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Does Central Europe Import the Missing Women Phenomenon?

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Does Central Europe Import the Missing Women Phenomenon?*

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Abstract: We examine whether immigrants have brought the missing women phenomenon to Germany and Switzerland. Using a range of micro data since 1990, we find no systematic gender selection of foreigners collectively, but a group of Balkan, Chinese and Indian immigrants display comparatively high sex ratios at birth. Employing different estimation methods we consistently calculate around 1,500 missing girls in Germany (2003-2014) and Switzerland (1990-2014) combined from these selected Balkan and Asian immigrant groups. A Germany-specific measure of cultural adaptation has no substantial effect on the level of son preference, and Swiss-specific data indicate a skewed ratio for fourth parity births. With household survey data we attempt to identify underlying reasons for son preference in Germany, but find no robust associations for any socio-economic variable employed. However, the sex of older siblings tends to matter, and again Balkan, Chinese and Indian immigrants increase the boy-birth likelihood whereas immigrants collectively do not.

Keywords: Missing Women, Sex Ratio at Birth, Son Preference, Migration

JEL Classification: J11, J16

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I. Introduction

Migration is a pressing global development issue and the United Nations (2016) estimate a current 244 million international migrants worldwide, of which 76 million are hosted by European countries. Economic prospects and labor market opportunities have recently turned Central Europe into the continent's gravity center for immigration. Migration flows to Germany and Switzerland have been of sizeable dimension in recent decades, in particular from countries located in Southeast Europe[1].

The socio-economic consequences of these migration waves have influenced the public discourse: Changes of the gender composition in European countries due to migration, received media attention (Ritter, 2016) and migrants may carry a range of traditional practices that differ from their new environment[2]. Such practices include different gender attitudes and potentially a relative preference of sons over daughters. Sen (1990) famously dubbed this form of female discrimination the "missing women" phenomenon. Although it is typically rather associated with India and China (Croll, 2001; World Bank, 2011), there is evidence that even within Europe son preference varies among countries (Anderson & Ray, 2010; Guilmoto, 2015; Instat, 2014). Previous literature has focused on Asian immigrants and suggests continued gender selection practices (Abrevaya, 2009; Dubuc & Coleman, 2007). We are not aware, however, of any work that has examined to what extent Southeast European immigrants have affected sex selection at birth in Central European countries. As migrants in Germany and Switzerland tend to came from the Balkans rather than from Asia, this paper aims to fill the research gap in the economics of migration and gender. We search for evidence whether the missing women issue was "imported" by migrants from Southeast Europe to Central Europe.

The map in figure 1 reflects our research motivation. It gives an overview of the average sex ratios (2003-2013) of all European countries from Germany and Switzerland to the East[3],

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[1] In the 2014 German micro census, the individually listed groups from Bosnia-Herzegovina, Serbia, and former Yugoslavia alone amount to more than two million people, or twelve percent of all migrants in Germany (Federal Statistical Office, 2015a). Migrants from that region have also begun to pursue alternative migration channels: about 30 percent of all asylum applications in Germany in 2015 were submitted from Balkan people (BAMF, 2016). Likewise in Switzerland, the 2014 national statistics indicate that citizens of Serbia, Montenegro, Kosovo, Bosnia-Herzegovina, and Macedonia account for 14 percent of all foreigners in the country, totaling around 275,000 people BFS (2015b).

[2] Kountouris and Remoundou (2016), for example, document how cultural background is a significant determinant of migrants' individual environmental attitudes.

[3] Data for all European countries except Kosovo, are from World Health Organization Europe (2015); for Kosovo, Kosovo Agency of Statistics (2014); for India and China, United Nations Population Division (2015).

as well as India and China. Countries are highlighted in red whose sex ratio has been at least 1.07, i.e. for 100 girl births there are on average 107 boy births or more. We observe a geographical concentration in Southeast Europe that deviates from what is considered a biologically normal sex ratio at birth of 1.04-1.07 (Chahnazarian, 1988). Albania, for example, reports an average ratio of 1.11 which is as high as the widely discussed national Indian figures. This paper is the first to provide a deeper explorative analysis of migrant groups from that region to Germany and Switzerland.

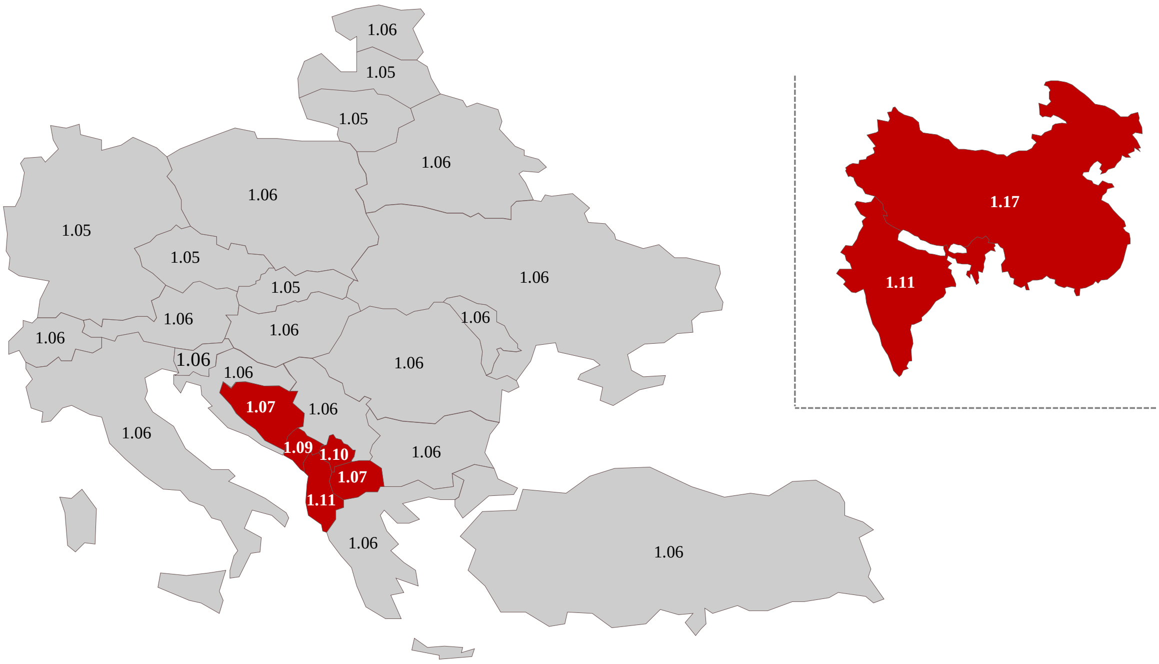

Figure 1: Average Sex Ratio at Birth (boys over girls) from 2003-2013 in Central and Eastern Europe, India, and China

To examine this complex topic of migration and gender discrimination, we employ different empirical techniques using three distinct micro data sources. We initially resort to abortion data as the most direct source for discovering sex-selective birth behavior. These provide a first indication on the extent of abortion practices, and their dynamics with respect to timing and child parity. We then analyze more than a decade of complete national birth registries along maternal citizenship and sex of the born child. In addition, from German data we are able to infer a proxy for the parental level of cultural adaptation. Swiss birth records in return document birth parity, which allows for a more granular perspective. Lastly, we employ the socio economic panel study (SOEP), a representative annual survey of households in Germany, to explore potential determinants for different sex ratios at birth. Thereby, we try to obtain a more refined picture of individual household characteristics. Comparing Germany and

Switzerland, which are otherwise similar both in terms of culture and socio-economic position, serves to investigate the consistency of our findings.

Results from abortion statistics over recent years support the hypothesis that sex-selective abortion may exist in Germany and Switzerland. From the birth registries we find that foreigners collectively show a slightly elevated sex ratio at birth compared to natives. The ratios, however, are still within biologically normal ranges and provide no evidence of a systematic “missing women” issue. Yet, a sub-group of Balkan, Chinese, and Indian immigrants display a systematically higher ratio. From this we conclude that there may be some gender selection which we document nonetheless to be small in absolute numbers.

Further results indicate that sex ratios at birth do not vary much if the father is German or from the same country as the mother, and also the number of years the parents spent in Germany has no substantial differentiating effect. The birth data for Switzerland reveal a u-shaped pattern of the sex ratio along parities, i.e. after a more skewed ratio for first parity the ratios decrease towards a more balanced rate for second and third parities, before sharply increasing again for fourth parity. Independent of the estimation method chosen, we consistently calculate around 1,500 missing girls in Germany (2003-2014) and Switzerland (1990-2014) combined from the highlighted Balkan and Asian immigrant groups. For foreigners collectively, in return, no robust evidence for missing girls is found.

Finally, we exploit the German SOEP and regress the proportion of male children as well as the boy-birth likelihood per household on demographic and socio-economic variables. Results again suggest that higher son preference is associated only with selected (Balkan and Asian) migrant groups, i.e. not migrants collectively, which is consistent with the findings from birth registries. Furthermore, existing female siblings play an important role, raising the odds for a boy birth significantly if the first child was a girl. Third, religiosity seems to be the only socio-economic variable that matters, but effects depend on the population group examined.

The paper is structured as follows. Section 2 reviews the related literature and points at the research gap regarding migrants from Balkan countries. Section 3 presents our three data sources and section 4 discusses the empirical results. Section 5 offers concluding remarks.

II. Literature Review

This paper contributes to three strands of the “missing women” literature and links issues of migration with the economics of gender. On the one hand, it adds to the research quantifying excess female mortality rates. Studies have examined this phenomenon in various countries of the world (Basu & Das Gupta, 2001; Dahl & Moretti, 2008; Das Gupta, Chung, & Shuzhuo, 2009; Meslé, Vallin, & Badurashvili, 2007; UNFPA, 2012b; Yount, 2001), leading to estimates on how many women are globally missing due to this form of gender inequality (Anderson & Ray, 2010; Bongaarts & Guilmoto, 2015; Coale, 1991; Klasen & Vollmer, 2013; Klasen & Wink, 2003; Sen, 1992). Some papers have then specifically looked at Southeast Europe, which also displays excess female mortality rates as documented in figure 1. Studies on general demographics and gender inequality in that region (Gjonca, 2004; Gjonca, Aasve, & Mencarini, 2008, 2009; Hall, 1994) have been complemented by focused research on the sex ratio at birth (Guilmoto, 2010; Polasek, Kolcic, Kolaric, & Rudan, 2005; UNFPA, 2015)[4].

Figures by the United Nations Population Fund (UNFPA, 2012a) as well as national statistical bureaus (for example Instat, 2012) also emphasize the enormous migration waves from Balkan countries to Western and Central Europe: in Albania alone, 24 percent of the population emigrated during the 1990s. It has been pointed out that migration flows may substantially affect the level of gender preference and the sex ratio at birth in both the original and the receiving country (Attané & Guilmoto, 2007; Dyson, 2012). Recent work therefore analyzed sex ratios at birth among migrants from societies that are known for son preference. Among the first, Dubuc and Coleman (2007) document an increase in the sex ratio of births to India-born mothers in England and Wales, especially for higher-order births. Abrevaya (2009) analyzes immigrant groups in the United States and concludes that over 2,000 Chinese and Indian girls are "missing" in the country between 1991 and 2004, especially due to gender selection at later births. Almond and Edlund (2008) have comparable results for the U.S., and Almond, Edlund, and Milligan (2013) re-confirm a similar outcome for South and East Asian immigrants in Canada. For the latter study, they specifically report substantially elevated sex ratios at birth at higher parities if the previous children were all girls.

We identified four additional papers that conduct a similar analysis for continental European countries. Verropoulou and Tsimbos (2010) conclude from Greek birth records that Albanian mothers have a five percent higher chance of having a male birth than Greek mothers, and Asian mothers also have a significantly higher sex ratio at birth than native Greeks. However, their sample comprises only a bit more than 100,000 births in total (out of which 12,000 are Albanian and only 1,200 Asian), which might not be sufficient for reliable estimates.

[4] Nonetheless, the issue of "missing women" is often unnoticed or not yet acknowledged in the region as described by Guilmoto and Duthé (2013). For instance, Stump (2011), a member of the European Council, notes that the Albanian authorities do not consider the skewed birth ratio as a nation-wide problem, but a sporadic phenomenon limited to some remote areas.

Gavalas, Rontos, and Nagopoulos (2014) conduct a second study on Greece with a larger sample, and report for Indian and Chinese mothers a highly elevated sex ratio at birth of 1.18 on average. Singh, Pripp, Brekke, and Stray-Pedersen (2010) conclude a comparable phenomenon in Norway for Indian, but not for Pakistani immigrants. Finally, González (2014) documents son-biased sex ratios at birth among Asian-born parents in Spain, which however have little impact in absolute terms since the Asian population in Spain is extremely small.

In summary, all papers have found that immigrants from countries with known son preference continue to display distorted sex ratios at birth also in their new environment. However, nearly all research focuses exclusively on Asian immigrants, and groups from Southeast Europe are neglected despite their large migration waves and their strong son preference that can be traced back in birth statistics for around 100 years (UNFPA, 2012a). Balkan migrants are also particularly interesting as they can be classified to the same major race as people in Western and Central Europe (Anemone, 2011). In addition they are reasonably proximate in terms of geography, and Jorde and Wooding (2004, p. 30) conclude from human genetic variation analysis that "most individuals from the same geographic region will be more similar to one another than to individuals from a distant region". Hence, potential biological bias that could cause diverging sex ratios at birth because groups belong to different races/ethnicities (Anderson & Ray, 2010; James, 1987) can be eliminated through this approach. The study by Verropoulou and Tsimbos (2010) examines Albanian migrants in Greece, but it relies on birth data from one single year and contrasts two population groups which live directly adjacent and are therefore probably substantially intertwined. Hence, to our knowledge this is the first paper to examine son preference effects from Southeast European migrants that moved to Central and West European countries. We also use data from two host countries (Germany and Switzerland), each spanning more than ten years of birth records to ensure a sufficiently large sample and robust conclusions.

Secondly, we contribute to the understanding of the mechanisms for implementing sex-selective practices. It is essential to clarify that these mechanisms are only the outcome channel from underlying son preference. Several options during and before pregnancy have been identified in the literature to reach a higher boy-birth likelihood (for a comprehensive overview, see Guilmoto, 2015). In recent decades, the rise of sex-selective abortions has been a key instrument. Two very common methods, sonography and non-invasive prenatal tests, allow for sex identification at early stages of the pregnancy, upon which the parents may act and abort a female embryo. There is no official documentation about this sex-selective practice, and Westoff (2005) notes that its extent is particularly unknown in Eastern Europe. The level of technology available is hereby important, in particular access to and cost of prenatal diagnosis (Abrevaya, 2009; Arokiasamy, 2007; Banister, 2004; Bongaarts, 2013; Junhong, 2001; Kim, 2005; Zeng et al., 1993). An alternative mechanism to eliminate children of undesired sex are neglect and lack of healthcare, which in theory could also be exercised before birth, but which appear unreliable and hence less common. Instead, adjusting the number of children represents another main mechanism for parents to achieve the desired son preference, leading to son-preferred differential fertility-stopping behavior (Filmer, Friedman, & Schady, 2009). The concept denotes that the desired number of children depends on the number of boy births, where typically no more children follow if the most recent child born was male. Zeng et al. (1993), Park and Cho (1995), and Das Gupta (2005), among others, reaffirm this mechanism empirically by documenting highly skewed sex ratios at last birth. Related research has also shown that contraception increases after a boy birth compared to after a girl birth (Arnold, 1997; Retherford & Roy, 2003), while a girl birth increases the likelihood that a mother shortens the birth interval until the next child (Leone, Matthews, & Zuanna, 2003; Milazzo, 2012). In this paper, we attempt to reveal the likely mechanisms of different population groups for implementing son preference in Germany and Switzerland, with a focus on sex-selective abortion.

The third strand of literature related to this paper seeks to explain the “underlying motives for gender selection” (Abrevaya, 2009, p.29) in the first place. A large research body exists both on roots for gender inequality (among others, Doepke & Tertilt, 2009; Doepke, Tertilt, & Voena, 2012; Jayachandran, 2014b), and more specifically on determinants of biased sex ratios (Bhat, 2002; Bulte, Heerink, & Zhang, 2011; Das Gupta et al., 2003; Kishor, 1993; Miller, 1985; Park, Bowen, & Steinbacher, 2012; Visaria, 1971). Bhaskar and Gupta (2007) caution to interpret a rise in the population’s sex ratio as reflecting son preference or discrimination against women, as other factors impact the sex composition of different age groups as well (see also Calvi, 2015). However, with our exclusive focus on the sex ratio at birth we are confident to largely eliminate such omitted variable bias. Hesketh and Xing (2006) summarize more than 30 demographic and environmental factors that have been associated with the sex ratio at birth, many of which are naturally interdependent and thus difficult to isolate.

Declining fertility levels are widely proposed as major determinant for stronger son preference (Banister, 2004; Das Gupta & Bhat, 1997; Graham, 2007; Guilmoto, 2009; Jayachandran, 2014a; Lin, Liu, & Qian, 2014), although Klasen (2008) contests such a relationship. The role of public policies has also been identified as critical (Abrevaya, 2009; Klasen & Wink, 2003; Nandi & Deolalikar, 2013; Sudha & Rajan, 1999), and similarly the overall political economy seems to matter, i.e. the political and economic system in place as well as the effects of changes and socioeconomic turmoil (Das Gupta, 2010; Das Gupta & Shuzhuo, 1999; Horrell, Meredith, & Oxley, 2009; Nicholas & Oxley, 1993). Moreover, differences in environmental and geographical conditions have been suggested to explain variations in the sex ratio at birth (Arokiasamy, 2004; Attané & Guilmoto, 2007; Fukuda, Fukuda, Shimizu, & Moller, 1998; Guilmoto, 2008, 2012; Hansen, Moller, & Olsen, 1999; Kim, 2010; Rose, 1999), and so has the access to media (Gillard, Howcroft, Mitev, & Richardson, 2008; Jensen & Oster, 2009).

Underlying economic reasons for patriarchal traditions and behavior, including patrilocality and patrilinearity, are discussed in more modern economic literature. Several papers argue that biased sex ratios at birth are rooted in practices of ancient agriculture-based economics (Aldashev & Guirkinger, 2012; Alesina, Giuliano, & Nunn, 2013; Carranza, 2014; Mayer, 1999), while others point at land inheritance customs that benefit sons (Arokiasamy & Goli, 2012; Jain, 2014; Lahiri & Self, 2005; Lahiri & Self, 2007; Sudha, Khanna, Rajan, & Srivastava, 2007). Increased poverty risk from dowries (Das Gupta, 2000), divorce laws (Sun & Zhao, 2011) and relatively less supply of brawn (Rosenblum, 2013) in case of a daughter further contribute to a patriarchal and son preference culture. Another incentive for male offspring lies in the expected care for parents at old age, for which daughters are widely not considered responsible (Bhasin, 1993; Ebenstein; Geeta, 2007; Larsen, Chung, & Das Gupta, 1998; Sun, 2002).

Yet, with our geographical focus, we believe that the determinants for son preference cited so far have limited usefulness, as they apply more to countries in strong socio-economic transition. Central Europe has arguably remained rather stable over the course of our observation period. Also, statistical constraints and the level of available micro data from household surveys (we only find a sufficient sample for Germany) lead to a limitation of the number of explanatory variables. Therefore, we introduce the following four socio-economic variables, which both find support in the literature and which we feel are most relevant in our research context. These represent a best effort towards explaining the small variation of the sex ratio at birth of different groups.

The individual income level of a household is thought to have a strong association with gender selection practices, although the relationship is not linear but tends to follow an inverted u-curve (Bhat & Zavier, 2007; Klasen & Wink, 2003; Sen, 1990). Guilmoto (2015) confirms that the initially positive relationship between household income and prenatal discrimination can be reversed above a certain social level, with son preference falling among the rich. Female labor force participation represents an important element in there, reducing gender inequality and son preference (Klasen & Wink, 2002; Qian, 2008; Sudha et al., 2007). However, Retherford and Roy (2003) note the monotonous trend of increased propensity for sex-selective abortion with higher (female) socioeconomic status. Murthi, Guio, and Drèze (1995), Banister (2004) Chamarbagwala and Ranger (2006), and Echávarri and Husillos (2016) caution similarly that one should not rely on rising income levels to improve the shortage of daughters.

Higher incomes are closely linked to access to better health, the second variable we consider highly relevant. Many studies find health differences a key driver behind missing women (Barcellos, Carvalho, & Lleras-Muney, 2012; Basu, 1992; Bose, 2011; Croll, 2000; Jayachandran & Kuziemko, 2011; Timaeus, Harris, & Fairbairn, 1998) although they tend to focus on post-natal mortality. A recent explanation for pre-natal excess female mortality was centered on the prevalence of hepatitis B, but could not be maintained (Das Gupta, 2005; Klasen, 2008; Lin & Luoh, 2008; Oster, 2005; Oster, Chen, Yu, & Lin, 2008). Eguavoen, Odiagbe, and Obetoh (2007) argue that a woman’s decision-making power on health predicts the level of son preference. Bharadwaj and Nelson (2010) and Agrawal and Unisa (2007) document preferential prenatal treatment of males in Asia, for example through more frequent tetanus shots and visits of antenatal clinics during pregnancy[5].

Education levels comprise our third socio-economic variable, which is usually associated with decreasing female mortality rates (Arokiasamy, 2007; Drèze & Sen, 1995; Foster & Rosenzweig, 2001; Klasen & Wink, 2003). Alam, van Ginneken, and Bosch (2007) in return find no effects, results by Abrevaya (2009) also yield mixed conclusions, and Das Gupta (1987) reports that the sex ratio at birth is actually elevated among more educated women for higher order births. Lastly, religion has been put forward as important determinant for son preference, both in terms of type of religious affiliation, and the extent of religiousness (Almond et al., 2013; Kim & Song, 2007). Guilmoto (2015) notes that for all main religious groups except Judaism a skewed sex ratio at birth can be found somewhere in the world. Hence, it would be a hasty judgment to call out a single “anti-women” religion. Due to this inconclusive finding and the public discussions on the impact of (non-traditional) religious groups in Germany and Switzerland, we incorporate it in our analysis as well.

[5] Nutrition as an aspect of health is also discussed in the literature, with mixed results, amongst others in Klasen (1996), Sommerfelt and Arnold (1998)(1998), Deaton and Drèze (2009). However, all research examines gender-specific effects *after* birth, which is not our direct focus.

Literature that examined reasons for ongoing son preference among migration groups could so far not resort to wider individual-level data. Thus little knowledge exists in particular on socio-economic determinants which could explain the observed patterns. With regards to our focus region in Southeast Europe, a report by the United Nations Population Fund (UNFPA, 2012a) on Albania describes that son preference was already visible in birth registries from the 1920s. The communist regime that ruled until 1990 attempted to emancipate Albanian women, yet recently a reverse trend towards again more traditional values can be observed (see also Morris, Herold, Bino, Yili, & Jackson, 2005). The local gender attitudes seem to be exemplary for neighboring Balkan countries with similarly biased sex ratios at birth, but do not explain how migrants would act in a new environment. What may cause sex-selection practices among the Balkan diaspora in Central Europe? The third contribution of this paper is to explore why this phenomenon continues to exist in Germany, in particular, with a focus on the four socio-economic variables income, health, education, and religion.

III. Data Sources and description

In order to investigate the number of missing women and potential economic determinants, we resort to three micro data sources. These are national abortion data, federal birth records, and household surveys. Abortion and birth records are fully comprehensive per country, while the survey sample is nationally representative. With this range of sources, we aim to balance individual disadvantages of each while leveraging their combined strength.

Abortion Data

We begin our empirical work by investigating whether abortion data are suitable as they represent the arguably most direct source for sex-selective birth behavior. Data and variable structure provided by the national statistical offices differ considerably between countries: Records for Germany (Federal Statistical Office, 2015b) are available for a longer historical period than for Switzerland (BFS, 2015a), and only Germany provides data on the reason for abortion and the number of previous live births. Both countries collect data for the total absolute and relative number of abortions per year, as well as the timing of the abortion in terms of weeks of gestation.

Overall, data for Germany and Switzerland are able to provide only first suggestive evidence since key variables of interest are not included, a fact that was observed also in other

Western countries (Abrevaya, 2009)[6]. Nonetheless, including these statistics as part of our broad empirical analysis will be useful for an understanding of abortion dynamics, as well as for exploring initial hypotheses on gender-selective practices.

Federal Birth Data

Federal birth data for Germany (Federal Statistical Office, 2015c) and Switzerland (BFS, 2015c) document all individual births per country on an annual basis. Such birth registries are also the most widely used source for research on imbalanced sex ratios at birth, respectively "missing women" (Almond et al., 2013; Attané & Guilmoto, 2007; Chung & Das Gupta, 2007; Klasen & Wink, 2003). For Germany, the key variables of interest, i.e. the citizenship of the mother and the sex of the born child, are available as of 2003, whereas the equivalent records for Switzerland can be retrieved theoretically up until 1970. We will, however, limit our data analysis to the time period since 1990, as this roughly coincides with the fall of the iron curtain and the onset of large migration waves from the Balkans to Western Europe. Note that one limitation of the data in both countries is missing direct information on race and immigration background. That means we are unable to include foreign-born mothers that have received German or Swiss citizenship in our target sample of immigrants, since we have to rely on the technical classification of citizenship as sole migration characteristic. For instance, mothers with Asian race and German citizenship would be accounted towards the overall German population group. As a consequence of this strict migrant versus native classification, our estimates of the extent of a missing girls phenomenon appear rather conservative.

Additional variables collected in the federal birth data vary between the two countries. In the German data, we find information on the citizenship of the newborn, which allows to draw conclusions on the family's migration history. According to current legislation, if the mother is foreign, the newborn may be German because the father is German (*ius sanguinis*), or because at least one of the two foreign-born parents has lived in Germany as legal resident for a minimum of eight years with a permanent right or residence[7] (*ius soli*) (Federal Foreign Office, 2015).

[6] Information on the gender of the embryo is not recorded, and likewise existing (previous) live births are not broken down further along gender. We also miss a detailed citizenship split of the parents which would allow to identify our target immigration groups.

[7] This rule on citizenship has been into force since the year 2000, hence our data sample covering the years 2003-2014 is fully governed by described legislation.

We can then determine through which of these two channels a newborn receives German citizenship given the mother is foreign-born. The father's citizenship is also recorded in the German birth registry for all married couples, which we re-code for our purposes as a dummy variable of "being German" versus "carrying the same (foreign) citizenship as the mother". Hence, a newborn that is given German citizenship despite both parents being foreigners must be due to the fact that the family (more precisely, at least one parent) has lived in Germany for at least eight years. In contrast, we know from a newborn with foreign citizenship that none of the parents is German, and that both have lived in Germany for less than eight years. Figure 2 summarizes the logic of all potential outcomes. Our inference regarding the time an immigration family already spent in Germany may directly be associated with its degree of socio-cultural assimilation (Robertson, 2001). Put differently, we are able to examine if the sex ratio at birth differs depending on the level of assimilation of the respective immigration group, measured through the years already spent in Germany. This is a particular feature compared to other national birth data statistics, which we are able to exploit for our research.

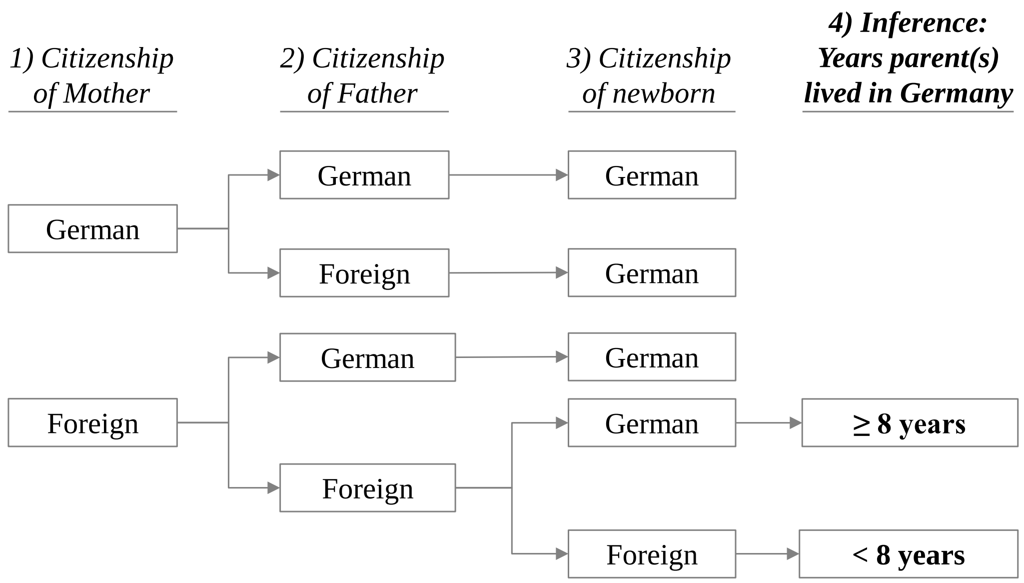

Figure 2: Logic of citizenship of newborn and resulting inference on parental time in Germany

The Swiss birth registry in return includes two other variables that allow additional targeted analyses. It records the age of the mother in seven age brackets, which may serve to examine differential dynamics of gender-selective practices depending on the woman's age and lifecycle situation (Lin et al., 2014; Verropoulou & Tsimbos, 2010). Even more important is the information provided per birth on child parity, i.e. we know how many previous children have been born into the family. While there are unfortunately no data on the sex of these existing children, we can nonetheless investigate the interaction between child parity and sex ratio at birth, which has been suggested as a key relationship (Park & Cho, 1995; Retherford & Roy, 2003; Zeng et al., 1993).

National Household Surveys

As discussed in the literature review, a variety of reasons are put forward to explain sex selective practices for newborns, and determinants why population groups continue to exert such behavior even after they migrated to a new country are not well understood. We attempt to shed some light on this debate towards the end of this paper, where we move from a census to household survey micro data. The German socio economic panel study (SOEP, 2015) is a representative annual study of private households, with nearly 11,000 households, and about 30,000 persons participating in the survey. For our purposes here, it contains useful information on citizenship, migration background, and the number as well as the sex of each child in the household. In addition, it collects a range of socio-economic variables. It is that latter part which we do not find in abortion statistics or birth registries (which are otherwise preferable as they are exhaustive). We base our analysis on version 30 of the SOEP survey, which hence covers the annual rounds from 1984 until 2013. Representative individual data are available for various population groups, including people with migration background.

Given that our statistics so far covered both Germany and Switzerland, it would seem natural to mirror the micro data analysis also for individuals in Switzerland. To this end, we inspect the suitability of the Swiss Household Panel (SHP), a yearly panel study following a random sample of private households in Switzerland over time. However, the number of households is smaller than the SOEP, and the variables that are of interest to us suffer in particular from poor response rates. For example, the target Balkan and Asian immigrants in the Swiss household survey record only 45 births in total since 1990, which would make meaningful analyses impossible, especially since we want to break those further down along birth parity. Hence, the focus of the micro data analysis will rest on Germany.

Our empirical strategy tests whether a set of demographic and socio-economic variables from the SOEP data are able to explain differences in the children's sex ratio at birth per household, measured as boy birth likelihood. For this purpose, sufficient data variation and sample size needs to exist per regression equation. We focus on three specifications: One considers all respondents, i.e. it mirrors the total population in Germany, the second is a sub-sample of foreigners only, i.e. all respondents with migration background, and the third is a sub-sub-sample of all foreigners with migration background from our target Balkan and Asian countries only. As the survey has a set of questions on origin and migration background, we can develop a less technical definition of being a migrant than what we had to resort to in abortion and birth statistics. Together with the questions on sex and parity per child per household, the survey collects the country of birth per individual through two separate questions[8]. We select all individuals as belonging to our target migration group who indicate as country of birth Albania, Bosnia-Herzegovina, Kosovo, Macedonia, Montenegro, Yugoslavia, China, or India. We then take only the most recent entry per individual to avoid weighing those individuals more who participated several times in the survey, and to have the most up-to-date picture of each household. We observe in several instances that a household in the most recent survey round reports an additional newborn, which is of course critical for our analysis.

In total, these selection criteria yield 208 target migration individuals, which is ca. 0.3 percent of the overall sample of 57,000 cases. This suggests an underrepresentation of this group with respect to the German population, as the German micro census accounts more than two million, or 2.5 percent of the overall population, to these nationalities. Finally, we eliminate all cases with no reported children (either because they explicitly report no children, or because the respective data entries are missing), which leaves us with 108 distinct target migration households. In the SOEP data, this compares to 2,209 foreign households with a general migration background and children, and 16,497 German households with children.

Initial data inspection indicates that the two migration samples (all migrants collectively, and our target migrant sub-sample) may not be large enough to create sufficient data variation, which is needed to explain the comparatively small differences in the sex ratios at birth (see table 8 in the appendix for descriptive summary statistics). This is an issue shared with other commonly used sources such as DHS surveys (Guilmoto, 2015). Also, the sex ratios at birth are surprisingly elevated for the overall sample (which mainly consists of German households) compared to the migrant sample. The target migration group, on the other hand, displays highly male-biased sex ratios at birth up until the third child, which exceed all other samples[9].

Our set of explanatory variables recognizes the general need for “controlling for observable differences in parents’ characteristics” (Abrevaya, 2009, p. 15), and takes up the four main determinants of son preference which we discussed in the literature review.

[8] These questions are collected as part of the bio information. One entry asks directly for the country of birth; the other asks more generally if the country of birth is outside Germany, and in a second step allows respondents to specify which foreign country they were born in.
[9] We regard the fourth parity statistics as not reliable given that these comprise only 22 births.

Specifically, we look here at underlying *causes* of higher boy-birth likelihood rather than the *mechanisms* to achieve that (stopping rule behavior, sex-selective abortion, neglect of girls, etc.), which are often mixed in the literature. We would like to examine a larger set of variables, but the data availability and response rate in the SOEP represents a substantial limitation. In addition to the information on an individual's siblings, our selection thus remains with income levels, religiosity, health, and education.

IV. EMPIRICAL EVIDENCE FOR THE MISSING WOMEN PHENOMENON

Evidence form Abortion Data

We begin with an overview of abortion dynamics over recent years in Germany and Switzerland (Table 1). The total numbers since the 2000s reflect that abortions are a sizeable factor, as on average about one in seven pregnancies is aborted[10]. About half of all pregnant women who decide to abort are single. Panel B indicates that availability of early sex-determining technologies may have a direct influence on abortion dynamics. Both in Switzerland and Germany, elective abortion is only legal up until the twelfth week of gestation, which however, according to some practitioners, already allows to identify the sex given high ultrasound quality (UNFPA, 2012a). Efrat, Akinfenwa, and Nicolaides (1999) find that the accuracy of sex determination increases with gestation from 70.3% at 11 weeks, to 98.7% at 12 weeks and 100% at 13 weeks. Parents willing to act on a less than 100% certainty of correct sex determination hence do have a time window to abort within the legal boundaries, and many mothers time their abortion to just before week 13. In addition, new noninvasive cell-free fetal DNA testing is widely marketed, which allows with a very high level of accuracy sex determination as early as week five after conception (Almond & Edlund, 2008; Mozersky & Mennuti, 2013). While theoretically doctors are still not allowed to disclose the baby's gender to parents until after week twelve, adherence to this rule is difficult to enforce if results are on hand.

After week 12, the two countries report only between two and four percent of abortions. This still translates into 2,780 abortions in Germany for 2014 after gestation week 12, but it remains speculative how many of those might be unofficially driven by gender selection. While

[10] Comparing this figure with Balkan countries proves to be difficult due to the high heterogeneity of officially reported numbers. Albania and Montenegro, for example, report for the 2000s an abortion rate of more than 20%, whereas the rate in Kosovo is only at around 5% (Instat, 2014, p. 51; Johnston 2015).

elective abortion is illegal after week 12, our interest group, i.e. European immigrants from the Balkan, have the realistic alternative to go on a "medical trip" to their home country and receive the desired treatment there. Interviews with Albanian women by the UN note that "there is a law on abortion, but it doesn't get implemented" (UNFPA, 2012a, p. 87). Consequently, cases like the following appear frequently: "My sister-in-law had an abortion when she was at the fourth month of pregnancy. The doctor at the hospital refused to do it, so she paid one of the nurses. The nurse let her in the hospital during the night, wearing a white uniform, and performed the abortion herself" (ibid., p. 85). It seems plausible that pregnant women that are originally from that region will also find a way to abort if their intent and financial background are just strong enough – but this would never appear in the data[11]. From Panel C we see that at least for Germany elective abortion comprises the overwhelming majority of all cases. This may be interpreted as existence of a societal attitude that widely tolerates a woman's "free" choice to abort – so sex-selective abortion might also be questioned less.

The hypothesis for existing prenatal sex discrimination receives perhaps the largest support from panel D, indicating that more than one third of abortions takes place after two children or more. Family planning emerges as key cause for this outcome, in line with declining fertility trends (Banister, 2004; Das Gupta & Bhat, 1997; UNFPA, 2012b; World Bank, 2011). Consequently, there is also a reduction as to how often parents are willing to "try again" for a son. Limiting the number of children has been identified as a major cause of soaring sex ratios at birth (Dyson, 2012; Filmer et al., 2009; Graham, 2007; Guilmoto, 2009; Jayachandran, 2014a). The abortion statistics for Germany, in combination with societal acceptance for abortion, state of the art technology for early sex determination, and the possibility to return relatively easy to the Balkans to abort after week 12, all leave considerable room for the hypothesis that prenatal sex selection could also exist among Balkan migrants in Central Europe. Yet, the findings so far are not conclusive.

[11] Allahbadia (2002, p. 414) describes a similar pattern for Indian parents in the United States and Canada, who are "courted by American companies" towards highly effective sex selection.

Table 1: Summary Statistics of Abortion in Germany and Switzerland

	2000	2007		2014	
	(1)	(2)	(3)	(4)	(5)
	Germany	Germany	Switzerland	Germany	Switzerland
Panel A: Number of legal abortions					
Total	134,609	116,871	10,645	99,715	10,249
Abortions as share of live births	17.5%	17.0%	13.8%	13.8%	11.7%
Share of Single Women	44.5%	52.9%	n/a	57.7%	n/a
Panel B: Weeks of gestation					
8 weeks or less	46%[1]	39%[1]	70%	72%	74%
9-12 weeks	52%[1]	59%[1]	23%	26%	22%
More than 12 weeks	2%	2%	4%	2%	4%
Panel C: Reason for abortion					
Elective abortion	130,945	113,774	n/a	96,080	n/a
Health	3,630	3,072	n/a	3,594	n/a
Rape / Reproductive Coercion	34	25	n/a	41	n/a
Panel D: Previous live births					
Zero	38%	41%	n/a	39%	n/a
One	25%	26%	n/a	25%	n/a
Two or more	36%	33%	n/a	35%	n/a

Footnote 1: Until 2009, Germany applied a different split of the weeks of gestation until week 12 as follows: 7 weeks or less (taken here as proxy for "8 weeks or less"), and 8-12 weeks (taken here as proxy for "9-12 weeks)".
Notes: Detailed data for Switzerland only available as of 2007. Numbers may not add up due to rounding or missing data entries. Germany has no data on nationality, while Switzerland has no data on the reason of abortion and the previous live births.
Source: Federal Statistical Office Germany (Destatis); Swiss Federal Statistical Office (BFS).

Evidence from Federal Birth Data

We therefore turn to statistics of the federal birth data as summarized in table 2. Aggregate results are broken down by maternal citizenship along the specific birth variables and time periods that are available for Germany and Switzerland as introduced earlier. Based on the insights from figure 1, we select three samples of immigrant groups for analysis. First, we look at all immigrants, i.e. all women in Germany who are non-German, respectively all women in Switzerland who are non-Swiss. We then take two sub-samples: On the one hand, we pool immigrants from the five Balkan countries which have been found to display son preference (Albania, Kosovo, Montenegro, Macedonia, and Bosnia Herzegovina). On the other hand, we examine Indian and Chinese women to assess their gender selection behavior, and to compare it to the birth dynamics of the highlighted Balkan countries. In addition, we report German, respectively Swiss citizen birth rates as native “baseline” per country.

The census data indicate that foreign mothers account for a substantial portion of overall births in our timeframe (21% in Germany, and 49% in Switzerland), totaling over two million newborns. In each country, nearly ten percent of these foreign births can be attributed to mothers of the highlighted Balkan countries – more than 100,000 births in total. The largest Balkan immigration group in absolute birth numbers are Kosovarians in Germany with 35,000 births, and Macedonians in Switzerland with 26,000 births, over the respective time periods. Chinese and Indian births are little in numbers, reflecting their small population share. We hence note that the distribution weights among immigrant groups is very different from other regions such as North America, which makes our focus on the highlighted Balkan countries all the more relevant.

Table 2: Federal Birth Data in Germany and Switzerland along Citizenship

Mother's Citizenship	(1) Domestic	(2) All Foreign	(3) 5 Balkan Countries	(4) China and India
Panel A: Germany (2003-2014)				
Total number of births	6,784,294	1,430,242	118,287	22,685
Sex ratio at birth	1.053	1.055	1.077	1.057
Father same citizenship as mother	n/a	52%	75%	56%
Parents in Germany less than 8 years	n/a	30%	34%	42%
Panel B: Switzerland (1990-2014)				
Total number of births	1,326,729	655,293	58,713	7,362
Sex ratio at birth	1.055	1.059	1.058	1.080
Mother below 30 years	38%	50%	74%	37%
Birth parity	1.79	1.68	1.80	1.46

Notes: The citizenship in columns refers to the mother's citizenship reported at the time of the child's birth. The sex ratio at birth is the ratio of male over female births. "Father same citizenship as mother" indicates the percentage of fathers which has the same citizenship as the mother. As the variable is dummy coded (1 = same citizenship as mother, 0 = German), column 1 has no values since here the two dummy categories coincide. Also, this variable is only collected for married parents, which decreases the sample size by about one third. For Switzerland, "birth parity" denotes the average number of children per mother. Information on this variable is not always collected, so that the sample size for this variable is smaller (there are ca. 250,000 births registered without information on birth parity). Swiss births for 5 Balkan countries include Yugoslavia from 1990-1993. Source: Federal Statistical Office Germany (Destatis); Swiss Federal Statistical Office (BFS).

Our key variable of interest, the sex ratio at birth, yields three interesting findings that hold for both Germany and Switzerland. First, the sex ratio at birth of all foreign mothers shows no sign of gender selection or son preference. The ratios in column two are below 1.06 for both countries, which is nearly in line with the ratios of native citizens, and fully in the range of biologically normal ratios (Anderson & Ray, 2012; Coale, 1991; Klasen & Wink, 2003). However, many of the foreign mothers actually come from neighboring Western European countries. For example, births in Switzerland from Germans alone account for nearly ten percent of foreign births. Hence, potential deviations from normal sex ratios among immigrants are significantly mediated by the large number of fellow Western and Central Europeans who show no gender selection in their countries of origin.

As second insight we note that selected immigrant sub-samples reveal a substantially higher level of son preference. In Germany, our five Balkan countries combined display a remarkably skewed sex ratio of 1.08, and we find the same ratio for the Chinese and Indian mothers in Switzerland. Given the large number of births from our set of Balkan citizens in

Germany, we are able to estimate the likelihood of a boy birth very precisely. We find that likelihoods between Balkan immigrants and Germans differ on a one percent significance level, i.e. the probability of a newborn being a son is significantly higher if the parents are from the highlighted Balkan region[12]. These findings are closely aligned with related studies on sex selection practices of immigrants in the Western world (Abrevaya, 2009; Almond et al., 2013; Dubuc & Coleman, 2007; Verropoulou & Tsimbos, 2010). The similarity between Balkan and Asian immigrants may consequently be interpreted as a comparable extent of son preference in South East Europe as has been documented in these Asian countries (Bongaarts & Guilmoto, 2015; Chung & Das Gupta, 2007; Das Gupta, 2010; Zeng et al., 1993)[13].

Thirdly, however, apart from the within-country variation, we also document between-country differences. Put differently, we see not only that native Germans respectively Swiss and our Balkan immigrants display different sex ratios, but also that the Balkan birth dynamics differ depending on whether the parents live in Germany or in Switzerland. The between-country fluctuations are largest for Chinese and Montenegrin citizens, which we largely attribute to the small sample sizes. The pooled immigrant groups have a narrower yet still observable between-country spread. The sex ratios at birth of the highlighted Balkan countries as well as Chinese and Indian immigrants differ by 0.02 depending if they are observed in Switzerland or in Germany. As we previously proposed that a direct comparison between the two countries serves to evaluate consistency of results, it is fair to state that immigrant cross-country findings on biased sex ratios at birth are not entirely robust. While our estimates are generally conservative given the strict citizenship classification, on aggregate the sex ratios at birth of immigrants are only biased in selected cases. The cross-country fluctuations suggest that prenatal female discrimination is not consistently salient in Germany and Switzerland.

Inspection of the country-specific variables allows to conjecture on reasons for the varying sex ratios at birth. For the Swiss-specific variables, we observe a striking gap between the Balkan countries and the other groups in terms of the mother's age at birth. Independent of birth parity, only every fourth woman from Albania, Kosovo, Montenegro, Macedonia, or Bosnia-Herzegovina is older than 30 years when giving birth, which contrasts to over 60% of

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[12] We are not able to provide comparable evidence of statistical significance for the Chinese and Indian mothers in Switzerland due to the small sample size and resulting larger standard errors.

[13] While we do not report here the results broken down to individual foreign citizenship due to the comparatively small sample size, qualitative evidence suggests also heterogeneity within the pooled samples. Albanians in Germany, for example, have a sex ratio of 1.10 based on 4,294 births, whereas Bosnian-Herzegovians have a basically normal ratio of 1.06 based on 27,812 births. The differences closely mirror what can be observed in their countries of origin as well.

Swiss mothers in that age. Given that early childbearing is more common among women from disadvantaged backgrounds, these findings might hint at stark socio-economic differences between these groups (Coley & Chase-Lansdale, 1998; Moore et al., 1993; Sonfield, Hasstedt, Kavanaugh, & Anderson, 2013). We also find a negative correlation between son preference and number of children (r= -0.36), which has been previously observed in the literature (Banister, 2004; Hu & Schlosser, 2015; Jayachandran, 2014a). Mothers from China, for instance, have the highest sex ratio in Switzerland among our groups, while they are on average the oldest and display the lowest fertility levels.

The Germany-specific variables at first glance suggest an association between homogeneity of parental background in terms of common citizenship, and the level of son preference. Nearly half of the partners of all foreign mothers are Germans, and we observe a balanced sex ratio at birth for this group. For the highlighted Balkan sub-group, however, three quarters of parents share the same Balkan citizenship (only every fourth father is German), and the sex ratio is substantially more skewed. For Asian immigrants, the picture is similar: On aggregate, Chinese and Indian mothers have a German partner in 44% of cases, and no distinct son preference. However, a break-down by country reveals that Chinese mothers have German partners in 52% of cases, and a particularly low sex ratio of 1.03. In contrast, only 37% of Indian mothers have a German partner (i.e., 63% have an Indian partner), and they reach a highly elevated sex ratio of 1.09.

While these figures hence suggest an existing correlation, we do not know if the two variables (common citizenship of parents, and sex ratio at birth) are really linked, or if omitted variable bias is present. It could be, for example, that Balkan mothers in general have a strong son preference independent of the citizenship of the father, and that the low number of German partners is unrelated. To tackle such potential bias, we will refine our empirical approach by splitting up the sample further. Similarly, we also interpret the last row in panel A such that the effect from the time spent in Germany requires further analysis, as our basic threshold measure of plus/minus eight years is not conclusive. The impact of both the homogeneity of parental citizenship, and of the length of stay in Germany will hence be examined in further detail in the next section.

Refined Analyses of Birth Statistics per Country

We documented in the previous section that on aggregate levels the sex ratio at birth differs between native citizens, and selected Balkan and Asian immigrant groups. Now we exploit additional country-specific variables from national birth statistics in order to conduct a number of refinement analyses.

German birth statistics provide information on the citizenship of both parents, and indirectly on the time parents with foreign citizenship have been resident in Germany as described earlier. We aim to examine if the time immersed in a new and broadly gender-equal sociocultural environment affects gender-selective practices of immigrants. There is endorsement in the literature for such a relationship (UNFPA, 2012b). Abrevaya (2009) argues that a change of son preference among Asian immigrants could occur in the United States, as second- and third-generation mothers might have a reduced cultural bias, and González (2014) speculates similarly for her country analysis of Spain. However, both studies suffer from insufficient data availability to verify this hypothesis empirically. Almond et al. (2013) find some empirical evidence for a declining son preference in Canada, as second-generation immigrants no longer continued having children in the absence of sons to the same extent as first-generation immigrants.

In table 3, we convert the sex ratio at birth into a boy-birth likelihood per group, which reaches values of 0 (zero likelihood of newborn to be a boy) to 1 (certainty that newborn will be a boy). Panel A contrasts the boy-birth likelihoods along parental citizenship, i.e. we look at differences depending if only the mother is immigrant (and the father German), versus both parents being immigrants without German citizenship. Note that the sample size in panel A is about one third smaller than the totals in table 2. We are missing information on the citizenship of the father in all those cases, since this is only recorded if the parents are married. Panel B is a deep-dive of the right side of panel A, since it compares the time of permanent residence of all non-German parents, which is our proxy for the level of sociocultural assimilation (see figure 2). Given the data structure and legislative situation, we can classify foreign parents in two categories of assimilation, depending on if they have had residence in Germany for longer than eight years or not.

Results in panel A indicate that there are no substantial differences in son preference depending if both parents share the same foreign citizenship, or if the father is German. This could not be inferred from the aggregate descriptive statistics in table 2, which actually rather implied a differential effect depending on parental citizenship homogeneity. However, the highlighted Balkan countries for instance, only move from a sex ratio at birth of 1.073 (father German) to a ratio of 1.080 (father with same foreign citizenship as mother) when we convert the boy-birth likelihoods. Note that already the first ratio is considerably above a natural birth rate, which then increases just a bit further if mother and father share the same citizenship.

Our likelihoods in the left column (father German) might also be biased upwards due to our classification which we owe to the data availability. We pointed already earlier at the fact that males with migration background who have obtained German citizenship cannot be differentiated from German males whose ancestors have lived here for generations. This is likely a relevant issue in this context, as foreign females may look for a partner with similar cultural background independent of his actual current citizenship[14].

Table 3: Boy-Birth Likelihood in Germany along Parental Citizenship and Time of Residence in Germany

Panel A: Parental Citizenship	Father German		Both Parents Foreign	
Mother's Citizenship	Boy-birth likelihood	Sample Size	Boy-birth likelihood	Sample Size
German	0.513	4,045,343	n/a	n/a
All Foreign	0.513	519,639	0.513	557,772
5 Balkan Countries	0.518	21,567	0.519	65,513
China and India	0.512	8,978	0.511	11,273
Panel B: Time of residence in Germany	Residence for at least 8 Years		Residence for less than 8 Years	
Mother's Citizenship	Boy-birth likelihood	Sample Size	Boy-birth likelihood	Sample Size
German	n/a	n/a	n/a	n/a
All Foreign	0.512	303,585	0.514	254,187
5 Balkan Countries	0.519	40,887	0.519	24,626
China and India	0.507	3,175	0.512	8,098

Notes: Each cell reports the fraction of male births along mother's citizenship. In panel A, both parents foreign indicate that the father carries same citizenship as the mother, whose citizenship is given in the very left column. Totals in panel A about one third smaller than the total of births in table 2, because not all births have information attached regarding the nationality of the father. Panel B is a detailed breakdown of the two columns at the right of panel A, i.e. panel B only contains births from parents who share the same foreign citizenship.
Source: Federal Statistical Office Germany (Destatis).

Panel B breaks down the all-foreign parents sample by their time of residence in Germany. There is some evidence that the time spent in Germany affects the parents' level of son preference, although the boy-birth likelihood differences are not statistically significant. The Balkan countries on aggregate remain at a boy-birth likelihood of 0.519, which translates into a sex ratio at birth of 1.080. For Kosovarians, who represent the largest both-parents-foreign group with over 20,000 births, the sex ratio at birth moves down from 1.100 with residence less than eight years to 1.088 with residence longer than eight years (see table 10 in the appendix). These are all strongly biased ratios, but they are too closely positioned for the sample differences to be statistically significant. In summary, intra-generational cultural assimilation measured in length of stay seems to have no significant effect on gender-selective practices of immigrant groups in Germany. This is closely related to a similar conclusion by Almond et al. (2013) for a study on Canada, which also yields mixed findings as to whether

[14] While not affecting our interpretations, we found it surprising that for a foreign mother, more births are registered with a foreign father than with a German father, and for our set of Balkan countries both-parents-foreign births are triple as many as only-mother-foreign births.

son preference of immigrants declines over generations. Our findings suggest that several years of residence do not make a substantial difference on how much immigrating parents prefer a son over a girl.

Additional valuable information provided by Swiss birth registries relate to the birth parity indication, i.e. we know how many live births a mother has previously had. Similar to Abrevaya (2009), we can therefore break down the overall relative son preference per population group along birth parity. Table 4 reports statistical results, where panel A pools all births in Switzerland since 1990, whereas panel B only examines births since the year 2000. The two time periods yield largely identical results, but in comparison to Swiss birth data in table 2 the sample size is reduced since we have not records on birth parity for all births.

For Swiss citizens, higher-parity births are actually less likely to be boys. While the likelihood figure changes only in the third decimal, the huge sample allows very precise estimation, and the pattern is nearly linear as parity increases. Abrevaya (2009) explains a very similar outcome for white U.S. citizens with the fact that "later births are more common among women with lower socioeconomic status and lower-quality prenatal care" (p. 11), which are more prone to harm male fetuses. Hence, we refrain from linking this trend directly to any kind of parental gender preference among Swiss. For all foreign mothers, the sex ratio at birth displays a U-shaped pattern, i.e. it decreases after the first birth, but rises again substantially for the fourth birth.

The sample with five Balkan immigration groups yields very similar results. We see son preference for the first child, followed by more balanced sex ratios for the second and third child, and finally a spiking boy-birth likelihood for the fourth child, which is significantly higher than at first parity in both panels. Considering Macedonian immigrants as example (results are given in table 11 in the appendix), we see a particularly strong gender imbalance at birth for fourth parity. Among the 1,100 births registered in Switzerland for that parity and citizenship, there are only 501 girls, which leads to a sex ratio of 1.20. Overall, results are nearly identical for our two time periods examined, but we prefer the pooled sample from 1990-2014 since the larger number of births allows for more precise and reliable interpretations.

Table 4: Boy-Birth Likelihood in Switzerland along Mother's Citizenship and Birth Parity

Mother's Citizenship	(1) 1st Birth	(2) 2nd Birth	(3) 3rd Birth	(4) 4th Birth	(5) Sample Size
Panel A: Full sample (1990-2014)					
Swiss	0.514	0.513	0.512	0.512	1,152,609
All Foreign	0.515	0.512**	0.512	0.521*	582,632
5 Balkan Countries	0.519	0.507***	0.513	0.534**	71,685
China and India	0.511	0.534**	0.534	0.722***	6,996
Panel B: Millenium sample (2000-2014)					
Swiss	0.515	0.514	0.514	0.513	602,376
All Foreign	0.515	0.513	0.512	0.517	365,646
5 Balkan Countries	0.520	0.508**	0.511	0.541*	43,871
China and India	0.508	0.544**	0.526	0.611	5,198

Notes: Each cell reports the fraction of male births along mother's citizenship. Columns indicate the number of previous births plus 1 per mother, and the last column reports the total number of births per population group, where birth parity is known. 5 Balkan Countries includes Yugoslavia until 1993. Due to missing entries on birth parity the totals are smaller than the comparable figures in table 2. *, **, *** indicate significance at the 10, 5, and 1 percent level as calculated via a z-test that measures the difference between the n^{th} birth and the first birth. Source: Swiss Federal Statistical Office (BFS).

Lastly, brief inspection of our second reference group of Indian and Chinese immigrants in Switzerland yields evidence for son preference despite a rather small sample. Consistently the boy-birth likelihoods are much larger for higher parity births than normal, exceeding even the skewed sex ratios of Balkan immigrants. Hence, data for Switzerland confirm what previous literature has concluded on gender preferences of these two Asian immigrant groups in relation to birth parity (Abrevaya, 2009; Almond et al., 2013; Dubuc & Coleman, 2007; González, 2014). Similar to Germany the detailed perspective for Switzerland provides evidence of son preference and missing girls among selected immigrant groups[15]. However, the phenomenon appears to be confined to few distinct cases and small in absolute numbers. In the following, we estimate how many women seem to be really missing.

Estimates of Missing Women at Birth

In the spirit of the counterfactual exercise by Sen (1990), we now aim to quantify how many more women should actually exist in Germany and Switzerland if all parents would behave according to an "unbiased" reference sex ratio at birth. Before discussing the results, two remarks seem appropriate. First, we restrict our estimate of missing girls to the number of women "missing" at birth. The literature correctly points at the necessity to observe female death rates throughout a woman's lifetime, since additional factors may also cause an

[15] We also employed a second dimension in the data, namely age of the mother, which has been associated with the degree of son preference Verropoulou and Tsimbos (2010); Lin et al. (2014). However, our results for Switzerland are not supportive of any consistent link between those two variables.

anomalously high number of missing girls during childhood and adolescence, as well as adulthood and old age (Anderson & Ray, 2010, 2015; Milazzo, 2012). However, this is primarily a concern in less developed countries, so we are confident to capture nearly all missing girls in Germany and Switzerland at the point of birth. We recognize that we might not provide a full picture of excess female death rates, but the existence of additional missing girls after birth seems unlikely.

Second, the debate on the correct reference sex ratio at birth is far from settled (Bongaarts & Guilmoto, 2015; Klasen & Wink, 2003; Sen, 1992), so that consequently we decide to employ three alternative estimation methods for quantifying missing girls. The first and preferred method is to simply take the observed sex ratio at birth of natives (i.e. Germans in Germany, and Swiss in Switzerland) as reference. We believe this is an intuitive approach, while it also seems conceptually sensible. Both countries are far from displaying systematic female discrimination in terms of gender selection at birth. Therefore, instead of calculating a somewhat arbitrary average rate of sex ratios at birth in Western countries, we feel more comfortable with taking directly the native ratio of our respective "host" countries. Also, Germans in Germany, and Swiss in Switzerland have each more than one million births recorded in our sample, which provides a highly reliable reference rate.

Nonetheless, we also indicate a second estimate based on the fixed global sex ratio at birth of 1.059 proposed by Coale (1991), and we adopt an alternative approach developed by Klasen and Wink (2003). The latter estimate an individual expected sex ratio at birth per country through a regression in which they link life expectancy to the sex ratio at birth. We apply their regression coefficients and, using life expectancy data from the World Development Indicators, estimate an expected sex ratio at birth per country. The expected sex ratio at birth for a pool of countries (i.e., the highlighted five Balkan countries, as well as China and India combined) is an average of the individual ratios weighted by their number of births recorded in Germany, respectively Switzerland[16].

Results are given in table 5, where the observed actual sex ratio at birth is contrasted to each of the three reference rates, which yields the estimated number of missing girls. The number should be read as women who should exist in addition to all born females in these two

[16] See the Appendix for a detailed methodology description. Klasen and Wink (2003) originally use as data source for life expectancy the UN Demographic Yearbook. However, this is unsuitable for our purpose, since our target set of Balkan countries are not included. Also, while an important contribution to the literature, we disregard Anderson and Ray (2010) as alternative estimation method, since they solely focus on China, India, and Sub-Saharan Africa, which play a negligible role as sources of immigration to Germany and Switzerland.

countries in the time period of 2003 to 2014 in Germany, respectively 1990 to 2014 in Switzerland. Three findings stand out. First of all, the all-foreign group, i.e. immigrants per se, does not lead to women missing at birth in Germany and/or Switzerland. The sex ratio at birth of all foreigners is only marginally higher than the ratio of natives, and any calculation is very sensitive to the choice of reference rate. The counterfactual rates based on the method of Coale or Klasen and Wink indicate no excess female deaths, while the native reference rate does suggest it, but at minimum levels. This outcome is not surprising given the heterogeneity of immigrating foreigners. Most migrated from culturally similar neighboring Western and Central European countries and thus show no son preference, while others come from very different regions including those known for sex-selective practices.

Inspection of immigrant groups from our target countries (which are known for son preference) yields strikingly different results. All our estimates for the highlighted Balkan countries, and in five out of six cases also for the China/India sample, indicate an issue of missing women. Independent of the estimation method employed, the numbers are remarkably stable: In Germany, there are systematically at least 1,000 women missing from the five Balkan countries, which is equivalent to two percent of all female births from that population group. For the Asian sample, there are in absolute numbers more missing girls in Switzerland (ca. 80) than in Germany (ca. 40), even though German birth records indicate around three times more births from Chinese and Indian mothers. The estimates are consequently due to the substantially more skewed sex ratio at birth of these Asians in Switzerland, which translates into a higher relative shares of Asian missing women in Switzerland than in Germany.

Finally, comparing results between estimation methods reaffirms that the reference rate of native citizens appears as the most plausible and useful here. This becomes particularly evident when reading the missing girls totals in panel C. The negatively signed results for the "all foreign" group based on the approach by Coale or Klasen and Wink suggest that there are actually too many girls born by immigrants in Germany and Switzerland. This would in return imply a daughter preference in three out of four cases among all foreigners. We think that this sign switch is implausible and due to an imprecise reference rate. The native ratio at birth as reference is the only method which yields a very small number of missing girls from immigrant groups, which seems reasonable given the high level of gender equality in Germany and Switzerland in international comparison. In any case, with these fluctuating estimates depending on the reference rate, it is all the more noteworthy how consistent all estimates are for missing girls from the five Balkan countries as well as from China and India.

Table 5: Estimates of "Missing Women" at Birth in Germany and Switzerland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Native Ratio			Coale's (1991) method			Klasen and Wink's (2003) method		
Mother's Citizenship	Actual Sex Ratio	Reference Sex Ratio	Missing Women	% missing births	Reference Sex Ratio	Missing Women	% missing births	Reference Sex Ratio	Missing Women	% missing births
Panel A: Germany (2003-2014)										
5 Balkan Countries	1.077	1.053	1,269	2.23%	1.059	958	1.68%	1.055	1,164	2.04%
China and India	1.057	1.053	39	0.35%	1.059	-20	-0.19%	1.053	42	0.39%
All Foreign	1.055	1.053	1,339	0.19%	1.059	-2,381	-0.34%	1.057	-1,375	-0.20%
Panel B: Switzerland (1990-2014)										
5 Balkan Countries	1.061	1.055	205	0.54%	1.059	75	0.20%	1.055	202	0.53%
China and India	1.080	1.055	81	2.30%	1.059	69	1.95%	1.053	89	2.51%
All Foreign	1.059	1.055	1,026	0.32%	1.059	-64	-0.02%	1.057	397	0.12%
Panel C: Totals Germany and Switzerland										
5 Balkan Countries			1,474	1.55%		1,033	1.09%		1,366	1.44%
China and India			120	0.82%		49	0.33%		131	0.90%
All Foreign			2,365	0.23%		-2,445	-0.24%		-977	-0.10%

Notes: Expected sex ratio based on Klasen and Wink's (2003) method are the authors' own calculations based on the regression equation in table 2, column 1 from ibid. Hereby, All Foreign uses the life expectancy from the World Bank for "Europe and Central Asia" as proxy. 5 Balkan Countries in Panel B (Switzerland) includes Yugoslavia until 1993, but Yugoslavia is not included in the weighted expected sex ratio at birth for Klasen and Wink's (2003) method for the 5 Balkan Countries due to missing data on life expectancy at birth in Yugoslavia. % missing births is arrived at by dividing the number of Missing Women by the actual number of female births reported.
Source: Federal Statistical Office Germany (Destatis); Swiss Federal Statistical Office (BFS); World Development Indicators (World Bank).

These two samples are always estimated to cause between 1,100 and 1,600 missing girls in Germany and Switzerland combined over the respective time periods, independent of the reference rate. Thus, while a small number in absolute terms, these selected immigrant groups display an issue of missing girls also in Central Europe, which is unfortunately highly robust. In contrast, all foreigners collectively do not cause a missing girls phenomenon as shown through our range of data analyses.

Micro-Evidence on Underlying Reasons for Son Preference in Germany

In this section we employ German household survey data to analyze potential underlying reasons for the diverging sex ratios at birth that we documented based on census data. In other words, we test the explanatory power of a set of socio-economic and demographic variables for the varying sex ratios at birth of different population groups (entire sample, the all-foreign group, and a Balkan and Asian target group). As described earlier, we employ only the German socio-economic panel study (SOEP) as the sample size for the comparable Swiss household survey is too small. Our first regression analysis consists of the following OLS equation:

(1) $$\text{Proportion of Male Children}_i = \beta_0 + \beta_1 \text{Migration}_i + \beta_3 X_i + \varepsilon_i$$

where *i* designates individual households, and Migration_i is a vector of two dummies whether the individual has a general migration background (all-foreign) and/or originates from our highlighted Balkan and Asian countries,. X_i denotes the described additional socio-economic determinants that have been proposed in the literature (Abrevaya, 2009; Almond et al., 2013; Gavalas et al., 2014; Kim & Song, 2007) and have a reasonable response rate in our household survey. These are monthly gross income, level of religiosity, extent of health issues, and education measured as level of schooling; finally ε_i is the heteroscedasticity-robust error term. The dependent variable measures the share of male children in a household, which ranges from zero (no sons, only daughters) to one (only sons, no daughters). The objective of this approach is to examine whether our regressors are able to explain the overall children gender composition in a household, respectively to identify variables that increase the proportion of sons[17]. The advantage of this analysis lies in a larger sample size, as we can include all households with at least one child, and in examining a linear data distribution that complements our second, dichotomous regression analysis.

[17] We also estimated a fractional logit model where results are qualitatively identical, but with larger coefficients in absolute terms.

The second model is based on a categorical outcome variable *P*, which takes the value of 1 if the newborn at indicated parity is a boy, and 0 if it is a girl. Its probabilities are modeled in the following logit equation:

(2) $P_{i,n}$ (boy = 1) = λ ($\beta_0 + \beta_1$ Migration$_i$ + β_2 Previous Child Female$_{i,n}$ + β_3 X$_i$) ,

where the logit function λ at the right hand side, in addition to the two regressors already introduced for equation (1), now employs the dummy Previous Child Female which is coded 1 if any of the previous children in the household are female at given parity, and 0 otherwise[18]; *n* denotes the given birth parity. We hence examine whether our variables are able to explain if the sex of a child per parity is male, and if so, we are interested in the effect indicated by the β coefficients. The equations are estimated using robust standard errors, and we will report coefficients as odds ratios for the dependent variable being male instead of female[19].

Our procedure for both equations is as follows: We begin by analyzing whether being foreign per se has a significant impact on the children gender composition, respectively the likelihood of having a boy birth. Specifically, in Panel A we take a broad perspective and include a migration background dummy that takes the value of 1 for all-foreign individuals not born in Germany, whereas in Panel B the migration dummy marks only the immigrant sub-sample from our target Balkan and Asian countries. Panel C includes two dummies, i.e. one all-foreign dummy and one target-group dummy, and in Panel D we test whether within all foreigners the target Balkan and Asian migrants have a differential effect.

Table 6 presents results for these four main specifications. Inspection of columns one and two for the proportion of male children indicates a clear differentiation of effects depending on the migration group. The all-foreign sample and the target sample carry opposite signs, which are kept throughout all specifications, and even if the overall explanatory power of the model is weak. Being a foreigner per se tends to decrease the share of sons in a household, whereas a migration background from the target Balkan and Asian countries leads to a higher proportion of male children. The significant results in panel C suggest that the all-foreign sample reduces the proportion of male children by two percentages points, whereas migration background from target countries increases it by six percentage points. Also when looking only at foreigners in panel D, the target countries maintain a differential effect towards more sons. None of the

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[18] Conceptually, it would also be interesting for third and fourth parity births to employ a dummy on whether all of the previous children in the household are female. Such a case, however, is too rare in our sample for meaningful analyses.

[19] We also experimented with linear probability models which yielded nearly identical results in terms of sign and significance of coefficients as well as overall model fit. However, due to the dichotomous nature of our dependent variable we prefer to report results from logit models.

additional socio-economic variables have a meaningful effect, hence we are unable to identify further determinants for a male bias.

Moving on to the logit results in columns three to ten, we find that the likelihood of a boy birth is more affected by the sex of existing children than by a person's migration background, but with changing coefficient signs. The existence of daughters has a significant positive impact on the likelihood of the next child being male, but for second parity only, i.e. when the first child born was a girl. Here, the odds ratios indicate that a boy birth is seven percentage points more likely when the first child was a girl, an effect that remains constant (though no longer significant) if we consider only foreign migrants in panel D. However, the likelihood of a son actually decreases on average for third and fourth births among households in Germany if there have been girls among the older siblings. These higher parity estimates might be somewhat erratic due to finite sample sizes at higher parities, but we also conclude that evidence for son preference is not consistently found in our household survey.

Next, we have a closer look at the two migration dummies employed, where we focus on second and third parities. We find again that only for the target migration countries the odds ratios are higher than one in nearly all specifications (10 out of 12 in panels B through D), i.e. male-biasing. In contrast, the odds ratio of the all-foreign migration dummy indicates a decreasing boy-birth likelihood throughout all specifications in panels A, C, and D. While the associated standard errors are generally large so that only selected dummies are significant, we nevertheless interpret this sign switch depending on the migration dummy as reaffirming evidence for son preference among certain immigrant groups only. This is also consistent with the census findings on son preference from birth registries, which were not irregular among all foreigners in Germany combined, but substantially biased for our target group. We see a similar link between this sub-sample of Balkan/Asian groups and son preference here in the SOEP household survey, whereas immigrants overall show an inconspicuous pattern – in our survey data even a higher girl-birth likelihood.

Lastly, our additional controls have in general again no material impact on boy-birth likelihood. Religiosity is the only variable whose odds ratio is consistently below one for our full sample in panels A through C. Estimates suggest that a higher level of religious belief, measured via frequency of church respectively temple visits, decreases the odds for a male child. This likely reflects a general refusal to abort any child independent of gender preference, an attitude which is common among more religious people. In panel D, however, we observe a switch for religiosity from lower to higher boy-birth likelihood after the first birth. This could suggest that the frequency of religious activities has a different effect among migration groups than among the general German population, probably because migrants tend to follow a different religion. A differential effect of religious affiliation on son preference has previously been documented in a study on Korea (Kim & Song, 2007). Unfortunately, the data here do not allow a further break-down along religious affiliation due to poor response rates, but among the all-foreign group the level of religiosity rather increases the odds of a male child after first birth. In any case, this variable is never estimated precisely enough in our equations to reach significance levels, so that conclusions remain somewhat speculative.

Overall the explanatory power of the model is quite limited, which is somewhat in line with our expectations. It mirrors the earlier finding that variations of the sex ratio at birth between groups are small. In particular for the first child estimates are likely to be obtained by chance. As we expect parents with gender preferences to display a corresponding deliberate behavior, if any, towards later births (for the first birth many might just "give it a try" for a son), this outcome is plausible. Increasing evidence for son preference towards higher parities has previously been documented among immigrant groups (Almond et al., 2013; Dubuc & Coleman, 2007). A further statistical reason for insignificant findings is simply due to the limited sample size, especially for second and third births: Due to poor response rates for the control variables, the theoretically available number of birth observations decreases by around 80 percent, and for panel D, by even more than 90 percent. The sample for fourth parity is small in any case, as only few households actually have four children. This also forces us to omit estimates for the full specification at fourth birth in panel D, as there would be only twelve observations.

Finally, we examine the explanatory power of our socio-economic regressors for our target migrants from the Balkans and Asia only. The objective is to identify potential reasons why these groups maintain sex selection practices in Germany, in spite of living in a very different socio-economic environment than in their home countries. Is that phenomenon due to "cultural heritage" only, or can we identify additional variables that affect the odds of having a male versus a female child? We again estimate an OLS model for the proportion of male children per household in panel A, as well as a logit model for the boy-birth likelihood per given parity in panel B through D. The empirical work is impeded due to a strongly reduced sample, as we only look at survey respondents from our highlighted countries, i.e. a further subset of panel D in table 6. For this reason, we cannot include all regressors simultaneously, and we cannot conduct estimates for fourth parity births.

Table 6: Regressions on Proportion of Male Children (OLS), and Boy-Birth Log-likelihood per Parity (Logit, Odds Ratios Shown)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Proportion of Male Children		1st Birth		2nd Birth		3rd Birth		4th Birth	
Panel A: Full sample with migration background dummy										
Migration Background	-0.02	-0.02	0.96	0.97	0.91	0.81	0.96	0.82	0.75	0.37
	(0.01)**	(0.03)	(0.04)	(0.15)	(0.05)*	(0.16)	(0.08)	(0.30)	(0.10)**	(0.22)*
Previous Child Female	n/a	n/a	n/a	n/a	1.07	1.07	0.82	0.93	0.75	1.45
					(0.04)*	(0.07)	(0.07)***	(0.14)	(0.11)**	(0.58)
Additional Controls	no	yes	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
Wald Chi-Square (p-value)			0.34	0.68	0.05	0.08	0.03	0.70	0.01	0.21
Panel B: Full sample with dummy for migration background from target countries										
Migration Background from Target Countries	0.04	0.12	0.91	0.71	1.04	4.69	1.04	0.99	0.53	0.78
	(0.03)	(0.15)	(0.17)	(0.48)	(0.22)	(5.11)	(0.28)	(1.45)	(0.22)	(0.84)
Previous Child Female	n/a	n/a	n/a	n/a	1.07	1.07	0.82	0.93	0.75	1.45
					(0.04)*	(0.07)	(0.05)***	(0.14)	(0.11)**	(0.58)
Additional Controls	no	yes	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Wald Chi-Square (p-value)			0.63	0.65	0.18	0.05	0.01	0.75	0.05	0.37
Panel C: Full sample with two migration background dummies										
Migration Background	-0.02	-0.03	0.96	0.98	0.91	0.74	0.96	0.81	0.77	0.41
	(0.01)***	(0.03)	(0.04)	(0.16)	(0.05)*	(0.15)	(0.08)	(0.31)	(0.11)*	(0.24)
Migration Background from Target Countries	0.06	0.15	0.94	0.72	1.13	6.24	1.08	1.21	0.64	0.90
	(0.03)*	(0.15)	(0.18)	(0.50)	(0.24)	(6.92)*	(0.31)	(1.83)	(0.28)	(0.65)
Previous Child Female	n/a	n/a	n/a	n/a	1.07	1.07	0.82	0.93	0.74	1.40
					(0.04)*	(0.08)	(0.05)***	(0.14)	(0.11)**	(0.57)
Additional Controls	no	yes	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
Wald Chi-Square (p-value)			0.61	0.76	0.08	0.04	0.03	0.81	0.02	0.30
Panel D: All Foreign sub-sample										
Migration Background from Target Countries	0.06	0.20	0.96	0.95	1.17	6.68	0.96	2.02	0.67	
	(0.03)*	(0.15)	(0.19)	(0.67)	(0.25)	(7.27)*	(0.28)	(2.53)	(0.32)	
Previous Child Female	n/a	n/a	n/a	n/a	1.06	1.19	0.69	4.78	0.69	*insufficient sample size*
					(0.11)	(0.49)	(0.12)**	(6.53)	(0.22)	
Additional Controls	no	yes	no	yes	no	yes	no	yes	no	
Sample Size	2,209	172	2,209	172	1,640	107	693	31	275	
(Pseudo) R-Squared	0.01	0.02	0.01	0.01	0.01	0.04	0.01	0.07	0.01	
Wald Chi-Square (p-value)			0.85	0.79	0.64	0.39	0.12	0.84	0.43	

Notes: In columns 1 and 2 the OLS coefficients are reported, where the dependent variable is the share of male children in a household, ranging from 0 (no children are male, all female) to 1 (all children are male, no females). In columns 3 to 10 a logit model estimates the boy-birth likelihood per parity indicated. The coefficient from the logit model is reported for the indicated independent variable along with the robust standard error in parentheses. Migration Background denotes whether the individual is born outside of Germany; Migration Background from Target Countries denotes whether the individual is born in Yugoslavia, Albania, Croatia, Bosnia-Herzegovina, Macedonia, Kosovo, India, or China. Previous Child Female denotes as dummy whether any of the previous children in the household are female. The dependent variable is a dummy whether the child at given birth parity in a household is male (=1) or female (=0). Even columns include the following controls: Monthly gross household income in EUR in logs; the level of religiosity as measured by frequency of church/mosque/temple visits; health issues, which measures the subjective extent of general sickness and lack of health; and the level of schooling. See the appendix for detailed variable description. The sample comprises singular data from 1984-2013; in case of several data entries by the same household individual over different years only the most recent data are used. The number of births deviates from the sample size at higher parities since less and less parents report a second, third, or fourth child. *, **, *** indicate significance at the 10, 5, and 1 percent level. Source: German Socio-Economic Panel Study (SOEP).

Table 7 summarizes results for these target immigration groups. In line with previous findings, we cannot identify significant determinants for the odds of having a male child. This suggests again that observable household characteristics cannot explain the variations of the sex of the child. If anything, religiosity appears to be most suitable for explaining boy-birth likelihoods. The regressor is significant in two out of three cases, and we are able to reaffirm in panels B through D the switch in the odds ratio from less to more than one after first parity, which we found in table 6 for the all-foreign group as well.

For parents who migrated from the Balkans, China, or India, religiosity favors the likelihood for a girl at first birth parity. However, for the second child, each additional level of religiosity increases the odds for a male child by 2.4 times. Furthermore, the dummy indicating whether older female siblings exist carries the expected sign, but has a significant effect only at second parity. This is in line with what Abrevaya (2009) reports for Chinese and Indian mothers in California. In our case, given that the first child was a girl, the odds for the second child being a boy increase by about two times. Our remaining explanatory variables employed are erratic. Income levels seem to increase boy birth likelihood but never significantly, and the level of health as well as the level of schooling of an individual yield no consistent picture either. All OLS results in panel A similarly yield no statistical evidence. In summary, the micro level analyses based on the German socio-economic panel study showed the difficulty to establish robust patterns between socio-economic respectively demographic variables, and the sex of a child. We interpret this mostly as a lack of systematic prenatal female discrimination that would be salient enough for statistical significance. In other words, we find no evidence for sex selection in households in Germany, i.e. if a newborn is a boy or a girl results generally from a biological, random process, even for migrant sub-groups. Overall, the limited number of observations represented a considerable empirical challenge.

Nonetheless, three further findings stand out from the OLS and logit estimates. First, existing female siblings tend to play a significant role. If the first child is a girl, the odds for a male birth at second parity always increase, though for higher parities the effects from existing female siblings become smaller or even turn negative. Second, if there is any son preference, it is associated only with selected migrant groups, which is consistent with our earlier findings from birth registries. Specifically, the target migration sample of Balkan and Asian origin is more likely to have male children, but migrants altogether in Germany (the all-foreign group) do not share this pattern. Third, the level of religiosity appears to be the only socio-economic factor with some explanatory power, which is closely related to findings by Almond et al. (2013). However, the specific effect of that variable effect depends on the sample.

Table 7: Regressions on Proportion of Male Children (OLS), and Boy-birth Log-likelihood per Parity (Logit, Odds Ratios Shown) for Target Migration Groups

Dependent Variable: Boy-birth likelihood	(1)	(2)	(3)	(4)	(5)
Panel A: Proportion of Male Children					
Monthly Income	0.07				
	(0.04)				
Religiosity		-0.03			
		(0.05)			
Health Issues			-0.02		
			(0.03)		
Level of Schooling				0.03	
				(0.10)	
Sample Size	60	60	111	20	
R-Squared	0.04	0.01	0.01	0.01	
Panel B: First birth					
Monthly Income	1.19				
	(0.30)				
Religiosity		0.42			
		(0.20)*			
Health Issues			1.21		
			(0.20)		
Level of Schooling				1.41	
				(0.64)	
Sample Size	60	60	111	20	
(Pseudo) R-Squared	0.01	0.10	0.01	0.03	
Wald Chi-Square (p-value)	0.51	0.07	0.24	0.46	
Panel C: Second birth					
Monthly Income	1.17				
	(0.36)				
Religiosity		2.42			
		(0.90)**			
Health Issues			0.97		
			(0.17)		
Level of Schooling				2.11	
				(0.97)*	
Previous Child Female					2.04
					(0.87)*
Sample Size	51	51	92	15	92
(Pseudo) R-Squared	0.01	0.09	0.01	0.09	0.02
Wald Chi-Square (p-value)	0.59	0.02	0.88	0.10	0.09
Panel D: Third birth					
Monthly Income	1.32				
	(0.54)				
Religiosity		1.84			
		(0.99)			
Health Issues			1.06		
			(0.25)		
Level of Schooling				0.33	
				(0.54)	
Previous Child Female					1.35
					(0.87)
Sample Size	25	25	54	8	54
(Pseudo) R-Squared	0.02	0.05	0.01	0.05	0.01
Wald Chi-Square (p-value)	0.49	0.25	0.80	0.50	0.64

Notes: In panel A OLS coefficients are reported, where the dependent variable is the share of male children in a household, ranging from 0 (no children are male, all female) to 1 (all children are male, no females). In panels B through D a logit model estimates the boy-birth likelihood per parity indicated. Reported is the coefficient from a logit model for the indicated independent variable along with the robust standard error in parentheses. The dependent variable is a dummy whether the child at given birth parity in a household of the migration target countries (Yugoslavia, Albania, Croatia, Bosnia-Herzegovina, Macedonia, Kosovo, India, China) is male (=1) or female (=0). Previous Child Female denotes as dummy whether any of the previous children in the household are female. The regressors are: Monthly gross household income in EUR in logs; the level of religiosity as measured by frequency of church/mosque/temple visits; health issues, which measures the subjective extent of general sickness and lack of health; and the level of schooling. See the appendix for detailed variable description. The sample comprises singular data from 1984-2013; in case of several data entries by the same household individual over different years only the most recent data are used. Due to the limited sample size not all regressors can be included simultaneously. Sign Switch for Girl-birth Likelihood denotes that when employing the girl-birth likelihood instead of the boy-birth likelihood as outcome variable, the respective regressor switches signs. *, **, *** indicate significance at the 10, 5, and 1 percent level. Source: German Socio-Economic Panel Study (SOEP).

For the total sample, more religiosity leads on average to a lower boy-birth likelihood, which we explain with the tendency among more religious people to oppose abortion. Religiosity among migrants, however, leads to higher odds of having a son, both for all foreigners collectively and for our target migration sub-sample. We believe this is due to the different meaning of religiosity for the average German versus the migrant population, which leads to divergent behavior regarding son preference and sex selection practices.

V. Conclusion

Even in the 21st century discrimination of women remains a central issue (Chant, 1992; Duflo, 2005), which is not only confined to the developing world. For Europe, prenatal excess female mortality continues to be a reality in certain Balkan countries, and large migration waves from that region could have the potential to disseminate gender selection practices further across the continent. The objective of this paper has been to examine if migrants, who moved to Germany and Switzerland and who come from Balkan and Asian countries that are known for son preference, display biased sex ratios at birth also in the new environment. Using different micro data sources, we systematically compared those target migrants to all migrants collectively as well as to the native population. As second step, we attempted to identify underlying motives for gender selection with a focus on socio-economic determinants.

We screened abortion statistics and birth registry data in Germany and Switzerland to examine sex ratios at birth along maternal citizenship. Empirical results indicate that mothers from the target Balkan and Asian countries maintain a high son preference in their new environment, as compared to native Germans, respectively Swiss. In contrast, the sex ratio at birth of immigrants collectively is only marginally higher than the native population. Hence, Central Europe is not broadly importing the missing women phenomenon but foreigners from selected countries tend to continue to have a biased sex ratio at birth.

Birth data for Germany allowed us to further examine effects from cultural adaptation. However, neither the citizenship of the father, i.e. the distinction if he is German versus from the same country as the mother, nor the parental length of stay in Germany at the point of birth affect the level of son preference much. The Swiss data provided additional information on birth parity, and for all migration groups we observe a u-shaped pattern of son preference along parities, where especially for first and fourth birth a strong male bias is present. Considering three different reference rates of the sex ratio at birth, we consistently estimated around 1,500 missing girls from the Balkan and Asian immigrant groups in Germany (2003-2014) and

Switzerland (1990-2014) combined. Hence while we identified prenatal gender selection among distinct immigrant groups, the impact in absolute perspective is rather small.

We also attempt to identify potential underlying reasons for son preference, by employing the Germany SOEP household survey. It contains information on sex and parity of each newborn as well as demographic and socio-economic indicators, though the sample of foreign respondents is limited. Overall findings showed the difficulty to establish robust patterns between socio-economic respectively demographic variables, and the sex of a child. This confirms census data results which have not yielded evidence for broad systematic son preference either. Children of households in Germany are above all determined by nature, i.e. through a random outcome, even for migrant sub-groups. Nevertheless, our regressions suggest that composition of previous parities tends to matter, as the boy-birth likelihood always increases significantly if the first child was a girl. We also observe that if prenatal female discrimination exists, it is associated with the selected Balkan and Asian households in Germany, and not with foreigners collectively. This mirrors the aggregate findings from national birth registries. Finally, out of our socio-economic determinants only religiosity comes close to being significant, but the direction of the effect depends on the sample examined. Among all households, more intense religious belief decreases son preference, which might be due to a general opposition to abortion among more religious people. For foreigners, however, more religiosity leads to a higher male bias at birth.

We propose future research to refine the explanatory analyses for gender preferences, which for selected groups seems to persist independent of the geographical environment. Likewise, a more longitudinal perspective could help in the understanding of the level of son preference over time. Are the variations of son preference caused by a different speed of integration depending on the migration group? Policy makers would benefit from enhanced knowledge on the pace of adjustment of the sex ratio at birth towards “normal” levels. Given the unfavorable fertility rates and demographic trends in Central Europe, migration will most likely continue to be a key socio-economic variable in the future. Thus, although currently the effects of pre-natal sex selection are small in absolute terms, the issue may become more relevant going forward.

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VI. APPENDIX

Table 8: Descriptives for the German socio economic panel study (SOEP)

Averages (unless otherwise indicated)	(1) Total Sample	(2) All Foreign	(3) Target Migration Sample[1]
Sample Size (at least One Child)	18,706	2,209	108
Sample Size (at least Two Children)	13,035	1,640	87
Sample Size (at least Three Children)	4,672	693	49
Sample Size (at least Four Children)	1,490	275	22
Number of Children	1.71	1.80	1.94
Sex Ratio at Birth: First Child	1.08	1.04	1.08
Sex Ratio at Birth: Second Child	1.00	0.93	1.18
Sex Ratio at Birth: Third Child	1.04	1.02	1.33
Sex Ratio at Birth: Fourth Child	1.11	0.90	0.83
Log Average Monthly Income	7.39	7.33	6.95
Religiosity	2.11	2.15	2.08
Health Issues	2.65	2.58	2.79
Level of Schooling	2.06	2.09	1.90

Notes: 1 Target Migration Sample includes all respondents who indicate as country of birth Albania, Bosnia-Herzegovina, Kosovo, Macedonia, Montenegro, Yugoslavia, China, or India. The sex ratio at birth is calculated as total male births over total female births per parity given. Log Average Monthly Income is the gross monthly income in EUR reported per household. Religiosity refers to the frequency of church/temple visits on a scale from 1 (never) to 5 (daily). Health issues is the subjective individual's health situation on a scale from 1 (very good) to 5 (bad). Level of schooling is the highest school education achieved on a scale from 1 (lower secondary school) to 5 (high school graduation with general qualification for university entrance). Source: German socio economic panel study (SOEP).

Table 9: Detailed Statistics for Federal Birth Data in Germany and Switzerland along Citizenship

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mother's Citizenship	Domestic	All Foreign	5 Balkan Countries[1]	China and India	Kosovarian	Montenegrin	Macedonian	Albanian	Bosnian-Herzegovi-nian	Chinese	Indian
Panel A: Germany (2003-2014)											
Total number of births	6,784,294	1,430,242	118,287	22,685	34,552	31,425	20,204	4,294	27,812	11,735	10,950
Sex ratio at birth	1.053	1.055	1.077***	1.057	1.087***	1.075**	1.078*	1.095	1.062	1.032	1.085
Father same citizenship as mother	n/a	52%	75%	56%	72%	79%	83%	52%	72%	48%	63%
Parents in Germany less than 8 years	n/a	30%	34%	42%	31%	41%	31%	37%	31%	39%	44%
Panel B: Switzerland (1990-2014)											
Total number of births	1,326,729	655,293	58,713	7,362	14,011	287	25,966	962	14,144	4,019	3,343
Sex ratio at birth	1.055	1.059	1.058	1.080	1.039	1.126	1.073	1.060	1.048	1.091	1.066
Mother below 30 years	38%	50%	74%	37%	72%	58%	80%	60%	67%	32%	43%
Birth parity	1.79	1.68	1.80	1.46	1.78	1.68	1.75	1.58	1.72	1.43	1.49

1: 5 Balkan Countries includes Yugoslavia from 1990-1993 (38,620 births).
Notes: The citizenship in columns refers to the mother's citizenship reported at the time of the child's birth. The sex ratio at birth is the ratio of male over female births. "Father same citizenship as mother" indicates the ratio of fathers in percentage that have the same citizenship as the mother. As the variable is dummy coded (1 = same citizenship as mother, 0 = German), column 7 has no values since here the two dummy categories coincide. Also, this variable is only collected for married parents, which decreases the sample size by about 42,000 births. For Switzerland, "birth parity" is the average number of children per mother. This variable is not collected, so that the sample size for this variable is smaller (there are ca. 200,000 births registered without birth parity allocation) Source: Federal Statistical Office Germany (Destatis); Swiss Federal Statistical Office (BFS).

Table 10: Boy-Birth Likelihood in Germany along Parental Citizenship and Time of Residence in Germany

Panel A: Parental Citizenship	Father German		Both Parents Foreign	
Mother's Citizenship	Boy-birth likelihood	Sample Size	Boy-birth likelihood	Sample Size
German	0.513	4,045,343	n/a	n/a
All Foreign	0.513	519,639	0.513	557,772
5 Balkan Countries	0.518	21,567	0.519	65,513
China and India	0.512	8,978	0.511	11,273
Kosovarian	0.520	7,722	0.522	20,181
Montenegrin	0.515	4,690	0.519	17,930
Macedonian	0.509	2,656	0.520	12,611
Albanian	0.547	1,352	0.508	1,479
Bosnian-Herzegovinan	0.514	5,147	0.515	13,312
Chinese	0.497	5,216	0.513	4,897
Indian	0.533	3,762	0.510	6,376
Panel B: Time of residence in Germany	Residence for at least 8 Years		Residence for less than 8 Years	
Mother's Citizenship	Boy-birth likelihood	Sample Size	Boy-birth likelihood	Sample Size
German	n/a	n/a	n/a	n/a
All Foreign	0.512	303,585	0.514	254,187
5 Balkan Countries	0.519	40,887	0.519	24,626
China and India	0.507	3,175	0.512	8,098
Kosovarian	0.521	12,895	0.524	7,286
Montenegrin	0.520	9,959	0.518	7,971
Macedonian	0.522	8,598	0.515	4,013
Albanian	0.487	651	0.525	828
Bosnian-Herzegovinan	0.515	8,784	0.513	4,528
Chinese	0.498	1,152	0.517	3,745
Indian	0.513	2,023	0.508	4,353

Notes: Each cell reports the fraction of male births along mother's citizenship. In panel A, both parents foreign indicate that the father carries same citizenship as the mother, whose citizenship is given in the very left column. Panel B is a detailed breakdown of the two columns at the right of panel A, i.e. panel B only contains births from parents who share the same foreign citizenship.
Source: Federal Statistical Office Germany (Destatis).

Table 11: Boy-Birth Likelihood in Switzerland along Mother's Citizenship and Birth Parity

Mother's Citizenship	(1) 1st Birth	(2) 2nd Birth	(3) 3rd Birth	(4) 4th Birth	(5) Sample Size
Panel A: Full sample (1990-2014)					
Swiss	0.514	0.513	0.512	0.512	1,152,609
All Foreign	0.515	0.512**	0.512	0.521*	582,632
5 Balkan Countries	0.519	0.507***	0.513	0.534**	71,685
China and India	0.511	0.534**	0.534	0.722***	6,996
Kosovarian	0.511	0.501	0.524	0.521	13,486
Montenegrin	0.612	0.411***	0.577	0.333**	262
Macedonian	0.524	0.513	0.503**	0.545	25,397
Albanian	0.504	0.523	0.519	0.520	864
Bosnian-Herzegovinan	0.518	0.504	0.519	0.505	13,215
Chinese	0.516	0.536	0.534	0.636	3,715
Indian	0.504	0.532	0.534	0.857***	3,281
Panel B: Millenium sample (2000-2014)					
Swiss	0.515	0.514	0.514	0.513	602,376
All Foreign	0.515	0.513	0.512	0.517	365,646
5 Balkan Countries	0.520	0.508**	0.511	0.541*	43,871
China and India	0.508	0.544**	0.526	0.611	5,198
Kosovarian	0.511	0.501	0.524	0.521	13,486
Montenegrin	0.612	0.411***	0.577	0.333**	262
Macedonian	0.521	0.513	0.497**	0.565	20,532
Albanian	0.533	0.492	0.532	0.818	565
Bosnian-Herzegovinan	0.525	0.511	0.517	0.503	9,026
Chinese	0.514	0.544	0.533	0.400	2,8666
Indian	0.499	0.544	0.519	0.875***	2,332

Notes: Each cell reports the fraction of male births along mother's citizenship. Columns indicate the number of previous births plus 1 per mother, and the last column reports the total number of births per population group, where birth parity is known. 5 Balkan Countries includes Yugoslavia until 1993. Due to missing entries on birth parity the totals are smaller than the comparable figures in table 2. *, **, *** indicate significance at the 10, 5, and 1 percent level as calculated via a z-test that measures the difference between the nth birth and the first birth. Source: Swiss Federal Statistical Office (BFS).

Background Information on the Reference Sex Ratio at Birth based on Klasen and Wink (2003):

Klasen and Wink (2003), building on Klasen (1994), propose a "variable" sex ratio at birth, arguing that a secular upward trend in the sex ratio at birth in rich countries requires rejection of a "stable" sex ratio at birth. "Whenever better health and nutrition lower the rates of spontaneous abortions and miscarriages and reduce the incidence of stillbirths, the sex ratio at birth increases" (ibid., p. 269). As people in more developed countries also enjoy higher life expectancies, they conduct a regression of the observed sex ratio at birth on the life expectancy in a country. Hereby the sample with observed sex ratios at birth consists of countries which have complete birth registration data, at least 5,000 births per year, and no evidence of sex-selective abortion.

Then, using the estimated regression coefficients, they calculate an expected "unbiased" sex ratio at birth per country that is now associated with the respective average life expectancy. Hence, in addition to biological factors, the authors also consider the individual state of development per country, proxied by the life expectancy, which influences the sex ratio at birth. As data source for life expectancy and the observed sex ratio at birth they use the UN Demographic Yearbook. Generally, the expected "unbiased" sex ratio at birth by Klasen and Wink (2003) for countries with excess female mortality (e.g., China, India) are below the ratio for Coale (1991), leading to a higher estimated number of "missing women".

For our purposes, we adopt the regression coefficients estimated by Klasen and Wink (2003), consisting of the constant = 0.991, and the beta for life expectancy = 0.00087. By taking life expectancy data from the World Development Indicators, we the estimate an expected sex ratio at birth for each country in our sample. For combined migration groups, e.g. the group of Indian and Chinese mothers together, we take an average of the individual country results weighted by the actual number of births in Germany and Switzerland. For the all-foreign group, we proxy the average life expectancy of all migrants by employing the aggregate World Bank life expectancy value for "Europe and Central Asia", yielding an expected sex ratio at birth of 1.057.

Table 12: Detailed Estimates of "Missing Women" at Birth in Germany and Switzerland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Native Ratio			Coale's (1991) method			Klasen and Wink's	
Mother's Citizenship	Actual Sex Ratio	Reference Sex Ratio	Missing Women	% missing births	Reference Sex Ratio	Missing Women	% missing births	Reference Sex Ratio	Missing Women	% missing births
Panel A: Germany (2003-2014)										
5 Balkan Countries	1.077	1.053	1,269	2.23%	1.059	958	1.68%	1.055	1,164	2.04%
China and India	1.057	1.053	39	0.35%	1.059	-20	-0.19%	1.053	42	0.39%
Kosovarian	1.087	1.053	532	3.22%	1.059	441	2.67%	1.052	551	3.33%
Montenegrin	1.075	1.053	316	2.09%	1.059	234	1.54%	1.056	279	1.84%
Macedonian	1.078	1.053	225	2.32%	1.059	172	1.77%	1.056	198	2.04%
Albanian	1.095	1.053	80	3.92%	1.059	69	3.36%	1.058	71	3.44%
Bosnian-Herzegovinan	1.062	1.053	114	0.85%	1.059	42	0.31%	1.057	65	0.49%
Chinese	1.032	1.053	-117	-2.02%	1.059	-147	-2.55%	1.056	-133	-2.30%
Indian	1.085	1.053	155	2.96%	1.059	127	2.41%	1.049	176	3.35%
All Foreign	1.055	1.053	1,339	0.19%	1.059	-2,381	-0.34%	1.057	-1,375	-0.20%
Panel B: Switzerland (1990-2014)										
5 Balkan Countries	1.061	1.055	205	0.54%	1.059	75	0.20%	1.055	202	0.53%
China and India	1.080	1.055	81	2.30%	1.059	69	1.95%	1.053	89	2.51%
Kosovarian	1.039	1.055	-106	-1.54%	1.059	-129	-1.87%	1.052	-85	-1.24%
Montenegrin	1.126	1.055	9	6.68%	1.059	9	6.32%	1.056	9	6.63%
Macedonian	1.073	1.055	209	1.67%	1.059	165	1.32%	1.056	199	1.59%
Albanian	1.060	1.055	2	0.43%	1.059	0	0.09%	1.058	1	0.16%
Bosnian-Herzegovinan	1.048	1.055	-48	-0.69%	1.059	-71	-1.03%	1.057	-59	-0.86%
Chinese	1.091	1.055	65	3.38%	1.059	58	3.03%	1.056	63	3.28%
Indian	1.066	1.055	16	0.99%	1.059	11	0.67%	1.049	26	1.60%
All Foreign	1.059	1.055	1,026	0.32%	1.059	-64	-0.02%	1.057	397	0.12%
Panel C: Totals Germany and Switzerland										
5 Balkan Countries			1,474	1.55%		1,033	1.09%		1,366	1.44%
China and India			120	0.82%		49	0.33%		131	0.90%
Kosovarian			427	1.40%		312	1.02%		466	1.52%
Montenegrin			325	2.11%		242	1.57%		288	1.87%
Macedonian			434	1.95%		337	1.52%		397	1.78%
Albanian			82	2.73%		69	2.30%		71	2.37%
Bosnian-Herzegovinan			67	0.74%		-29	-0.33%		6	0.07%
Chinese			-52	-0.67%		-89	-1.15%		-70	-0.91%
Indian			171	2.50%		137	2.00%		202	2.94%
All Foreign			2,365	0.23%		-2,445	-0.24%		-977	-0.10%

Notes: Expected sex ratio based on Klasen and Wink's (2003) method are the authors' own calculations based on the regression equation in table 2, column 1 from ibid. Hereby, All Foreign uses the life expectancy from the World Bank for "Europe and Central Asia" as proxy. 5 Balkan Countries in Panel B (Switzerland) includes Yugoslavia until 1993, but Yugoslavia is not included in the weighted expected sex ratio at birth for Klasen and Wink's (2003) method for the 5 Balkan Countries due to missing data on life expectancy at birth in Yugoslavia. % missing births is arrived at by dividing the number of Missing Women by the actual number of female births reported.
Source: Federal Statistical Office Germany (Destatis); Swiss Federal Statistical Office (BFS); World Development Indicators (World Bank).

Table 13: Boy-Birth Log-likelihood Regressions (Logit, Regular Coefficients Shown)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	1st Birth		2nd Birth		3rd Birth		4th Birth	
Panel A: Full sample with migration background dummy								
Migration Background	-0.04	-0.03	-0.09	-0.21	-0.04	-0.20	-0.29	-0.98
	(0.04)	(0.16)	(0.05)*	(0.20)	(0.08)	(0.37)	(0.13)**	(0.57)*
Previous Child Female	n/a	n/a	0.06	0.06	-0.20	-0.07	-0.30	0.37
			(0.04)*	(0.07)	(0.07)***	(0.15)	(0.14)**	(0.40)
Monthly Income		-0.01		-0.09		0.07		0.05
		(0.03)		(0.04)		(0.07)		(0.13)
Religiosity		-0.01		-0.04		-0.08		-0.12
		(0.03)		(0.04)		(0.06)		(0.12)
Health Issues		-0.04		-0.02		-0.03		0.20
		(0.03)		(0.04)		(0.08)		(0.16)
Level of Schooling		-0.04		-0.03		0.01		0.21
		(0.03)		(0.03)		(0.06)		(0.14)
Additional Controls	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
Wald Chi-Square (p-value)	0.34	0.68	0.05	0.08	0.03	0.70	0.01	0.27
Panel B: Full sample with dummy for migration background from target countries								
Migration Background from Target Countries	-0.09	-0.34	0.04	1.54	0.04	-0.01	-0.64	-1.08
	(0.19)	(0.67)	(0.21)	(1.09)	(0.28)	(1.47)	(0.42)	(0.84)
Previous Child Female	n/a	n/a	0.06	0.07	-0.20	-0.08	-0.30	0.30
			(0.04)*	(0.07)	(0.07)***	(0.15)	(0.14)**	(0.41)
Monthly Income		-0.01		-0.09		0.07		0.05
		(0.03)		(0.04)		(0.07)		(0.13)
Religiosity		-0.01		-0.04		-0.08		-0.12
		(0.03)		(0.04)		(0.06)		(0.12)
Health Issues		-0.04		-0.02		-0.03		0.20
		(0.03)		(0.04)		(0.08)		(0.16)
Level of Schooling		-0.04		-0.03		0.01		0.21
		(0.03)		(0.03)		(0.06)		(0.14)
Additional Controls	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Wald Chi-Square (p-value)	0.63	0.65	0.18	0.05	0.01	0.75	0.05	0.37
Panel C: Full sample with two migration background dummies								
Migration Background	-0.04	-0.02	-0.10	-0.30	-0.04	-0.21	-0.26	-0.90
	(0.05)	(0.16)	(0.05)*	(0.21)	(0.08)	(0.38)	(0.14)*	(0.59)
Migration Background from Target Countries	-0.06	-0.33	0.13	1.83	0.08	0.19	-0.45	-0.71
	(0.19)	(0.69)	(0.21)	(1.11)*	(0.28)	(1.51)	(0.43)	(0.65)
Previous Child Female	n/a	n/a	0.06	0.07	-0.20	-0.07	-0.30	0.34
			(0.04)*	(0.07)	(0.07)***	(0.15)	(0.14)**	(0.40)
Monthly Income		-0.01		-0.09		0.07		0.05
		(0.03)		(0.04)		(0.07)		(0.13)
Religiosity		-0.01		-0.04		-0.08		-0.12
		(0.03)		(0.04)		(0.06)		(0.12)
Health Issues		-0.04		-0.02		-0.03		0.20
		(0.03)		(0.04)		(0.08)		(0.16)
Level of Schooling		-0.04		-0.03		0.01		0.21
		(0.03)		(0.03)		(0.06)		(0.14)
Additional Controls	no	yes	no	yes	no	yes	no	yes
Sample Size	18,706	4,776	13,035	3,205	4,672	900	1,490	214
(Pseudo) R-Squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
Wald Chi-Square (p-value)	0.61	0.76	0.08	0.04	0.03	0.81	0.02	0.30
Panel D: All Foreign sub-sample								
Migration Background from Target Countries	-0.04	-0.05	0.16	1.90	-0.04	0.71	-0.40	
	(0.20)	(0.70)	(0.22)	(1.09)*	(0.30)	(1.25)	(0.47)	
Previous Child Female	n/a	n/a	0.06	0.18	-0.37	1.57	-0.36	
			(0.10)	(0.41)	(0.18)**	(1.36)	(0.32)	
Monthly Income		0.20		-0.27		0.27		
		(0.16)		(0.22)		(0.32)		
Religiosity		-0.04		0.05		0.03		
		(0.14)		(0.18)		(0.39)		*insufficient*
Health Issues		0.07		0.03		0.22		*sample size*
		(0.17)		(0.22)		(0.36)		
Level of Schooling		0.07		0.22		-0.12		
		(0.14)		(0.20)		(0.38)		
Additional Controls	no	yes	no	yes	no	yes	no	
Sample Size	2,209	172	1,640	107	693	31	275	
(Pseudo) R-Squared	0.01	0.01	0.01	0.04	0.01	0.07	0.01	
Wald Chi-Square (p-value)	0.85	0.79	0.64	0.39	0.12	0.84	0.43	

Notes: Reported is the coefficient from a logit model for the indicated independent variable along with the robust standard error in parentheses. Migration Background denotes whether the individual is born outside of Germany; Migration Background from Target Countries denotes whether the individual is born in Yugoslavia, Albania, Croatia, Bosnia-Herzegovina, Macedonia, Kosovo, India, or China. Previous Child Female denotes as dummy whether any of the previous children in the household are female. The dependent variable is a dummy whether the child at given birth parity in a household is male (=1) or female (=0). Even columns include the following controls: Monthly gross household income in EUR in logs; the level of religiosity as measured by frequency of church/mosque/temple visits; health issues, which measures the subjective extent of general sickness and lack of health; and the level of schooling. See the appendix for detailed variable description. The sample comprises singular data from 1984-2013; in case of several data entries by the same household individual over different years only the most recent data are used. The number of births deviates from the sample size at higher parities since less and less parents report a second, third, or fourth child. *, **, *** indicate significance at the 10, 5, and 1 percent level. Source: German Socio-Economic Panel Study (SOEP) .

Table 14: Boy-birth Log-likelihood Regressions for Target Migration Groups (Logit, Regular Coefficients Shown)

Dependent Variable: Boy-birth likelihood	(1)	(2)	(3)	(4)	(5)
Panel A: First birth					
Monthly Income		0.18			
		(0.25)			
Religiosity			-0.86		
			(0.47)*		
Health Issues				0.19	
				(0.17)	
Level of Schooling					0.34
					(0.46)
Sample Size		60	60	108	20
Wald Chi-Square (p-value)		0.51	0.07	0.24	0.46
Panel B: Second birth					
Previous Child Female	0.71				
	(0.43)*				
Monthly Income		0.16			
		(0.30)			
Religiosity			0.88		
			(0.37)**		
Health Issues				-0.03	
				(0.18)	
Level of Schooling					0.75
					(0.46)*
Sample Size	87	51	51	87	15
Wald Chi-Square (p-value)	0.09	0.59	0.02	0.88	0.10
Panel C: Third birth					
Previous Child Female	0.30				
	(0.64)				
Monthly Income		0.28			
		(0.41)			
Religiosity			0.61		
			(0.54)		
Health Issues				0.06	
				(0.24)	
Level of Schooling					-1.10
					(1.63)
Sample Size	49	25	25	49	8
Wald Chi-Square (p-value)	0.64	0.49	0.25	0.80	0.50

Notes: Reported is the coefficient from a logit model for the indicated independent variable along with the robust standard error in parentheses. The dependent variable is a dummy whether the child at given birth parity in a household of the migration target countries (Yugoslavia, Albania, Croatia, Bosnia-Herzegovina, Macedonia, Kosovo, India, China) is male (=1) or female (=0). Previous Child Female denotes as dummy whether any of the previous children in the household are female. The regressors are: Monthly gross household income in EUR in logs; the level of religiosity as measured by frequency of church/mosque/temple visits; health issues, which measures the subjective extent of general sickness and lack of health; and the level of schooling. See the appendix for detailed variable description. The sample comprises singular data from 1984-2013; in case of several data entries by the same household individual over different years only the most recent data are used. Due to the limited sample size not all regressors can be included simultaneously. Sign Switch for Girl-birth Likelihood denotes that when employing the girl-birth likelihood instead of the boy-birth likelihood as outcome variable, the respective regressor switches signs. *, **, *** indicate significance at the 10, 5, and 1 percent level. Source: German Socio-Economic Panel Study (SOEP).