizygotic and monozygotic twins. We avoid this problem by restricting the estimation sample to dizygotic twins.

The literature on the effect of siblings' gender is small but recently expanding. The findings and their interpretations are both mixed.[2] The pioneering study of Butcher and Case (1994) found that women with any sisters attained lower education than women with only brothers, but their results could not be replicated by others (Kaestner, 1997; Conley, 2000; Hauser and Kuo, 1998).[3] Gielen et al. (2016) examine the earnings of twins and closely spaced singleton sibling pairs. They find that those with a same-sex sibling have higher earnings than those with an opposite-sex sibling, except in the case of closely spaced singleton men.[4] Brenøe (2018) focuses on the impact of a sibling's gender on women's choice of occupation and partner. Specifically, the main outcomes are whether women and their partners work in male dominated occupations, such as those within Science, Technology, Engineering and Mathematics (STEM). She finds that brothers decrease (increase) the likelihood that women (women's partners) work

in such occupations. Consistent with this finding, she also finds that brothers decrease women's earnings. Rao and Chatterjee (2018) and Cools and Patacchini (2018) both look at self-reported wages from the US. The two studies use two different surveys and reach different conclusions. Rao and Chatterjee (2018) finds that the wages of women do not change by sibling sex composition, while the wages of men are increasing in the proportion of siblings who are brothers. They also find that according to a job search questionnaire, same-sex siblings serve more often as contacts to get a job. They argue that this might explain their finding on men's wages. Cools and Patacchini (2018) find that the wages of men do not change by sibling sex composition, but women with brothers earn less. Their sample is too young to measure actual family formation, but self-reported intentions show that women with brothers are more family-centric. The authors conclude that these family-focused intentions could partly explain their findings.

In terms of empirical approach, the tradition is to include both older and younger siblings in the sample.[5] However, since parents may prefer certain sex compositions over others (Angrist and Evans, 1998), the gender of older children can affect subsequent fertility decisions. This means that the gender of an earlier born child influences the selection of a potential later born child into the sample. As we explain in Section 2 and show empirically in Section 4, this can lead to biased estimates since parental preferences may affect children's outcomes.

Both of our empirical strategies circumvent this problem. The singleton strategy avoids the selection problem since the gender of the second-born child cannot affect the existence of the first-born child retroactively. The twin strategy exploits the fact that twins are born at the same time, so parents cannot make decisions about one twin based on the gender of the other twin.[6] By executing these two empirical strategies we aim to obtain clear evidence on the effect of a sibling's gender. As we use two different samples for the two strategies, we can get a better understanding of the robustness of the effects.

Our paper provides several other contributions as well. We give a comprehensive picture of the effects as we focus not only on labor market outcomes but also on the family formation of both genders. Our sample of singletons is substantially larger than the samples of the other studies. We have high quality register data not only on important outcome variables like earnings, but also on several additional variables that can be used to learn more about the underlying channels.

In both samples, we find that a same-sex sibling increases men's earnings, their probability of ever getting married and having children, and their number of children. Our results for women are less consistent between the two samples. In the singleton sample, we find that women with a same-sex sibling earn more and are slightly more likely to form a family. However, we do not find these effects in the twin sample, which consists of older cohorts.

We find that our main results are unlikely to be explained by growing up in a larger family or by economies of scale. Instead, we argue that the positive effect on men's income could be largely driven by competition between brothers, as we find that men with brothers choose higher paying occupations. For women, we find no substantial impact on occupational choice. Instead, the positive effect on women's earnings could partly come from lower unemployment. We argue that a plausible explanation for the reduction in unemployment is that women can use a sister's job search network more efficiently than the network of a brother. For family formation, we find empirical patterns that suggest that differential parental treatment could be an important channel for men, while competition between sisters might explain the effects for women.

---

[2] We focus here on results from Western countries. For results on other populations, see e.g. Parish and Willis (1993), Morduch (2000), Chen et al. (2017) and Jayachandran and Pande (2017).

[3] Similarly, a draft by Pettersson-Lidbom et al. (2008) finds little evidence of an effect on various educational and labor market outcomes.

[4] Gielen et al. (2016) do not investigate specific social mechanisms behind their results as they focus on the relation between a potential biological factor and wages. We will discuss their approach and its differences from our strategy in Section 4.

---

[5] The two new working papers, Cools and Patacchini (2018) and Brenøe (2018), and a draft by Pettersson-Lidbom et al. (2008) do not follow this tradition. Rao and Chatterjee (2018) do a robustness check where they only use the gender of the next younger sibling as treatment.

[6] Selective abortion and IVF techniques were not available in the time period that we examine.