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IMMIGRANT MOTHERS` PREFERENCES FOR CHILDREN`S SEX

A register-based study of fertility behavior in Norway

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ABSTRACT

Parental sex preferences have been documented in many native populations, but much less evidence is available on immigrants' preferences for the sex of their children. Using high quality longitudinal register data from Norway, a country with a recent immigration history, we estimate hazard regression models of third birth rates by the sex composition of the first two children. A central question in the extant literature is whether the sex preferences of immigrant mothers match those observed in the country of origin, or if cultural adaption to local conditions is more important. Our analyses indicate that the sex preferences of immigrants generally match those previously documented for the corresponding native population, especially in the case of son preferences. The pattern of sex preferences is unmodified by the mother's exposure to the host society. In sum, our evidence generally supports theories emphasizing cultural persistence, rather than theories of adaption or immigrant selectivity. (150 words)

Keywords: immigrants, fertility, parental sex preferences, children, family composition, register data, Norway, parental gender preferences, integration

Introduction

Parental preferences for the sex of their children are documented for many populations across all major regions of the world. A preference for at least one child of each sex seems to be a nearly universal finding, although its strength varies by country, region and period (Arnold 1985; Arnold 1992; Hank and Kohler 2000; Dahl and Moretti 2004; Raley and Bianchi 2006; Fuse 2010). A sex-specific preference for sons is also commonly found, especially in Southern Asia, Eastern Asia, The Middle East and Northern Africa (Arnold 1985; Arnold 1992; Fuse 2010). The origins of such preferences are likely to be partly psychological, as children provide parents with opportunities for self-realization, affiliation and other benefits (Hoffman and Hoffman 1973; Kohler et al. 2005; Marleau & Saucier 2002). Children of different sexes may be able to provide fulfillment of different psychological needs, and those needs may vary depending on the sex of the parent (Hank 2007). A desire for a child of the same sex is often documented for each parent (Marleau and Saucier 2002; Dahl and Moretti 2004; Hank 2007). Nevertheless, there are also important social variations in sex preference patterns. Studies of industrialized nations have pointed to an emerging indifference among parents in some countries (c.f. Pollard and Morgan 2002) as well as comparatively stronger preferences for daughters in the highly gender-egalitarian Scandinavian countries (Andersson et al. 2006).

More recently, important contributions to the literature have had a focus on parental sex preferences of immigrants (Okun 1996; Almond and Edlund 2008; Almond et al. 2009; Almond et al. 2013; Kavli 2015; Ost and Dziadula 2016). While there is much evidence on the general fertility and family-building patterns of immigrants in industrialized countries (see e.g. Andersson 2004; Dubuc 2012; Mussino and Strozza 2012), we have until recently known little about their preferences for daughters or sons in the countries where they reside after migration. While describing immigrants parents' sex preferences in the context of their host societies is important in its own right, the relative paucity of research is unfortunate also because studies like these both provide clues to these groups' preferences for other family-related outcomes and ultimately contribute to answering questions on whether and in what way immigrants adapt to local cultural conditions (Kahn 1988; Okun 1996; Almond et al. 2009; Almond et al. 2013).

In addition to documenting the parental sex preferences of immigrants, this emerging literature is especially preoccupied with the question of whether the parental sex preferences of immigrants are mostly attributable to the persistence of cultural norms acquired in their

country of origin, or whether cultural adaption to the new country is more important. Distinct immigrant behaviors and values, such as parental sex preference patterns markedly different from those of natives, may suggest a persisting cultural distance between the native and immigrant populations (Wimmer and Soehl 2014; Kavli 2015). On the other hand, cultural integration and adaption to the norms, incentives and institutions of the host country may affect these preferences, and there may for example be important differences by age at migration, years of residence, and endogamy-exogamy patterns. Thus far, we know very little about these issues (but see Almond et al. 2013; Ost and Dziadula 2016 on the first point). If those who arrive during childhood, and therefore complete much or all of their education in the host country behave more similar to natives rather than to older migrants from the same region, an argument can be advanced that child migrants will more efficiently adapt to local conditions.

We will contribute to answering these questions by studying the parental sex preferences of female first-generation migrants who arrived in Norway between 1955 and 2014. We extend previous research by separately including immigrants from a larger and more heterogeneous set of countries. Following the extant literature, we assess sex preferences by studying parity progression to third birth by the sex composition of children previously born. Our main sample includes all immigrant mothers who were registered as living in Norway when their second child was born, though analyses utilizing two different inclusion criteria are included in the appendix (c.f. Hank and Kohler 2000; Andersson et. al. 2006). Importantly, we benefit from the comprehensive administrative register data available in Norway, which gives us complete a complete history of births on a yearly basis. This allows us to use the methods considered *de rigeur* in the literature. Additionally, the available data minimizes problems usually encountered in previous studies based on survey methods, such as selective attrition and a small number of observations. We also break the analysis down into subgroups based on country of origin, and estimate interaction models with measures of the nativity of co-parent, the mother's duration of residence in Norway, and age at arrival.

We would like to emphasize four main findings. First, the parental sex preferences we document for the immigrant groups generally match those found for native populations on the relevant regions in previous research, though there are a few interesting exceptions. Second, neither age at arrival nor time in Norway seem to affect parental sex preferences very much. Third, although there are exceptions, having a native co-parent is generally unimportant. Last, accounting for educational attainment does not affect the results, thus providing some

suggestive evidence against the importance of immigrant selectivity. We generally interpret these results in line with theories focusing on the persistence of cultural norms from the country of origin. Apart from a few cases, mechanisms related to adaption to Norwegian culture and institutions seem less important, even when taking age at arrival and duration of stay in Norway into consideration.

The Norwegian case is interesting for several reasons. First, focusing on a European country which has a relatively short history of large-scale immigration makes for an interesting contrast with previous research from “nations of immigrants” such as the U.S. and Canada. Second, Norway is characterized by a high level of gender equality and human development more generally (Fortin 2005; UNDP 2013). Norway should thus represent an interesting case for comparison to other countries with a lower level of gender equality. Secondly, comparatively speaking, immigrants have fairly successfully been integrated into the labor market (Birkelund and Petersen 2005; Brekke and Mastekaasa 2009; Hermansen 2013), which is an important indication of immigrant integration along economic lines. There are large variations between immigrant groups, however, with some groups facing markedly higher lifetime risks of labor market exclusion (Bratsberg, Raaum and Røed 2010).

Theory and previous research

The literature on patterns in parental sex preferences covers both factors thought to be human universals as well as explanations that are culture-, country- or process-specific (Brockmann 2001; Hank 2007; Mills and Begall 2010). We assess immigrant mothers' preferences for children's sex in Norway, taking as our main research problem whether these preferences (if any) are mainly affected by the culture of the immigrants' country of origin, or whether adaptations to local conditions are more important. In order to provide a satisfying answer to this question, we must consider several different explanations and theories. Our review consists of two main parts: theories emphasizing the importance of persistent cultural norms and their genesis, and theories on the dynamic aspects of cultural adaptation and the migration event.

From differential utility to cultural norms: Adaptation and cultural persistence

The literature provides us with several different perspectives focusing on cultural norms, and we will emphasize two dimensions that seem especially relevant. First, the differential utility perspective aims to explain how norms related to sex preferences arise in a given culture

(Wolf 1984). We also need to approach the question of how such norms persist or adapt under changing cultural conditions associated with the migration process (cf. Almond et al. 2013).

The differential utility perspective emphasizes that giving birth to a child of one sex is associated with different economic, social or cultural advantages and disadvantages compared to parenting a child of the other sex (Wolf, 1984; Arnold and Zhaoxiang 1986). The *economic* advantages of boys are thought to be particularly important in developing countries, where girls often find themselves either barred from working in many or most types of work, or subjected to extensive discrimination (Wolf 1984; Duflo 2011). Dowry payments when a daughter is married are also important in many countries (Das Gupta et. al. 2003). The cost associated with raising a girl might also be higher than that of raising a boy (Dahl and Moretti 2004). In addition, males are on average physically stronger, thus providing potential advantages in agricultural work as well as in areas of conflict (Oldenburg 1992).

Social and *cultural* advantages are also associated with sons in many countries and regions. For example, in patrilineal societies, the birth of a son enables one to extend the family name, whereas patrilocality implies a potentially advantageous extension of the household upon the marriage of a son (Arnold and Kuo 1984). Generally, the symbolic role associated with being male often plays an important role in rituals and ceremonies of several religions (Arnold and Kuo 1984; Das Gupta et. al 2003). For example, a strong preference for boys has been found in most countries where Confucianism has been historically important (Williamson 1976a; Williamson 1976b; Arnold and Kuo 1984; Tang 2013). It should be noted that these asymmetric preferences for one sex are often more evident when data on attitudes rather than behavior is analyzed (Cronk 1991).

In other cultural contexts and situations however, girls may represent an advantage to the family. In some contexts, these advantages may even outweigh those advantages associated with giving birth to boys, or play a complementary role (c.f. Morgan and Niraula 1995). This is true for social and religious differentials in particular, for example in the case of matrifocal societies (Quinlan 2006). Girls` perceived capacity for care and nurture in old age, as well as for housekeeping tasks are often considered important as well (Cleland et. al. 1983; Arnold 1997). Thus, a preference for at least one girl is often expected, and well documented empirically in many regions (Williamson 1976a; Arnold 1997; Hank and Kohler 2000; Fuse 2010).

Many of the arguments associated with the differential utility perspective are based on economic and utilitarian incentives mostly associated with economically less developed and culturally traditional societies. Thus, the relevant predictions should generally not be expected

to hold true as a result of individuals adapting to the set of incentives present in industrialized countries such as Norway (Brockmann 2001; Andersson et al. 2006; Hank 2007). Still, the perspective is highly relevant when focusing on immigrants in these contexts for at least two reasons. First, although some of the mentioned practices are rendered less relevant and/or are prohibited by law, others could persist after immigration. For example, there is a tendency for patrilocality among Turkish immigrants to Norway (Visdal-Johnsen 2005) and important social and religious traditions will likely persist after migration, while being modified to some extent in accordance with local norms. Secondly, while many incentives will change, preferences may linger even in the absence of incentive-generating institutional arrangements (Dowding 2006). The persistence of son preferences with deep historical and cultural roots across South Asia in the face of sweeping social and economic changes is an example of this phenomenon (Chung and Das Gupta 2007).

The cultural context of gender egalitarianism in Norway, as well as the expected cultural dynamics of adaption, must be considered in greater detail. Norway, a very generous welfare state (Birkelund and Petersen 2005; Esping-Andersen 2013), ranks as one of the most gender equal societies in the world (UNDP 2013). This gender egalitarianism extends to non-natives along several dimensions. In Norway, immigrant women from several regions of the world have entered occupations and earn wages on par with male immigrants, in some cases at levels only slightly below the majority population (Brekke and Mastekaasa 2008; Hermansen 2013). It has been claimed that the increasing equality of opportunity between the sexes leads to an increasing indifference in parental sex preferences, though the evidence is mixed (Bongaarts 2001; Pollard and Morgan 2002; Das Gupta et al. 2003; Mills and Begall 2010). Recent evidence indicates that a preference for girls has emerged over the last decades among Norwegian (and other Scandinavian) natives (Jacobsen et al. 1999; Andersson et al. 2006).

Given the institutional context and level of integration implied by these findings, one could reasonably expect that the parental sex preferences of immigrants will become more similar to those of the native population over time, indicating cultural adaption (or assimilation) and adjustment to institutional incentives. Additionally, the process of cultural adaption may be stronger for those immigrants who arrived in Norway as children or, as this age is often considered a critical period in connection with cultural assimilation (Bleakley and Chin 2010; Ost and Dziadula 2016). These immigrants will complete parts of or the entirety of their schooling in Norway, and face more exposure to Norwegian culture in general. Age at migration has been shown to affect various other outcomes (Åslund 2015; Blau 2015;

Hermansen 2017), and it is likely that also fertility patterns in general as well as sex preference patterns more specifically, are affected by the age at arrival in the host country (Almond et al. 2013). Years of residence in Norway could also be relevant for similar reasons.

Although the Norwegian culture may accentuate gender equality, and levels of economic integration are relatively high, other factors point in the opposite direction. Immigrants bring with them norms and values prescribing certain fertility and family behaviors, that may well be different from the norms and values of the native population. Such norms may well, as we have noted, survive the process of immigration and possibly also socioeconomic integration into the host society. This mechanism is referred to in the literature as “cultural persistence” (Almond et al. 2013).

A final issue is that immigrants arriving in Norway are not selected at random from the population in their country of origin (cf. Forste and Tienda 1996; Razhin and Wahba 2015). Having made the choice to migrate could imply a greater similarity in sex preferences with the native population. Migrants to Norway may share or be more prepared to adapt to local values and preferences to a larger degree than those who did not migrate or migrated elsewhere (Kahn 1998). This implies that a pattern of sex preferences similar to that displayed by the native population, cannot unambiguously be interpreted as evidence for cultural adaption. Although we do not have direct data on the selectivity of the relevant immigrant groups, we do attempt to make some headway by using information on the educational attainment of immigrants.

What we expect to find

By combining the perspectives above, we are able to make some overall predictions. Cultural persistence implies that immigrants bring cultural norms with them from their region of origin and that this has a dominating influence on their behavior at the expense of local norms. This perspective, combined with the differential utility perspective, therefore leads us to expect that preferences for the sex of one’s child will be highly similar to that found in the parents’ region of origin. In most cases we predict a preference for boys, which is the dominant preference in the countries of origin included in this study. This will of course depend on a more detailed comparison with previous results for the country in question. On the other hand, if adaption and assimilation to local cultural norms are more important, one would expect immigrants’ preferences for their children’s sex to be closer to that of the majority population.

We aim to disentangle these mechanisms in several ways. First, we will compare the sex preferences of specific immigrant groups in Norway with those previously documented

for the native populations of the corresponding countries of origin. In short: If the preferences point in the same direction as those previously documented for natives in the relevant countries of origin, this provides some support for the importance of cultural persistence. On the other hand, if immigrants' preferences are more similar to that of the Norwegian majority, this would point to the importance of the local cultural norms and incentive structures present in Norwegian society, and therefore provide evidence for the importance of cultural adaption or potentially immigrant selection. Secondly, we investigate whether arriving in the country before or after age of 16 as well as the number of years spent in Norway is associated with changes in parental sex preferences. In this way, we are able to provide relevant evidence for the importance of cultural adaption over time, as the immigrants who have spent (parts of) their childhood in Norway or who have lived here for longer are expected to show greater cultural integration and changing preferences with time (Bleakley and Chin 2010; Åslund 2015; Ost and Dziadula 2016). Thirdly, we take a closer look at the importance of whether the co-parent of the second child is born in Norway or abroad, thus shedding additional light on the potential importance of more specific adaption and or/selection processes. Fourth, we estimate models with controls for educational level in order to provide some indirect evidence for the potential importance of immigrant selectivity for explaining parental sex preferences.

Data and Methods

The data used in this study come from Norwegian administrative registers, comprising the full population of both natives and immigrants to Norway. Information on individuals and their children were linked using the Norwegian personal ID number system. Fertility registrations include all relevant births taking place from 1955 and until 2014 in Norway, as well as births taking place abroad in the cases where mothers move to Norway with their previously born children at a later point in time. We include data on all mothers that were resident in Norway at the time of their second births. Two alternative residency-related criteria were also tested. The first includes all mothers who were resident when giving birth to their first child, while the second involves no residence-based restrictions. These choices make little difference for the results (cf. supplementary materials). In all specifications, observations were censored at the end of women's reproductive career (45 years), or at the time of death or emigration from Norway if the events took place earlier.

Some immigrant groups in our data are very small. We exclude mothers from the smallest immigrant groups to avoid reporting un-interpretable results with very large standard

errors. After experimentations with various cut-offs, we excluded groups of less than 800 mothers from further analysis, leaving us with data on 27 immigrant groups and the native group in the main analysis. The immigrant groups are from Bosnia-Herzegovina, Chile, China, Denmark, Finland, France, Germany, Iceland, India, Iran, Iraq, Kosovo, Morocco, the Netherlands, Pakistan, the Philippines, Poland, Russia, Somalia, South Korea, Sri Lanka, Sweden, Thailand, Turkey, United Kingdom, United States and Vietnam.

Statistical approach

For each immigrant group (and the majority population), we estimate relative rates of having a third birth using a Cox proportional hazard model (Allison 1984; Hoem 1993; Leung 1988; Haughton and Haughton 1998). This is a standard method in the literature for studies of rate differentials. We also experimented with a linear probability model. The choice of statistical model was of very little importance for the results.

The duration variable is the time passed since second birth. The main independent variable, the sex composition of children previously born, is a categorical variable with four levels: two boys, two girls and two mixed sex categories. The two girls-category served as the omitted reference group, and dummy variables represented the other categories. The exponentiated coefficient for previously having had two boys then measures the third-birth rate relative to the group with two girls. The magnitude of this coefficient thus provides us with a measure of specific sex preferences. A relative rate of 1.0 represents equal rates for the two parity progressions, which does not indicate any specific preference. Magnitudes larger than 1.0 indicate faster parity progressions for mothers with two girls compared to two boys, and thus a preference for boys. Magnitudes smaller than 1.0 indicate a preference for girls.

In all models, we include a vector of control variables to standardize for demographic characteristics (cf. Hank and Kohler 2000; Andersson et. al. 2006). Mother's birth cohort and age at second birth were included as quadratic polynomials. As simultaneously including period controls leads to fundamental collinearity problems, calendar year was not included in the main model. We included a parameterization of period in a sensitivity analysis (cf. supplementary materials), but the results were largely unaffected. To test hypotheses related to specific mechanisms, we add four variables to the basic model in a set of further models. Note that all these models modify the basic model, and that models are not nested.

In Model 2, we include educational attainment as a control variable, measured before and as close in time to the second birth as allowed by the available data. The mother's level of education was measured by the first digit of the so-called NUS-code, the national statistical

standard for education with ten values, ranging from 0 (Less than primary education) to 8 (Doctoral level education) with an additional category for missing information.

We gauge the importance of exposure to the host society in three different models. In all three, we add a variable of host society exposure to the model specification and interact this variable with the preference indicator. First, in Model 3, we introduce a dummy indicating whether the immigrant woman arrived in Norway in childhood, before the beginning of her reproductive career (age 15). In Model 4, we include a linear term measuring age at arrival. Finally, in Model 5 we add a dummy variable for whether or not the co-parent of mother's second child born in Norway. In these interaction models, we only interpret the results for the *interaction term* between the preference indicator of having two girls and the new variable.

Exogeneity of sex of previous children

In line with the extant literature, we argue that the sex composition of previous children can reasonably be assumed to be exogenous to our outcome, and therefore the relationship between sex composition and the outcome cannot be confounded by any other variable (Westoff et al. 1963; Angrist and Evans 1998). Thus, we do not add any more control variables (apart from those mentioned above, which all are related to the appropriate estimation of birth rates or the evaluation of specific mechanisms). The critical assumption here is that the sex composition of previous children is not associated with one or more factors that varies systematically depending on one's country of origin, and which is also related to sex preferences.

This assumption seems to have support in the literature. Neither biological nor environmental mechanisms mediating such possible associations are very well documented, nor are they hypothesized to be of an order of magnitude large enough to distort our results significantly (Angrist and Evans 1998; Gellatly 2008; Orzack et al. 2015). One possibility is the existence of gene variants related to sex ratio, but there is no direct empirical evidence at the individual or the group level (Gellatly 2008; Orzack et al. 2015). The Trivers-Willard hypothesis predicts that the sex ratio of newborn children depends on the mother's environment (Cameron 2004), and some studies have indeed indicated that high social status and high levels of testosterone in mothers may skew the sex ratio towards males (Grant and Chamley 2007; Cameron and Dalerum 2009). However, this evidence is rather weak and based on small samples, while a larger study based on administrative data failed to support the hypothesis (Kolk and Schnettler 2016).

There is also the potential issue of sex-selective abortion, which could provide an alternative way of realizing one's preferences. However, this does not seem likely to be important in Norway (Tønnesen et al. 2013). We discuss this issue in detail in the limitations section, and while acknowledging several caveats, we find it reasonable to interpret our results in line with the extant literature, as indicating a behavioral decision based on preferences for a specific sex.

Descriptive statistics

Table 1 provides a basic statistical overview of the immigrant groups we study. Evident are the large variations in the average time and age of arrival of these groups, their sizes, and their fertility behavior in Norway. Figures S1-S3 in the supplementary materials provides further information on cohort sizes and level of education for each country of origin.

TABLE 1 ABOUT HERE

Results and Discussion

As a first analysis step, we present evidence for the parental sex preferences of each group. Figure 1 is a horizontal forest plot, and show estimates from Model 1, the main model specification. It provides us with the relative third-birth rate for mothers of two girls compared to the corresponding rate for mothers of two boys, in the form of the exponentiated Cox regression coefficients from the model. Each horizontal bar represents the 95% confidence interval of the relative rate for each immigrant (and majority) group, while a square marker represents that group's point estimate. The vertical dotted black line represents the hypothetical case of equal rates in the two cases, indicating a neutral sex preference. Thus, a relative preference for boys over girls of 0,0 in the figures is equivalent to a relative rate of 1 estimated in the relevant models. Estimates to the right of the vertical dotted black line thus indicate a preference for sons, while estimates to the left of the line indicate a preference for daughters. The immigrant groups are sorted top-to-bottom by the strength of their preference. In all of the following analyses, we should be wary of both Type I and Type II errors. Due to the large number of estimated coefficients, there will likely be some Type I errors (deviations from a neutral preference purely due to stochastic variation) and Type II errors may abound as signal-to-noise-ratios decrease. Many immigrant groups are small and the difference in third-

birth rates will be difficult to detect in small samples. The full set of numerical estimates from all models are included in the supplementary materials.

FIGURE 1 ABOUT HERE

From Figure 1, it is clear that many immigrants (and natives) in Norway hold clear preferences for their children's sex, and that these preferences vary quite a lot. Immigrant women from India have the strongest preference for boys, with a rate of third birth for mothers' of two girls that is about 1.25 times higher the rate for mothers' of two boys. On the other hand, the corresponding relative rate for Polish mothers' third-birth rate is around half, the strongest statistically significant preference for girls in our results. Estimates for the other groups lie between these two extremes. We found statistically significant boy preferences for immigrants from Bosnia-Herzegovina, China, India, Iraq, Kosovo, Pakistan, Somalia, and Turkey. A statistically significant preference for girls was found for natives and immigrants from Poland, the Philippines, Sweden and the United States. The results for the other countries were not statistically significant, either be due to a lack of statistical precision or because their preferences are (close to) sex-neutral. Immigrants from Denmark, Iceland, the Netherlands, Russia, Chile, South Korea and Sri Lanka are leaning towards a girl preference, while those from Finland, France, Iran, Morocco, and Vietnam leans towards a boy preference. Finally, we consider that the signal displayed by the groups from Germany, Thailand and the United Kingdom to be so weak that we place them in the neutral preference category.

A comparison of preferences of immigrants Norway and those observed in native populations

In Table 2, we provide any relevant evidence on sex preferences in native countries from the previous literature where available, allowing comparisons between preferences observed among an immigrant group in Norway and among the native population (or another relevant comparison group) in the country of origin.

TABLE 2 ABOUT HERE

Due to the large number of countries included, this discussion must focus on the general results. We start by commenting the overall patterns by world regions, while discussing single group results only in some cases. This structure is useful as preferences often show regional patterns, and because it provides us with an organized context for the discussion of individual

results. A first message from the comparison is that in all cases where our evidence indicates a significant preference for sons, the direction of the preferences matches that found for natives in the previous literature. The match is less clear in the cases involving a preference for daughters.

Previous literature has indicated an emerging, moderate preference for girls in the Nordic countries (Jacobsen et al. 1999; Andersson et al. 2006; Saarela and Finnäs 2014; Jónsson 2015). Our evidence supports this, with significant girl preferences found for Norwegians and Swedish immigrants and with insignificant results pointing in the same direction for Denmark and Iceland. Our results for Finnish immigrants conform to the previously observed boy preference in Finland (Andersson et al. 2006).

Eastern Europe is somewhat less clear. Relevant literature based on analyses of fertility behavior in this region indicates a preference for girls in some countries, while existing evidence for Poland does not point towards a sex-specific preference (Hank and Kohler 2000). We find that Polish immigrants in Norway have the strongest preferences for daughters of all groups included in our analyses, and Russians display a weak (but insignificant) daughter preference. Immigrants from the war-torn Balkan countries Bosnia-Herzegovina and Kosovo, however, show a clear and statistically significant preference for boys. Some evidence indicates that in these populations, sex ratios are heavily skewed towards boys (Guilmoto and Duthé 2013). In a context where sex-selective abortion is unviable, it may make sense for immigrants who share such preferences to make use of behavioral strategies in order to realize them.

Among migrants originating in Western Europe and the Americas, the overall evidence is even more unclear and points to weak or no preferences, with the exception of migrants from the United States, who seems to hold measurable girl preferences.

Turning to Asian countries, we expect, based on the existing literature, to find rather marked son preferences (Arnold 2001; Fuse 2010). An exception is the Philippines, where the literature points to a daughter preference (Fuse 2010). In general, we find that this pattern is reproduced among Asian migrants in Norway. Chinese, Indian, Pakistani and Vietnamese mothers hold son preferences, while Philippine and South Korean migrants hold daughter preferences. The latter result could be considered an anomaly (C.f. Larsen et al. 1998), but this group is largely comprised of adoptees to Norwegian families. Their family culture is thus likely to be very similar to that of the native population, which also holds a weak daughter preference.

In the final group, denoted “The Greater Middle East and North Africa”, the expectation was to find consistent son preferences (Fuse 2010; Rossi and Roanet 2015). Migrants from Iraq, Somalia and Turkey have significant son preferences, and the weaker evidence for Iranians and Moroccans points in the same direction.

How can we then relate the results for these 27 groups to the ideas of adaption or cultural persistence? The strongest evidence against adaption is arguably the strong son preferences among immigrants from regions where we know such preferences exist. This is the case for mothers originating in Pakistan, Iraq, China, Turkey, Bosnia-Herzegovina, Kosovo and India. If we assume that cultural adaption mechanisms in general are strong and effective, the pattern of sex preferences for these countries of origin should have been changed or even reversed.

Immigrant mothers originating in Poland, the Philippines, the United States and Sweden have sex preferences in the same direction as the Norwegian majority, favoring daughters. For the Swedish and Philippine immigrants this preference is as expected based on previous research on native populations. The evidence for these groups is thus ambiguous: while consistent with the idea of cultural persistence, they could obviously also be affected by a cultural adaption process. On the other hand, the evidence for immigrant mothers from Poland and the United States could be seen as support for the importance of cultural adaption and/or selection of some kind, as the findings for these groups are opposite to that found in previous studies of natives. These anomalous bits of evidence may of course point to the possibility of heterogeneity, where immigrants from some countries adapt to the host society and others conserve their origin culture. For example, one might speculate that being culturally closer to natives at the outset could make adaption more likely.

Additional analyses related to migrant selection

In general, the findings reviewed above do not suggest that immigrant selectivity is an important explanation of the sex preferences of the relevant groups; as such selection would lead to dissimilarity in preferences compared to natives from the regions of origin and greater similarity to Norwegian natives. To complement our analysis, we also assess sex preferences while controlling for educational level. While imperfect, this factor may provide some additional insight into the issue of immigrant selectivity. The literature indicates that higher levels of education are associated with weaker son preferences in many contexts, e.g. by functioning as an indication of participation in the modern labour market and whether one lives in a city (Hank and Kohler 2003; Chung et al. 2007; Almond et al. 2013). Previous

research has also documented marked differences in educational levels and socioeconomic status for immigrants and their children in Norway (Fekjær 2007; Hermansen 2013). Since it is plausible at least some of the educational differences between the different groups in our sample can be attributed to selection of immigrants of different countries, controlling for this factor could at least potentially be helpful in teasing out the importance of migrant selectivity. Table S3 (cf. supplementary materials) confirms that there is much variation in the educational attainment of the different immigrant groups.

FIGURE 2 ABOUT HERE

Figure 2 reports results from a model that include controls for the mother's educational level. We find that the inclusion of educational level as a control variable makes nearly no difference for the overall results. Given the argument of the previous paragraph, this provides further, though not decisive, evidence against the general importance of immigrant selectivity related to education or factors associated with it for explaining differences in sex preferences between immigrants from different countries and natives.

Three tests of whether immigrants adapt sex preferences to local conditions

A weakening of preferences for the groups with more exposure to host country culture could provide some support for the idea of migrants adapting to local conditions. Our third step is to examine whether our main results are at all modified by three different indicators of exposure to the host country culture: the mother's age of arrival in Norway, the length of her residence in the country, and whether or not the co-parent of her second-born child is a Norwegian native or not.

FIGURES 3-5 ABOUT HERE

If adaption or assimilation were valid explanations, one would expect preferences of immigrants arriving in childhood to be more similar to those of the native population compared to the preferences of immigrants arriving later. In Figure 3, we see that the interaction term for son preference and being a childhood arrival is statistically insignificant in all but one case. Immigrants from India are an interesting exception however, and child-immigrants have a more daughter-friendly preference, which is clearly consistent with theories emphasizing adaptation. The general implication is that whether or not the mother

arrived in Norway during her childhood, does not affect sex preferences in any measurable way. Figure 4 shows us that the interaction coefficients for son preference and time spent in Norway is close to zero in the majority of cases and not statistically significant in any. Thus, the results indicate that time in Norway in general does not matter much for sex preferences.

The final step breaks down the analysis based on the country of origin of the co-parent of the second child (Figure 5). For most groups, the coefficients are not significantly different from zero, thus indicating that preferences are not much affected. There are a few exceptions. For immigrants originating in China, India, Vietnam and France, having a native co-parent shifts the preference towards neutral/girls, the opposite of the preference indicated in Figure 1. This could be taken to indicate adaptation and/or selection. However, given the large number of estimated parameters one would also expect a few significant results under the null hypothesis of no difference by the co-parents nativity.

In sum, the findings from these three models do not suggest that potential mechanisms of cultural adaption as gauged by these indicators of exposure to the host society modify the sex preference structure very much. The major remaining caveat is that it may be difficult to measure the exposure-adaption process with our available data, as many of our groups are small.

Feedback to theory

The high degree of consistency with previous studies of natives in the countries from which the migrant groups studied originated, point to cultural persistence as the most plausible explanation of the sex preferences we observe. Immigrants to Norway largely share the direction of sex preferences previously documented in the country of the world in which the immigrants were born, at least in the case of son preferences. Admittedly, the magnitude of the preferences is not directly comparable to those reported in earlier research, as the literature consists of many types of studies with many types of preference measures. Still, we consider the observed congruency in direction as suggestive evidence against theories emphasizing cultural adaptation along this dimension of behavior (Ford 1990; Forste and Tienda 1996).

Several different mechanisms potentially contribute in producing this tendency towards cultural persistence. First, some of the cultural practices associated with economic, social or religious advantages of having a child with a certain gender, may persist, perhaps in a modified form, after migrating to Norway. Second, preferences could remain even though they have lost their original rationale (cf. Fernandez and Fogli 2009). Other types of evidence, i.e. ethnographic research, or studies of the fertility behavior of the descendants of immigrants

will be very helpful in gaining a deeper understanding of sex preferences among migrants. It could of course also be possible that adaption and/or selection operate at a more fine-grained level than we are able to ascertain here.

This conclusion is interesting when viewed in the light of previous literature. Studies on the effects of migration on fertility rates often conclude that assimilation and/or adaptation is an important mechanism (cf. Kahn 1988; Ford 1990; Stephen and Bean 1992). However, the evidence concerning migration and sex preferences is mixed. While Al Harahsheh (2011) and Andersson et al. (2007) provide clear evidence indicating cultural persistence, the findings of Okun (1996) point in the direction of adaptation. The latter findings may however, be at least partly due to the focus on one the special case of Jewish migrants to Israel, thus implying an underlying cultural homogeneity, and perhaps also a clearer rationale or wish for assimilation among the relevant migrants. The studies of immigrants to Canada and the US by Almond et al. (2013) and Ost and Dziadula (2016) respectively, are particularly relevant. Both studies have a design similar to ours, focusing on parity progression conditional on sex composition. The results of Almond et al. (2013) generally indicate cultural persistence, with mixed evidence for the importance of childhood arrival in the host country as an adaptive mechanism. The authors of that study take advantage of a multi-generational design. Our study, which examines a larger number of immigrant groups in a different society complements and expands on their findings. Ost and Dziadula (2016) use data on Asian immigrants and, like us, they focus on the first generation. Interestingly they find clear evidence of cultural assimilation, with immigrants arriving before the age of 15 displaying behavior closer to the majority population.

Limitations

We were able to perform analyses considered *de rigueur* in the literature based on large quality data on first generation migrants to Norway. Some issues and challenges to the validity of our results remain. The possible impact of sex-selective abortion deserves further discussion. Sex-selective abortion is one way of behaviorally fulfilling sex preferences for children, and e.g. Almond and Edlund (2008) found evidence of prenatal screenings and sex-selective abortions among Asian Americans in the United States. In our opinion, this is not very likely to be important in Norway. A first study did find some indications of a skewed sex ratio in higher parities (3th and 4th) for Indian-born mothers (but not Pakistani-born mothers), but the authors acknowledged that the sample was small, and the evidence weak (Singh et al. 2010). More recent research offers no evidence for skewed sex ratios at birth (Tønnessen et al. 2013). The

Norwegian health care system does not allow early ultrasounds that are necessary to establish the sex of the fetus early enough to allow for legal abortions (before the 12th week of pregnancy). However, if a yet to be documented tendency towards illegal sex selective abortion for one or more groups proves could be empirically established, our method of comparing third-birth rates should be judged to be a conservative test of the existence of son preferences. The couples who have had two same-sex children of the non-preferred sex are couples who have not made use of this technique previously, and thus we would expect to see weaker evidence of sex preferences for this group than we would if persons who used sex selective abortion to avoid this condition were also included.

Our study uses a wider set of countries than most previous research and a very large data set. Small sample sizes are still a limitation, in particular when we include interactions with exposure indicators. The study is also somewhat limited in its ability to understand the mechanisms in how preferences emerge and change with exposure to the host country. It is an important task for future research to establish with confidence whether there are any sex preferences among the descendants of immigrants and the role of host society and family in the genesis of such preferences. By studying many different combinations of populations sending and receiving migrants, one could hope to understand the importance of institutional and cultural variation between countries.

Conclusion

Using population-wide data and a statistical approach where relative third-birth rates serve as the instrument with which we measure preferences, we provide the first comprehensive set of findings on parental sex preferences of immigrants in Norway. Importantly, we complement the previous literature by focusing on a larger set of countries and a context quite different from the US and Canada, which thus far have been the main foci of the literature.

Our results suggest that, while previous literature shows that immigrants' fertility quantum responds both quickly and markedly to the experience of living in Norway (Lappegård 2006), sex preferences seems to be less flexible. We document strong parental sex preferences among various migrant groups. The actual direction of the preference is arguably dependent on the cultural norms in their region of origin, with rather large pro-son effects observed among immigrants from countries of the world where son preferences are well-documented, and pro-daughter effects observed among immigrants from regions where such effects could be expected in most cases. We find little evidence indicating that educational

differences and exposure to the host society, such as arriving during childhood, a long residence or having a native co-parent, serve as an adaptive mechanism in preferences.

The evidence generally favors cultural persistence as the most relevant explanation over adaption and selection. Local incentive structures as well as Norwegian gender egalitarianism may also affect immigrant preferences at more fine-grained levels than we are able to investigate here. Still, our results indicate that such factors do not dominate over the fact that immigrants to Norway seem to import the cultural norms and values embedded in their regions of origin.

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TABLE 1. DESCRIPTIVE STATISTICS FOR ANALYSIS VARIABLES BY NATIONAL-ORIGIN GROUP

Country of origin	Group size	Mean year of birth	Mean age at 2 nd birth	% with 3 rd birth	Mean 3 rd birth interval	Co-parent of 2 nd child native	Mean time in Norway	% arrived < age 16
Bosnia-Herzegovina	1322	1970.07	30.59	20.8%	9.32	8.2%	6.71	8.0%
Chile	1120	1965.38	30.17	36.4%	8.21	31.9%	8.60	23.4%
China	872	1967.94	33.77	20.4%	6.69	29.0%	7.18	4.6%
Denmark	5375	1959.38	30.06	35.7%	8.20	75.4%	11.07	25.6%
Finland	1822	1960.78	30.78	33.0%	7.45	70.9%	7.65	7.7%
France	956	1963.27	31.87	29.0%	5.80	53.6%	8.03	15.0%
Germany	3290	1962.10	31.42	34.7%	7.56	65.8%	10.18	25.4%
Iceland	1119	1963.07	29.74	38.8%	6.23	40.8%	7.90	14.2%
India	1581	1966.16	30.32	31.3%	8.15	14.4%	8.34	14.9%
Iran	1354	1968.89	32.09	18.2%	8.56	10.6%	7.25	7.2%
Iraq	1698	1973.61	31.00	54.8%	5.43	1.0%	4.58	2.7%
Kosovo	1193	1971.55	28.34	52.0%	5.63	2.7%	4.20	5.7%
Morocco	1086	1968.93	29.15	65.2%	5.40	8.4%	7.23	14.5%
Netherlands	1236	1961.14	31.36	39.2%	6.63	59.5%	9.01	18.6%
Pakistan	4227	1965.80	27.26	80.1%	4.81	4.9%	7.01	17.2%
Philippines	2698	1967.49	32.10	30.7%	7.63	75.1%	6.76	6.4%
Poland	2653	1969.41	32.64	17.8%	6.96	40.4%	5.57	5.7%
Russia	1369	1972.13	33.38	24.8%	6.20	63.9%	5.44	0.9%
Somalia	1581	1972.75	29.29	78.2%	3.67	2.2%	4.61	3.4%
South Korea	1237	1970.99	31.55	29.9%	7.25	86.8%	26.24	85.6%
Sri Lanka	2246	1968.78	30.99	43.4%	7.11	4.2%	6.82	4.1%
Sweden	8641	1962.43	30.80	33.1%	8.02	82.1%	12.13	32.5%
Thailand	2087	1970.74	31.88	26.8%	7.25	90.8%	5.53	4.9%
Turkey	1946	1969.23	27.37	54.8%	7.95	6.2%	8.24	22.7%
United Kingdom	3717	1958.06	30.53	35.7%	7.23	67.3%	10.21	26.5%
United States	4242	1961.23	30.69	39.9%	7.28	78.9%	15.42	50.7%
Vietnam	2907	1968.75	29.88	46.2%	7.36	9.8%	9.85	25.5%
Norway	41174	1959.14	28.29	42.9%	9.98	94.4%	NA	NA%

TABLE 2. AN OVERVIEW AND COMPARISON OF ANALYSIS RESULTS AND FINDINGS FROM THE EXTANT LITERATURE BY IMMIGRANT GROUP ORIGIN

	<i>Country</i>	<i>Pref. in Norway</i>	<i>Pref. of natives</i>
<i>Nordic countries</i>	Denmark	Girl	Girl ¹⁻²
	Finland ^a	Boy	Boy ^{1 3}
	Iceland	Girl	Girl ⁴
	Norway (natives)	Girl*	Girl ¹
	Sweden	Girl*	Girl ¹
<i>Eastern Europe</i>	Bosnia-Herzegovina	Boy*	Boy ⁶
	Kosovo	Boy*	Boy ⁶
	Poland	Girl*	Neutral ⁵
	Russia	Girl*	Boy ⁷
<i>Western Europe/America</i>	Chile	Girl	n/a
	France	Boy	Neutral ⁵
	Germany	Neutral	Neutral ^{5 8 9}
	the Netherlands	Girl	n/a
	the United Kingdom	Neutral	Neutral ¹⁰
	the United States	Girl*	Neutral ¹¹⁻¹³
<i>Asia</i>	China	Boy*	Boy ^{22 23}
	India	Boy*	Boy ¹⁶⁻¹⁹
	Pakistan	Boy*	Boy ¹⁸⁻¹⁹
	Philippines	Girl	Girl ¹⁹
	South Korea ^b	Girl	Boy ^{24 25}
	Sri Lanka	Girl	Boy ²⁰⁻²¹
	Thailand	Neutral	Neutral ²⁸⁻²⁹
	Vietnam	Boy	Boy ²⁷
	Turkey	Boy*	Boy ^{19 30}
<i>Greater Middle East/ North Africa</i>	Iraq	Boy*	Boy ^{19 30}
	Iran	Boy	Boy ³⁰⁻³¹
	Somalia	Boy*	Boy ³²
	Morocco	Boy	Boy ³¹

Notes: * indicates a relative rate significantly different from 1.0 at the 5% level. ^a Among later cohorts, a girl preference has emerged (cf. reference ⁴). ^b This group largely consists of early childhood adoptees to Norwegian families.

References: ¹Andersson et al. 2006 ²Jacobsen et al. 1999 ³Saarela and Finnäs 2014 ⁴Jónsson 2015 ⁵Hank and Kohler 2000 ⁶Guilmoto and Duthé 2013 ⁷Meslé et al. 2007 ⁸Brockmann 2001 ⁹Hank and Kohler 2003 ¹⁰Carr-Hill et al. 1982 ¹¹Coombs 1977 ¹²Sloane and Lee 1983 ¹³Pollard and Morgan 2002 ¹⁴Krishnan 1987 ¹⁵Marleau and Saucier 1996 ¹⁶Das Gupta et al. 2003 ¹⁷Oldenburg 1992 ¹⁸Arnold 2001 ¹⁹Fuse 2010 ²⁰De Silva 1993 ²¹Abeeykoon 1995 ²²Almond and Kuo 1984 ²³Tang 2013 ²⁴Larsen et al. 1998 ²⁶Chung et al. 2007 ²⁷Haughton and Haughton 1998 ²⁸Prachuabmoh 1976 ²⁹Knodel et al. 1996 ³Edlund 1999 ³¹Arnold 1997 ³²Rossi and Roanet 2015