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Immigrant Fertility in Germany: The Role of Culture

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Abstract

This paper focuses on the role of home country's fertility culture in shaping immigrants' fertility. I use the German Socio-Economic Panel (SOEP) to study completed fertility of first-generation immigrants who arrived from different countries and in different years. The variation in total fertility rates (TFRs) across countries and over time serves as a proxy for cultural changes. By using a linear fixed-effects approach, I find that women from countries with high TFRs have significantly more children than women from countries with low TFRs. I also demonstrate that this positive relationship is attenuated by potential selection that operates towards the destination country. In addition, home country's TFRs explain a large proportion of fertility differentials between immigrants and German natives. The results suggest that home country's culture affects immigrants' long-run outcomes, thereby supporting the socialization hypothesis.

Zusammenfassung

Diese Studie befasst sich mit dem Geburtenverhalten von Migrantinnen der ersten Generation. Unter Verwendung der Daten des Sozio-oekonomischen Panels (SOEP) wird die endgültige Kinderzahl der Zuwanderinnen als abhängige Variable und die kulturelle Prägung aus dem Heimatland als Determinante modelliert. Zur Messung der "Fertilitätskultur" wird als Proxy die mittlere Differenz zwischen der zusammengefassten Geburtenziffer (total fertility rate – TFR) des Ursprungslandes und der von Deutschland zum Zeitpunkt der Migration verwendet. Die Schätzergebnisse eines linearen Fixed-Effects-Ansatzes zeigen, dass Fertilitätskultur einen signifikanten Anteil der Fertilitätsunterschiede zwischen Einheimischen und Migranten erklärt und positiv mit der endgültigen Kin-

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derzahl der Migrantinnen korreliert. Ergänzende Analysen legen nahe, dass der positive Zusammenhang durch potenzielle Selektion tendenziell unterschätzt wird. Die Befunde unterstreichen die sogenannte Sozialisationshypothese, welche besagt, dass die kulturelle Prägung des Ursprungslandes das Verhalten von Migranten dauerhaft beeinflusst.

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1. Introduction

The list of countries with below-replacement fertility has been getting longer in recent decades, and the rapid ageing of societies has become a major political issue in the developed world. In the debate about the best means to mitigate the recent demographic changes, immigration has emerged as one of the much disputed issues (see, e.g., Wu/Li, 2003; Alho, 2008). Because immigrants contribute remarkably to population dynamics in many contemporary societies (World Bank, 2013), understanding immigrants' fertility behavior is central to draw conclusions about general demographic developments and about various socio-economic outcomes of immigrants in the destination countries.

However, the migration-childbearing relationship is complex because immigrants may share the fertility culture of their home country and simultaneously they need to act under new socio-economic conditions in the host country (Fernandez/Fogli, 2009). Previous literature discusses at least three hypotheses to explain immigrants' completed fertility: selection, socialization, and adaptation (see, e.g., Kulu, 2005). Because each of the hypotheses has been supported and challenged, so far the exact mechanisms of how migration and fertility are related remain unclear.

To shed more light on this issue, I explore the childbearing behavior of immigrants living in Germany. Germany hosts the largest number of immigrants in Europe. Moreover, over recent decades, large migration flows from high fertility countries coincided with extremely low fertility of German women. As of 2010, foreign women, who made roughly 8 percent of all women in Germany (DESTATIS, 2012a), contributed substantially to the total number of births with a percentage of about 17 percent (DESTATIS, 2012b).[1]

[1] Until recently, German Federal Statistical Office distinguished only between German and non-German, i.e., foreign citizens. This approach does not account for the actual place of birth, thereby providing limited evidence on the actual migration background and migrant generations. This paper refers to foreigners and non-German citizens interchangeably throughout, but the definition of immigrants is based on the place of birth.

Despite large numbers of first-generation immigrants in Germany, the empirical evidence on their fertility is limited. Previous studies consistently show that on average immigrants exhibit significantly higher fertility than natives, but immigrant fertility successively approaches the fertility level of natives with increasing duration of stay (see, e.g., Nauck, 1987; Mayer/Riphahn, 2000; Milewski, 2007). Several studies emphasize significant differences in fertility patterns by immigrants' country of origin (see, e.g., Mayer/Riphahn, 2000; Schmid/Kohls, 2010; Milewski, 2010). So far, however, little attention has been paid to important questions such as: what drives the observed cross-country heterogeneities? Why does it matter for fertility to be of, for example, Turkish versus Italian origin? To what extent do cultural influences explain the cross-country variation and the immigrant excess fertility?

This study contributes to the literature in several dimensions. First, I examine whether immigrant fertility reflects fertility patterns prevailing in the countries of origin at the time of migration, thereby testing the socialization hypothesis. By using total fertility rates (TFRs) as a measure of country-specific fertility standards, I draw on the growing U.S. literature that investigates the quantitative importance of broadly defined culture for different socio-economic outcomes (see, e.g., Fernandez/Fogli, 2009; Blau et al., 2011; Gevrek et al., 2013). This strand of literature defines culture as systematic differences in preferences across groups of individuals, as opposed to differences in economic and institutional conditions (see, e.g., Fernandez/Fogli, 2009). Second, I use the German Socio-Economic Panel (SOEP) to study completed fertility of first-generation immigrants in Germany, thereby providing evidence for a non-U.S. setting. The SOEP also allows me to control for various socio-demographic characteristics such as education, marriage behavior, number of siblings, and religion. However, in contrast to most previous studies using German data (see, e.g., Nauck, 1987; Mayer/Riphahn, 2000; Schmid/Kohls, 2010), I examine the childbearing behavior of all immigrants, not only selected subgroups, and define immigrants by using their place of birth, as opposed to using their citizenship. Distinguishing immigrants and natives by using citizenship is insufficient in German context (Liebig, 2007). Finally, given that my empirical strategy exploits the variation in TFRs across countries and over time, I apply a fixed effects approach to isolate the influences of country and time-specific effects that are potentially related to both culture and fertility.

I find that women from countries with high TFRs have significantly more children than those born in countries with low TFRs. This positive relationship is in line with the socialization hypothesis and is quantitatively important: a one-unit increase in home country's TFR is associated with an increase in completed fertility of 0.5 children, which refers to almost 20 percent of the mean completed fertility of immigrants. Moreover, I show that different TFRs in the countries of origin explain about two-thirds of gross immigrant excess fertility versus natives. Finally, I also illustrate that the relationship between the TFR and individuals' own fertility is underestimated if immigrants are self-selected with regard to fertility preferences towards the destination country, if they eventually adjust their fertility to native levels, or both.

This paper is organized as follows: Section 2 sets the stage with information on immigration to Germany. Section 3 briefly reviews previous literature and outlines the hypothesis. Section 4 describes my estimation strategy and Section 5 the data. Section 6 shows the estimation results and Section 7 various sensitivity tests. Section 8 discusses the findings and concludes.

2. Immigration and Fertility in Germany

As of 2010, foreigners represented roughly 9 percent of the total population in Germany (DESTATIS, 2012a), but almost 19 percent of the population had a migration background (DESTATIS, 2011).[2] Because East Germany had no significant immigration before German unification in 1990, the current stock of foreigners in Germany results nearly entirely from the long and intense migration to West Germany. Since World War II, most immigrants arrived as ethnic Germans, traditional guest workers, or humanitarian migrants (see, e.g., Kalter/ Granato, 2007). Ethnic German repatriates arrived in the aftermath of World War II and after the dissolution of socialism after 1989. They emigrated from former German territories in Central and Eastern Europe, mainly from the former Soviet Union, Romania, Poland, and former Czechoslovakia. Because ethnic Germans obtain German citizenship at entry, they count as German citizens in most official statistics.

Traditional guest workers immigrated during the economic boom between the mid 1950s and the early 1970s, when Germany pushed intensive manpower recruitment and signed bilateral treaties with several countries such as Italy, Spain, Greece, Turkey, Portugal, and Yugoslavia. Although labor migrants' residence permit was initially restricted to one year, they tended to stay longer or even permanently and increasingly brought their family members. Most refugees and asylum seekers arrived in the 1990s from the territories under the Yugoslav wars such as Bosnia and Herzegovina, Croatia, and Slovenia (see, e.g., Kalter and Granato, 2007).

The current composition of the foreign population currently living in Germany still reflects these major migration streams: the dominant national minorities are Turks, followed by people from former Yugoslavia, Italy, and Poland (DESTATIS, 2012a). Despite the various geographic roots, the majority of im-

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[2] Foreigners are non-German citizens regardless of place of birth. Those with migration background migrated to Germany after 1949, are non-German citizens born in Germany, or have at least one parent who is either an immigrant or a foreign citizen (DESTATIS, 2011).

migrants moved from a high to a low fertility context. Table 1 shows the fertility developments in Germany and selected sending countries over the last five decades.

Table 1

Total Fertility Rates in Selected Countries (1960–2010)

Years	Germany	Turkey	Former Yugosavia	Italy	Poland
1960–1964	2.49	6.05	2.89	2.47	2.65
1965–1970	2.32	5.67	2.64	2.52	2.27
1970–1974	1.64	5.46	2.39	2.35	2.25
1975–1979	1.52	4.72	2.29	1.94	2.26
1980–1984	1.46	3.98	2.11	1.54	2.33
1985–1989	1.43	3.28	1.96	1.34	2.15
1990–1994	1.31	2.90	1.71	1.28	1.89
1995–1999	1.34	2.57	1.62	1.22	1.48
2000–2004	1.35	2.23	1.49	1.26	1.25
2005–2010	1.32	2.13	1.45	1.38	1.27

Note: Total fertility rate (TFR): basic indicator of the level of fertility, calculated by summing age-specific birth rates over all reproductive ages. Former Yugoslavian TFR refers to averaged TFRs of Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Slovenia, and the former Yugoslav Republic of Macedonia.

Source: Five-year average TFRs from the United Nations (2010).

The numbers reveal a general fertility decline. Since the late 1980s, total fertility rates (TFRs) in all countries, save for Turkey, have remained below the replacement level of 2.1 and nearly converged. Figure 1 displays fertility developments in Germany from 1991 through 2010, separately for German and foreign women.

While the TFR of German women increased from 1.26 in 1991 to 1.36 in 2010, the TFR of non-German women fell successively from 2.04 to 1.61. At the same time, foreign women substantially contributed to the total number of births. Between 1991 and 2010 the percentage of births to foreign mothers went up from 13.0 to 16.7 percent while the percentage of foreign women in the total female population increased from 6.5 to 8.5 percent (DESTATIS, 2012a).

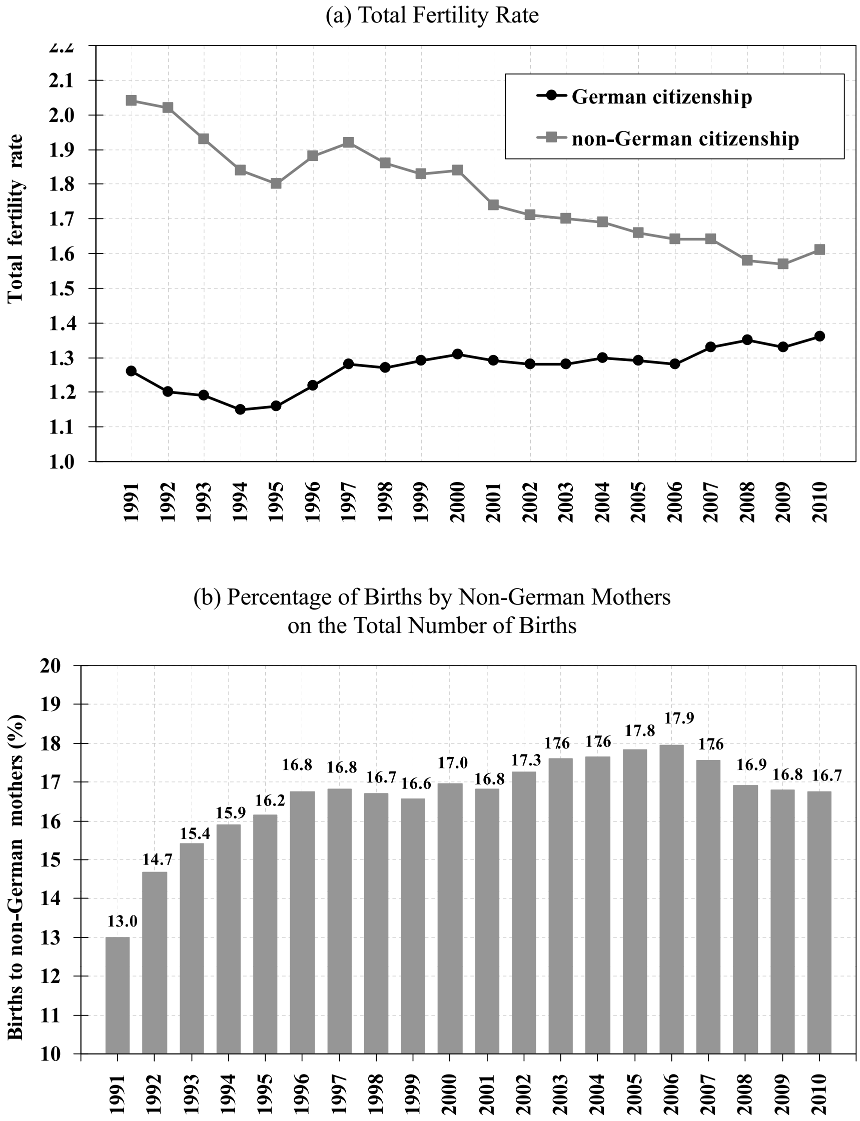

Figure 1: Fertility in Germany by Women's Citizenship 1991 – 2010

3. Previous Literature and Hypotheses

Existing research suggests that a variety of factors may affect immigrants' fertility behavior: self-selection into migration, pre-migratory experiences in the home country, socioeconomic environment in the destination country, and circumstances accompanying the migration process as such (see, e.g., Kulu, 2005). The literature focusing on the relationship between migration and completed fertility commonly discusses three hypotheses: selection, socialization, and adaptation.[3] These hypotheses are not necessarily mutually exclusive; they are partly complementary, partly contradictory, they may apply to specific lifetime periods and counteract or reinforce one another (Kulu, 2005; Chattopadhyay et al., 2006). I now consider each of them in turn and briefly review previous empirical findings.

The *selection* hypothesis holds that the process that selects people into migration is not random (see, e.g., Hervitz, 1985; Kulu, 2005; Blau / Kahn, 2007). Immigrants differ from the overall population at their place of origin along many dimensions that are associated with fertility such as age, education, employment, and marital status (Hervitz, 1985). Consequently, immigrants' childbearing preferences may, even before the move, more closely resemble the patterns prevailing in destination country than those of country of origin (Kulu, 2005). Previous research on internal rural-urban migrants provides evidence on this mechanism (see, e.g., Macisco et al., 1970; Goldstein / Goldstein, 1981; Lee / Pol, 1993; Chattopadhyay et al., 2006). Virtually all studies on international migrants discuss the selection hypothesis, but rarely test it because the limited availability of bi-national data hampers direct comparisons between migrants and their home country's counterparts. Exceptions provide, e.g., Bustamante et al. (1998); Blau / Kahn (2007) who compare selected characteristics of the Mexican population and Mexican immigrants to the U.S. by using data from both countries.

The *socialization* hypothesis emphasizes the crucial role of the home country in shaping immigrants' fertility.[4] According to this hypothesis, immigrants acquire norms and behavioral patterns regarding childbearing in their home country and continue to follow them over the life course (see, e.g., Kulu, 2005; Milewski, 2010). However, it is ambiguous when (if ever) the socialization of an individual ends. For example, Mortimer and Simmons (1978) define sociali-

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[3] In addition, related literature derives two hypotheses – disruption and interrelation – that explain temporary drops or rises in fertility around the migration event (see, e.g., Mulder and Wagner, 1993; Andersson, 2004; Kulu, 2005). However, the two hypotheses focus on the timing of childbearing rather than on completed fertility.

[4] The introduction of the concept of socialization into economic theory traces back to Easterlin (1966) who argued that preferences change systematically according to one's upbringing. For a long time endogenous preferences have represented a radical departure from traditional economic reasoning (Sanderson, 1976).

zation as a life-long process, but divided into two stages: primary and secondary socialization. Primary socialization takes place and is finalized during childhood and adolescence. Bisin/Verdier (2001) distinguish two channels that play a role in the formation of preferences at this early stage: socialization to the parents' trait and socialization to the prevailing trait in the population. By contrast, secondary socialization may occur also later in life, whenever a person encounters a new environment with changed conditions (Mortimer/Simmons, 1978). The migration literature traditionally discusses secondary socialization in the context of post-migratory adaptation (Milewski, 2007). Only few studies on immigrant fertility address the socialization hypothesis directly (see, e.g., Hervitz, 1985; Milewski, 2010) by showing heterogeneities in fertility across immigrants' origins. However, this approach does not determine to what extent home country's fertility standards matter. Several recent studies on the immigrants to the U.S. and their descendants provide a more sophisticated approach by demonstrating a strong relationship between the source country's fertility rates and women's preferences for children (see, e.g., Fernandez/Fogli, 2006, 2009; Blau et al., 2013).[5]

The *adaptation* hypothesis assumes that the current socio-economic environment in the receiving country matters most in shaping immigrants' fertility (see, e.g., Stephen/Bean, 1992; Kulu, 2005; Parrado/Morgan, 2008; Milewski, 2011). Numerous contributions use the terms adaptation and assimilation interchangeably because of the similar outcome: sooner or later, immigrant fertility comes to resemble that of natives. However, the mechanisms behind adaptation and assimilation differ (Hill/Johnson, 2004). Assimilation occurs if immigrants successively take up the host country's patterns regarding family size. Because cultural assimilation takes a long time, it should be more apparent over subsequent generations than within the first generation (see, e.g., Hill/Johnson, 2004; Andersson, 2004; Milewski, 2011). First-generation immigrants may instead be subject to adaptation that starts shortly after migration. Adaptation occurs if immigrants revise their childbearing preferences in response to changed conditions such as wages, prices, employment, and educational opportunities (see, e.g., Mayer/Riphahn, 2000; Hill/Johnson, 2004). The convergence to native fertility may be achieved after some years of stay (see, e.g., Kahn, 1988; Andersson, 2004) or more precisely with an increasing number of fertile years spent in the host country (Mayer/Riphahn, 2000). Clearly, the duration of exposure to native fertility patterns in the destination country is a function of age at migration. Consequently, previous research interprets the positive relationship between age at migration and fertility as a successive adaptation (see, e.g.,

[5] Some previous studies term the strategy of relating immigrants' outcomes to corresponding aggregate indicators in the country of origin "epidemiological approach" (see, e.g., Fernandez, 2007). Beyond fertility, this approach has been widely applied to other socio-economic outcomes such as labor supply, divorce rates, and trust (see, e.g., Algan/Cahuc, 2010; Gevrek et al., 2013; Furtado et al., 2013).

Mayer/Riphahn, 2000; Bleakley/Chin, 2010). However, age at migration simultaneously determines the duration of the socialization process in the country of origin and may also for this reason positively correlate with fertility. Moreover, because age at migration is not random, but rather an outcome of a decision process, it may also reflect self-selection. Therefore, the exact mechanism behind the pure effect of age at migration on fertility is ambiguous.

This study tests the socialization hypothesis on first-generation immigrants in Germany. However, because an additional year spent in the home country translates to one year less in the host country, the duration effects of exposure to different fertility standards are difficult to establish. Instead, I distinguish socialization from adaptation by investigating to what extent home country's birth rates explain individuals' completed fertility. I draw on several U.S. studies that use the country-specific total fertility rates (TFRs) to investigate the quantitative importance of culture for different socio-economic outcomes (see, e.g., Fernandez/Fogli, 2009; Blau et al., 2011). I contribute to this growing literature by studying immigrants in a large European country and thus provide empirical evidence for an institutional and cultural framework different from that in the United States. In addition, I also discuss the consequences of potential self-selection and adaptation for the culture-fertility relationship.

Previous studies on German data show that although socio-demographic characteristics play a crucial role in explaining fertility differentials between immigrants and natives, a significant immigrant-native fertility gap still remains unexplained (Mayer/Riphahn, 2000; Milewski, 2010). Nearly all studies on fertility of immigrants to Germany emphasize heterogeneities across countries of origin (see, e.g., Mayer/Riphahn, 2000; Milewski, 2010; Schmid/Kohls, 2010). So far, however, this literature has paid little attention to measuring the extent to which the home country's fertility matters for immigrant fertility outcomes. I contribute to this literature by exploiting the variation in TFRs across countries and over time. This variation allows me to examine whether immigrants' completed fertility reflects fertility patterns prevailing in their home countries and therefore to test the socialization hypothesis.

4. Estimation Strategy

To study the impact of the source country's fertility culture on immigrants' fertility, I compare immigrants and natives with the same observable characteristics. This approach allows me to determine the extent to which immigrant excess fertility is related to the fertility standards that immigrants experience before migration. I estimate the following equation:

$$y_{ijt} = \alpha' X_i + \beta Z_{jt} + \gamma_j + \delta_t + \varepsilon_{ijt}, \tag{1}$$

where y_{ijt} is completed fertility of woman i from country j who arrived in year t, X_i includes a vector of controls, γ_j refers to country of origin fixed effects, and δ_t to year of migration fixed effects.

The variable of interest Z_{jt} measures the difference in childbearing standards between an immigrant's source country and Germany. Positive β would therefore indicate a socialization mechanism. Central for my analysis is a use of an adequate quantitative proxy for fertility culture. Ideally, I would like to relate individual's completed fertility to the average completed fertility of her birth cohort in her home country. However, this approach suffers from serious data limitations because existing international databases do not provide complete information on cohort fertility rates (CFR).[6] I use the comprehensively available total fertility rate (TFR) instead. The United Nations (2010) define TFR as a basic indicator of the level of fertility, calculated by summing age-specific birth rates over all reproductive ages. Thus, TFR is an estimate of completed fertility of a hypothetical cohort of women assuming the given age-specific birth rates of a reference period and no female mortality at reproductive ages.[7] I calculate the difference between the country-specific TFR in immigrant's home country and in Germany in the migration year. This variable is therefore a proxy for the discrepancy in childbearing standards that an immigrant leaves behind in the home country and experiences at entry in Germany.[8] Nevertheless, we rather expect that cultural changes do not occur very rapidly, so that my main results should be largely insensitive to alternative choices of the point of time for measuring the TFR. I elaborate on alternative ways to measure cultural influences in Section 7.

Because the key explanatory variable Z_{jt} varies only by country of origin and year of arrival, I cluster the standard errors at the year of migration-country level. I treat Germany as a home country for natives, so the main variable of interest is set to zero for natives and represents an interaction term with an im-

6 At least two projects The Human Fertility Database (HFD) and The Contextual Database (CDB) of the Generations and Gender Programme offer international time-series for CFR. Unfortunately, the CFR is not available for all birth cohorts and home countries of immigrants in my main estimation sample (see Section 5). Even by combining the information from HFD and CDB, I was unable to link nearly 30 percent of the sampled immigrants to their respective CFR. The linked sample is potentially not representative for all immigrants in Germany and therefore I do not use it in the main analysis. Nevertheless, it serves as a basis for useful sensitivity tests in Section 7.

7 Note that using the TFR instead of CFR represents a necessary compromise to aid a precise and representative analysis, but at expense of a methodological problem; namely, comparing TFR as a period-specific indicator with completed fertility levels of a given cohort of individuals. Therefore, I test the sensitivity of my main results to alternative definitions of the cultural proxy in Section 7.

8 Note that using the home country's TFR directly would produce identical results for β because changes in the German TFR would be picked up by the year of migration fixed effects.

migrant dummy. However, because a full set of any of the migrant-specific dummies (country of origin and year of migration fixed effects) would be identical to an immigrant dummy, the latter is not separately included in the main model specification.

The aim of this paper is to identify the effect of different fertility standards, as opposed to country of origin differences in general. Fernandez/Fogli (2006, 2009) emphasize that TFR may beyond a cultural component capture also country-specific economic and institutional conditions. They argue that examining second-generation migrants may attenuate the problem because the economic and institutional conditions of the country of ancestry should no longer be relevant for this group. This strategy is an important step towards a clearer identification of cultural influences, but it is difficult to apply on German survey data because of a small number of relevant observations (Stichnoth/Yeter, 2013). Moreover, the strategy obviously provides limited insights into fertility behavior of actually migrating individuals. I include country of origin fixed effects to isolate the effect of source country's fertility patterns from the impact of any other country-specific factors. Blau et al. (2011) follow a similar strategy to study the impact of different home country's characteristics on immigrants' labor supply. This approach controls for any time-invariant differences between the source country and Germany such as unaccounted institutional, economic, or other factors that could be related to both fertility culture and the individuals' fertility.

Still, any study on first-generation immigrants has to face the difficult issue of selection into immigration. Because the factors that motivate selected individuals to migrate to a particular host country at a particular time may be of non-observable nature, I cannot fully control for self-selection directly. However, I include a full set of year of migration dummies to capture any effects associated with different time of migration including unobservable compositional changes of the immigrant population. The year of migration fixed effects account for selection to the extent to which the migration decision was motivated by time-varying incentives such as, e.g., changes in wealth, labor market opportunities, or migration policies in Germany.

The individual background variables in X_i control for observable socio-demographic differences across different origins. The economic theory of fertility (see, e.g., Becker, 1991) and previous empirical research guide my selection of covariates related to childbearing choices. I include a full set of year of birth dummies to account for birth cohort effects in the most flexible form. To proxy women's opportunity costs of an additional child, I use her highest completed degree. I distinguish six educational thresholds by using the International Standard Classification of Education (ISCED-1997). To capture a woman's preferences regarding traditional family structures and desired family size, I include an indicator of whether she was ever married, her age at first marriage, and the number of her siblings. Recent literature on the intergenerational transmission of fertility patterns suggests that individuals raised in larger families tend to establish large families themselves (see, e.g., Murphy / Knudsen, 2001; Booth / Kee, 2009). Because previous research strongly emphasizes the role of religious denomination in determining preferences towards birth control and family size (see, e.g., Heineck, 2012), I also include dummies for being Catholic, Protestant, or Muslim. The reference category is being non-religious.

Earlier research documents considerable fertility differentials between immigrants arriving at different stages in life by using duration variables such as years since migration or the number of fertile years spent in a country (see, e.g., Mayer / Riphahn, 2000). These variables are a linear function of age at migration. We would expect the socialization by fertility culture to be more pronounced, the more years an immigrant spent in her home country. Clearly, I cannot test this hypothesis because age at migration simultaneously determines the duration of both socialization in the home country and adaptation in the host country. Furthermore, because age at migration suffers from severe endogeneity problems, the interpretation of its coefficient would be difficult. Nevertheless, in a separate model specification I additionally include age at migration. The rationale for doing this is that women who migrate at a particular age are likely to share some unmeasured characteristics that drive the decision to migrate itself or the willingness to adapt afterwards. Thus, I expect that the estimate of interest β will be less affected by bias from potential selectivity and adaptation if I control for age at migration, even if its coefficient is not directly interpretable.

My model may still not entirely account for unobservable self-selection into migration that may be a source of bias. However, if we believe that immigrants are selected for fertility preferences, then we rather expect positive selection towards destination country (Fernandez, 2007; Fernandez / Fogli, 2009), i.e., compared to women who stay behind migrants' fertility preferences are, even before the move, closer to preferences of German natives. A similar logic applies to the potential adaptation after migration, i.e., if immigrants are subject to fertility adaptation, then they eventually follow fertility patterns of natives instead of following the patterns of their home country's counterparts left behind. Consequently, both selection into migration and adaptation would bias my results towards not finding any relationship between home country's birth rates and fertility. Section 6.2 shows some illustrative evidence that supports the attenuation bias argument.

5. Data

I use individual-level data from the German Socio-Economic Panel (SOEP). The SOEP is a representative longitudinal study of private households, conducted annually since 1984. This reach dataset provides retrospective information on births, migration, and background characteristics (see, e.g., Haisken-DeNew/Frick, 2005). Because I focus on completed fertility, I select only women aged 45 and above and code their past births as the dependent variable. The dependent variable does not vary over time, so that data from a single survey year would allow me to test the research hypotheses. Nevertheless, I pool cross-sectional observations taken from three SOEP waves to increase both sample size and the spread of analyzed birth cohorts.

Although using all waves 1984–2010 provides nearly identical results, I pool the survey years 1991, 1999, and 2007 for several reasons. First, I start with the year 1991 and cut the window of analysis in 2007 to minimize the number of observations with missing values on important control variables. Some control variables are available since 1991 and only in selected SOEP waves. The data appendix provides further details. Second, the use of only three survey years, as opposed to all years in-between, reduces the number of respondents entering the sample more than once. I include the survey year 1999 because the sample was refreshed in 1998. Moreover, an eight-year interval between the waves provides enough variation in birth cohorts and a sizeable sample for the analysis. I observe 46 percent of women in the final sample once, 27 percent twice, and 27 percent three times. I keep these repeated records because their elimination could lead to a biased sample. Nevertheless, Section 7 shows that the estimation results do not change qualitatively if I drop the repeated records and/or use all SOEP waves.[9]

By using the respondents' migration background, I construct two mutually exclusive subsamples: natives and first-generation immigrants. To obtain a homogenous native sample, I consider German citizens without migration background and include only West German households. Fertility and socio-demographic composition of the East and West German populations differ significantly (see, e.g., Goldstein/Kreyenfeld, 2011), and 90 percent of current foreigners live in the western part of the country (DESTATIS, 2012a).

The immigrant sample comprises foreign-born respondents with direct migration experience. I therefore exclude second-generation migrants, i.e., German-born respondents who have at least one parent with migration background, and the "generation 1.5", i.e., women who migrated before age 15. I consider first-generation immigrants regardless of their current citizenship. In contrast to the prevailing distinction along citizenship lines, this approach includes ethnic Germans and naturalized foreigners. Despite their current citizen status, they personally experienced migration and I expect them to follow similar fertility patterns as immigrants with foreign citizenship. Data limitations do not allow me to further distinguish between ethnic Germans and naturalized foreigners

[9] Panel A of Table A.3 summarizes the pro and con arguments for and against pooling all available SOEP waves and dropping the repeated records, i.e., keeping only the first interview given by a woman aged 45 or above.

among immigrants with German citizenship. I conclude my sample selection by eliminating immigrants aged 45 years and older at arrival because they potentially completed fertility before migration. Despite this age restriction, actually 33 percent of sampled immigrants had no further births after migration, 59 percent continued childbearing, and 8 percent eventually remained childless. I discuss the robustness of my results to alternative sample criteria in Section 7.

Finally, I drop records with missing information on explanatory variables (less than 4 percent of the sample). The final sample consists of 7,085 native and 1,123 immigrant observations. The immigrants arrived between 1949 and 2004 from 50 different countries, but most of them originate from countries of traditional guest worker recruitment: women of Turkish origin alone account for 22 percent of the immigrant sample, women from Italy, Spain, and Greece jointly for 27 percent. Notable numbers arrived from former Yugoslavian territories, and from different Eastern European countries. Table 2 lists the main countries of origin of the sampled immigrants and shows the average completed fertility by country. The numbers show large fertility differences across women of different origins, which range from 3.88 children for Turkish women to 1.29 for Czech women.

Table 2

Completed Fertility of Sampled Immigrants by Country of Origin

Country of origin	Number of observations	Mean fertility	Standard deviation
Turkey	251	3.88	1.97
Former Yugoslavia	212	2.21	1.71
Italy	128	2.75	1.62
Greece	120	2.34	0.88
Poland	58	2.09	1.27
Spain	58	2.47	1.83
Eastern Europe	46	1.67	1.51
Russia	43	2.56	1.78
Romania	27	2.41	1.15
Kazakhstan	24	2.33	1.13
Austria	24	1.63	1.28
Czech Republic	14	1.29	0.61
Philippines	10	2.50	1.51
Other	108	2.32	0.89
Immigrants total	1,123	2.66	1.74
Cross-country statistics	50	2.66	0.76

Note: Total number of immigrant observations is 1,123. Total number of countries is 50. Other refers to weighted average for countries with fewer than 10 observations.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007.

Table 3 shows summary statistics for the main estimation sample. Immigrants and natives differ with respect to fertility and socio-demographic characteristics. On average, the completed fertility of sampled immigrants is 2.66 and of natives 1.90. Immigrants are on average younger and less educated than natives. While the differences in marriage behavior are moderate, immigrants have more siblings. The religious affiliation differs substantially between the subsamples: most notably, while jointly almost 89 percent of natives are Christians, 23 percent of immigrants are Muslims. More than one fourth of all immigrants have German citizenship. The average age at migration is 29. At the time of arrival the TFR in the home country was on average by 1.19 births higher than the German one.

Table 3

Summary Statistics

	Natives		Immigrants	
Variable	Mean	St. Dev.	Mean	St. Dev.
Completed fertility	1.90	1.33	2.66	1.74
Socio-demographic variables				
Year of birth	1939.81	12.78	1944.36	9.03
Highest completed degree				
ISCED-1	0.00	0.06	0.23	0.42
ISCED-2	0.26	0.44	0.35	0.48
ISCED-3	0.51	0.50	0.21	0.41
ISCED-4	0.03	0.17	0.08	0.26
ISCED-5	0.07	0.26	0.04	0.19
ISCED-6	0.12	0.32	0.09	0.29
Number of siblings	2.20	1.96	3.79	2.58
Indicator if ever married	0.95	0.21	0.98	0.13
Age at first marriage	23.30	7.77	22.36	6.31
Catholic	0.40	0.49	0.41	0.49
Protestant	0.49	0.50	0.10	0.30
Muslim	0.00	0.02	0.23	0.42
Other religion	0.01	0.11	0.21	0.41
No religion	0.10	0.30	0.06	0.24
Migrant-specific variables				
German citizensihp			0.28	0.45
Age at migration			28.89	7.50
Year of migration			1973.26	9.62

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Table 3 continued

	Natives		Immigrants	
Variable	Mean	St. Dev.	Mean	St. Dev.
Country-specific TFR at the time of migration				
TFR in home country			3.07	1.33
TFR in Germany			1.88	0.45
Difference in TFRs			1.19	1.39
Observations	7,085		1,123	

Note: Means and standard deviations are calculated by using unweighted samples. All migrant-specific variables are coded 0 for the native sample.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) from the World Bank (2009) and the United Nations (2010).

I calculate the key variable – "difference in TFRs" – by using the country-specific total fertility rates (TFRs) obtained from the World Bank (2009) and the United Nations (2010). I assign to each immigrant in the SOEP sample the corresponding TFRs in both her country of origin and Germany as of her arrival. Finally, I calculate the difference between the two TFRs. The data appendix provides further details on the "difference in TFRs". The key variable is significantly correlated with the number of children that immigrants eventually bear. Table 4 shows the average completed fertility for different thresholds of the variable of interest. The positive relationship is apparent: the greater the difference in TFRs between the home and host country at arrival, the higher immigrants' completed fertility.

Table 4

Immigrants' Completed Fertility by Difference in TFRs Between Home and Host Country

Difference in TFRs between home and host country	Percentage of immigrant sample	Mean fertility	Standard deviation
–0.54 – 0.24	0.26	2.10	0.06
0.24 – 0.59	0.23	2.31	0.10
0.59 – 1.85	0.24	2.47	0.11
1.85 – 5.99	0.28	3.60	0.11

Note: Number of immigrant observations is 1,123.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) as of the time of migration from the World Bank (2009) and the United Nations (2010).

6. Results

6.1 Main Estimation Results

Table 5 reports the coefficients and the corresponding standard errors for selected variables. Each column shows results obtained from a separate linear regression and a different specification of equation 1.

Table 5

Main Estimation Results – Selected Variables

	(1)	(2)	(3)
Immigrant indicator	0.776 ***	0.244 ***	
	(0.104)	(0.086)	
Difference in TFRs		0.450 ***	0.495 **
		(0.058)	(0.226)
Year of birth dummies	yes	yes	yes
Socio-demographic variables			yes
Country of origin dummies			yes
Year of migration dummies			yes
Observations		8,208	

Note: Coefficients estimated using OLS regressions. Each column is a separate regression. Dependent variable is completed fertility. Robust standard errors in parentheses account for clustering at year of migration-country level (301 clusters). Coefficients and standard errors for control variables not shown to save space. All specifications include a constant. Socio-demographic variables include indicators for highest completed degree, number of siblings, indicator of ever married, age at first marriage, and indicators for religious affiliation. ***/**/* indicate significance at the 1%, 5%, and 10% level.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) as of the time of migration from the World Bank (2009) and the United Nations (2010).

Because my research design aims to measure the impact of different fertility culture on fertility of immigrants compared to natives, I begin with a simple model that estimates gross immigrant excess fertility adjusted only for birth cohort effects (column 1). As expected, the coefficient of the immigrant indicator is positive and significantly different from zero (at the 1 percent level), and indicates that immigrants bear roughly 0.776 children more than natives in the same birth cohort.

These gross fertility differentials between immigrants and natives diminish after I include the main variable of interest; the proxy for the difference in childbearing standards between the home and host country (column 2). The variable "difference in TFRs" explains a large percentage of the gross immigrant excess fertility versus natives and is positively and significantly related to individuals' own fertility, thereby supporting the socialization hypothesis. Assuming a constant TFR in Germany, an increase in home country's TFR of one birth per woman is related to a ceteris paribus growth in completed fertility of 0.45 children. I can reject the hypothesis that higher order polynomials of the key variable improve the goodness of fit.

However, there may be many reasons for the positive partial correlation that have little to do with the difference in cultural imprint between the home and host country. For example, the key variable may just be picking up different factors that vary systematically across countries or over time such as women's human capital, country-specific economic and institutional conditions, incentives for migration, other cultural factors such as religious affiliation, and attitudes towards traditional gender roles. To increase the likelihood that I estimate the effect of cultural imprint rather than other omitted factors, I next include a wide range of individual socio-demographic characteristics, country of origin fixed effects, and year of migration fixed effects (column 3). For each observation the sum of all country of origin dummies or year of migration dummies is identical to an immigrant indicator and the model therefore does not separately include an immigrant dummy. The point estimate for the variable "difference in TFRs" remains nearly unchanged and is significant at the 5 percent level.

I report the coefficients of individual socio-demographic controls in Table A.1 in the appendix. Almost all of these characteristics are important predictors of fertility outcomes and they correlate with fertility in the expected directions. The estimated coefficients of the control variables do not change notably in alternative model specifications.

To assess the quantitative importance of home country's TFR for immigrant fertility, note that the mean completed fertility of immigrants is 2.66. Thus, a one-unit increase in TFR is related to an increase in the number of children of 19 percent. The proportion is given by $0.495/2.66 \cdot 100\%$. Because the standard deviation in fertility among immigrants is 1.74 and across countries 0.76, a one-unit difference in TFR accounts for 28 percent of the variation in the number of children among immigrants and for 65 percent of the cross country-variation. The proportions are given by $0.495/1.74 \cdot 100\%$ and $0.495/0.76 \cdot 100\%$ respectively.

6.2 Socialization versus Self-selection and Adaptation

Because I study completed fertility of first-generation immigrants, the main challenge is to disentangle the effect of fertility culture from the mechanisms of selection into migration and adaptation. These two mechanisms are not mutually exclusive because, for example, strong pre-selection towards destination country may accelerate post-migration adaptation. However, paraphrasing the argument by Fernandez (2007), both selection into migration and adaptation would bias my results towards zero.

I study the potential attenuation bias in two ways. First, I include additional control variables to capture potential channels through which the mechanisms of self-selection and adaptation may operate. Second, because I expect that immigrants of non-German citizenship are less affected by selectivity than immigrants having German citizenship, I estimate the main model separately while excluding one of these two sub-groups. Table 6 summarizes these estimation results.

Table 6

Estimation Results Using Alternative Model Specifications and Sample Restrictions – Selected Variables

	(1)	(2)	(3)	(4)
Included immigrants	all	all	German citizenship	non-German citizenship
Difference in TFRs	0.488 **	0.584 **	0.378	0.631 **
	(0.214)	(0.240)	(0.278)	(0.299)
Immigrant-spouse indicator		0.135 *		
		(0.080)		
German language proficiency				
Very good		Ref.		
Good		0.109		
		(0.148)		
Fairly		0.307 *		
		(0.161)		
Poorly		0.722 ***		
		(0.238)		
Not at all		1.133 **		
		(0.516)		
Missing		0.299		
		(0.191)		
Year of birth dummies	yes	yes	yes	yes
Socio-demographic variables	yes	yes	yes	yes
Country of origin dummies	yes	yes	yes	yes
Year of migration dummies	yes	yes	yes	yes
Age-at-migration dummies	yes			
Observations	8,208	8,208	7,396	7,897
Clusters	301	301	147	185

Note: Coefficients estimated using OLS regressions. Each column is a separate regression. Dependent variable is completed fertility. Estimation sample in column 3 excludes immigrants of non-German citizenship and in column 4 immigrants of German citizenship. Natives are included throughout. Robust standard errors in parentheses account for clustering at year of migration-country level. Coefficients and standard errors for remaining control variables not shown to save space. All specifications include a constant. Socio-demographic variables include indicators for highest completed degree, number of siblings, indicator of ever married, age at first marriage, and indicators for religious affiliation. ***/**/* indicate significance at the 1%, 5%, and 10% level.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) as of the time of migration from the World Bank (2009) and the United Nations (2010).

The first two columns of Table 6 consider additional control variables. The regression in column 1 additionally controls for age at migration. If we believe that women who migrate at a particular age share some unmeasured motivation for migration, then age at migration should absorb some potential selectivity bias. In addition, age at migration may also capture other effects associated with the time that an immigrant spent initially in the source country and later on at the new destination, including the potential adaptation effects. I include dummies for immigrants' age at migration to capture these simultaneous effects in the most flexible way. Because the point estimate and significance of the key variable – "difference in TFRs" – remains basically unaffected, this model specification confirms the main results presented in Table 5.

The estimates in column 2 of Table 6 demonstrate that the baseline result persists also if I include further individual characteristics such as German language proficiency and migration background of the spouse. Although these variables may be endogenous to fertility, they exemplify potential channels through which positive selection towards destination country and adaptation may operate. In line with the attenuation bias argument, the point estimate of the key variable increases to 0.584 if I control for a woman's subjective opinion of her spoken German and include an indicator of whether she ever had an immigrant spouse. The data appendix provides further details on the additionally included variables. The estimated coefficients of additional control variables indicate that cohabitation with an immigrant and worse language proficiency are associated with higher fertility outcomes.

The last two columns of Table 6 show the results obtained by excluding immigrants without and with German citizenship respectively (columns 3 and 4).[10] Immigrants of German citizenship are either ethnic Germans or naturalized immigrants and account for nearly 28 percent of the sampled immigrants. This group is presumably more similar to German natives and less representative for the overall population of their home country than immigrants of non-German citizenship. Summary statistics in Table A.2 in the appendix support this argument. Most notably, immigrants of German citizenship have on average fewer children, are better educated, and arrived from lower fertility contexts than immigrants of non-German citizenship. Therefore, with respect to observable characteristics, immigrants of German citizenship seem to be more selected towards the destination country than the remaining immigrants. Consequently, I expect that immigrants of German citizenship are also more selected on unobservable characteristics than immigrants of non-German citizenship. Columns 3 and 4 of Table 6 show that the point estimate for the variable "difference in TFRs" obtained for the more selected group is smaller in magnitude, but qualitatively confirms the general pattern (column 3). Given the small sam-

[10] Note that natives are included throughout, so that the respective sample sizes in columns 3 and 4 do not add up to the size of the overall sample.

ple size, it is not surprising that the precision of the estimation falls. In contrast, the key coefficient for immigrants with non-German citizenship is larger than before (column 4). Comparing the results obtained for the two immigrant groups, I conclude that home country's fertility patterns affect immigrants' fertility less if selection is stronger. This finding strongly supports the argument that the main result presented in Table 5 may be attenuated by potential selection bias.

7. Robustness Checks

This section discusses results of various sensitivity tests that I perform by using an alternative definition of the proxy for fertility culture, changing various sample criteria, and using alternative estimation methods. Table 7 shows the detailed results.

Consider the proxy variable "difference in TFRs" first. The attempts to identify the effect of home country's cultural imprint on immigrants' fertility would fail if the key variable – "difference in TFRs" – was endogenous to fertility choices for some other reasons than the omitted factors related to immigrants' self-selection or adaptation, which I discuss in Section 6.2. The main concern is that the key variable reflects other timevariant unobserved characteristics of a woman's home country that affect fertility and are not captured by country of origin fixed effects or year of migration fixed effects. Another concern may arise because the key variable is based on TFR, which is a hypothetical period-specific fertility indicator and does not necessarily reflect actual completed fertility of a particular cohort of individuals. In attempt to obtain some more insights into the extent to which these problems may affect my results, I extensively tested the sensitivity of my results to various alternative definitions of the cultural proxy.

First, I calculated the variable "difference in TFRs" by using the TFRs as of the year of a woman's 15th birthday. I lost 30 percent of all immigrants who were born before 1935 because they reach age 15 before 1950 and neither the World Bank (2009) not the United Nations (2010) report country-specific TFRs before 1950. Similar to my main specification, the alternative proxy considers the TFR in home and host country both as of the same time. This has rather methodological than conceptual grounding because different years of measurement would collide with the specification of my fixed effects model. Note that the alternative approach assumes that socialization is finalized in adolescence, but the correlation between the new proxy variable and the original one is around 0.94. The coefficient of interest fell to 0.366, but remained significant at the 10 percent level (column 1). I obtained a coefficient of 0.54 and significant at the 5 percent level when I used the home TFR as of the year of 15th birthday directly, instead of the difference to the Ger-

Table 7

Estimation Results Using Alternative Samples and Methods – Selected Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sensitivity test	alternative cultural proxies: age 15	CFR	included if migration age <15	included if migration age >45	excluded if no birth after mig.	duplicate observ. dropped	weighted sample	Turks omitted	10% outliers on diff. TFR omitted	childless women omitted	Poisson regression
Difference in TFRs	0.366*		0.462 **	0.552 ***	0.638 *	0.370 *	0.395 *	0.588 *	0.704 ***	0.444 **	0.212 **
	(0.214)		(0.214)	(0.189)	(0.357)	(0.213)	(0.227)	(0.327)	(0.267)	(0.219)	(0.086)
Difference in CFRs		1.130 *									
		(0.622)									
Year of birth dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Socio-demographic variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country of origin dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year of migration dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Observations	5,732	7,906	8,262	8,438	7,815	5,647	42,318,44040	7,957	8,062	7,099	8,208
Clusters	271	223	318	362	221	301	290	277	285	285	301

Note: Coefficient in column 11 estimated by using Poisson regression. Remaining coefficients estimated by using OLS regressions. Each column is a separate regression. Dependent variable is completed fertility. In column 1 total fertility rates (TFRs) are measured as of age 15. In column 2 the cultural proxy is based on cohort fertility rates (CFR) linked to individuals by country of origin and birth cohort. In remaining columns the TFRs are measured as of the time of migration. Robust standard errors in parentheses account for clustering at year of migration-country level. Coefficients and standard errors for remaining control variables not shown to save space. All specifications include a constant. Socio-demographic variables include indicators for highest completed degree, number of siblings, indicator of ever married, age at first marriage, and indicators for religious affiliation. ***/**/* indicate significance at the 1%, 5%, and 10% level.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) from the World Bank (2009) and the United Nations (2010). Cohort fertility rates (CFRs) from the Generations and Gender Programme – Contextual Database (2014) and the Human Fertility Database (2014).

man TFR in this year (not reported to save space).[11] The main result is therefore robust to alternative assumptions about the timing of when woman's home country's fertility patterns constitute her attitudes towards childbearing, thereby suggesting a rather nature of cultural influences. Importantly, the tests account for undesirable effects of non-observable country-specific factors in a particular year of migration.

Second, I computed an alternative cultural proxy by using cohort fertility rates (CFR).[12] By combining data from the Human Fertility Database (2014) and the Generations and Gender Programme – Contextual Database (2014), I was able to link 70 percent of the sampled immigrants to their respective CFR. Although potentially not representative[13], this linked sample may serve as a basis for useful sensitivity test. Specifically, I computed the difference between the respective home and host country's CFR of a given cohort and re-run my main regression analysis by using this alternative cultural proxy. This estimation largely supports my main result (column 2), though the magnitude of the estimate is larger compared to my baseline estimate (1.13 versus 0.495). Using the home country's CFR directly leaves the result virtually unchanged (not reported to save space). This striking difference in the magnitude of the estimates may be partly explained by the selective sample due to missing values of CFR. Indeed, my initial cultural proxy yields somehow larger estimate in the limited sample. Although the period-specific TFR and cohort-specific CFR generally measure different aspects of fertility, I find that a simple correlation between the two indicators in my sample is 0.93. Thus, although imperfect, the difference in TFR between home and host country seems to be a good cultural proxy for measuring cultural influences on completed fertility of individual immigrants because it leads rather to a downward bias.[14]

Consider now alternative sample selection criteria. The main analysis imposes restrictions on immigrants' age at migration to obtain a homogenous

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11 I investigated also the year of 30th birthday, which might be considered as a middle of the fertile phase. The estimates were qualitatively similar and are available upon request.

12 Recall that the use the TFR in the main analysis represents a necessary compromise because this fertility indicator is comprehensively available, in contrast to the more suitable CFR.

13 The linked sample includes mainly immigrants from more recent birth cohorts and those from European countries, thereby being potentially not representative for the immigrant population in Germany.

14 Alternatively, to make the original cultural proxy more comparable to completed fertility, one might additionally want to consider changes in the mean age at childbirth (MAC) in the home and host counties. Again by drawing on combined data from the Human Fertility Database (2014) and the Generations and Gender Programme – Contextual Database (2014), I found that the coefficient of interest increases in magnitude from 0.495 to 0.517 and remains significant at the 5 percent level when I additionally condition on changes in MAB. Detailed results are available upon request.

sample of first-generation immigrants and to exclude immigrant groups that do not contribute to identification of the effect of home country's fertility patterns. Specifically, I excluded women who migrated as children before age 15 because it is ambiguous where their socialization potentially took place. I also excluded immigrants who were 45 and older at arrival because they potentially completed their fertility before migration. Although these two excluded immigrant groups are far too small to affect the main results, they could serve as useful control groups. Specifically, under the socialization hypothesis, I expect the fertility of women who arrived as children to be less affected by home country's birth rates than fertility of those who arrived as adults. Indeed, the coefficient of the variable "difference in TFRs" falls slightly to 0.462 if I include the group who migrated before age 15 into analysis (column 3). By the same logic, I expect women who arrived at age 45 and later to be more affected by home country's birth rates than women who migrated earlier in life. Indeed, the relevant point estimate increases to 0.552 if I additionally include the group who arrived after age 45 into analysis (column 4). Still, although the main estimation sample excludes immigrants aged 45 and more at arrival, roughly one-third of sampled immigrants had no further children after migration. Because I do not know if this was a result of an age-related decline in fecundity or a woman's choice, excluding them could bias the sample. Nevertheless, I do so and repeat the estimation to mitigate the concern that this group drives the main results. The point estimate from this regression increases to 0.638 and although its precision declines, it remains significant at the 10 percent level (column 5), thereby largely underpinning the baseline result.

Recall now that I pool three SOEP cross-sections and therefore some respondents enter the estimation sample more than once. Because elimination of the repeated records could lead to a biased sample, I keep them in the main analysis. Nevertheless, to test if this approach drives the main results, I repeat the analysis when the duplicate observations are dropped. Although the magnitude of the point estimate for "difference in TFRs" falls to 0.37, these estimates generally underpin the main findings (column 6). Given the smaller sample size, the larger standard errors are not surprising. Nevertheless, the coefficient remains statistically significant at the 10 percent level.[15] I also obtain nearly identical results if I rerun the regression using the cross-sectional weights (Table 7, column 7). The weights account for the oversampling of the traditional guest-worker population in the SOEP. This group consists of immigrants of Turkish, Spanish, Greek, Italian, and Yugoslavian origin. The estimated coefficient from the weighted sample is nearly 0.4 and significant at the 10 percent level.

15 In addition, Panel A of Table A.3 summarizes the pro and con arguments for and against dropping the repeated observations and pooling all available SOEP. Panel B of Table A.3 demonstrates that the results remain qualitatively similar while using either way of sample definition.

Next, I test whether the main results are driven by certain countries with high TFR or large numbers of observations. Specifically, I omit immigrants of Turkish origin. This restriction yields an increase in the coefficient of interest from 0.495 to 0.588 (column 8). Similarly, I obtain an even larger and more precise estimate of 0.704 (significant at the 1 percent level) if I exclude the 10 percent of immigrant observations with the highest values on the variable "difference in TFR" (column 9).

Furthermore, because the decision to remain childless may be driven by different mechanisms than the choice of the actual number of children, I repeat the analysis only for the 86 percent of sampled women who gave at least one birth. The coefficient of interest obtained from this regression is 0.444 (column 10) and largely underpins the baseline result.

Finally, I consider the functional form. I show results from linear regression models throughout. However, the dependent variable – completed fertility – is a non-negative integer and therefore a Poisson regression could be more appropriate. The Poisson approach yields identical signs and significance of the coefficient of interest (column 11). The point estimate for "difference in TFRs" is of 0.212 and is significant at the 5 percent level. The coefficient approximates a semi-elasticity; a one-unit increase in home country's TFR is related to an increase in completed fertility of almost 24 percent, which gives on average 0.63 more children (2.66 versus 3.29). The computation for a one-unit change in "difference in TFRs" is $(\exp(0.212) - 1) \cdot 100\%$. Still, the standard Poisson model assumes that the conditional mean and the conditional variance are equal. In practice, this strong equidispersion assumption is usually violated for fertility counts (see, e.g., Winkelmann and Zimmermann, 1994; Wang and Famoye, 1997; Mayer and Riphahn, 2000). Nevertheless, the recommended generalized Poisson regression (Hardin and Hilbe, 2007) provides here nearly identical results (not reported to save space).

Overall, each of the different exercises shows that the main results in Table 5 are virtually insensitive to changes in the model specification, various sample criteria, and estimation methods. Importantly, the results are also robust to alternative definitions of the cultural proxy, including drawing on a different aggregate indicator and using different time for measurement. This finding suggests that my fixed effects approach captures relatively stable cultural influences rather than other more volatile (e.g., economic or institutional) determinants of fertility.

8. Conclusions

This study focuses on the extent to which the home country's fertility culture plays a role in shaping immigrants' childbearing behavior. In particular, I examine whether immigrants follow fertility patterns acquired in the country of origin. This paper extends the growing literature that shows the impact of broadly defined culture on various socioeconomic outcomes of immigrants and their descendants in the U.S. (see, e.g., Fernandez/Fogli, 2009; Blau et al., 2011). By focusing on completed fertility of first-generation immigrants in Germany, I provide empirical evidence for a different institutional and cultural framework. In contrast to previous studies on German data (see, e.g., Nauck, 1987; Mayer/Riphahn, 2000; Milewski, 2007; Schmid/Kohls, 2010; Milewski, 2010), I use country-specific total fertility rate (TFR) as a quantitative measure of fertility culture to test the socialization hypothesis. My fixed effects approach takes advantage of the variation in TFRs across countries and over time.

My empirical results reveal remarkable patterns in line with the socialization hypothesis: immigrants from countries with high TFR have significantly more children themselves. A one-unit increase in home country's TFR is associated with an increase in completed fertility abroad of 0.5 children, which accounts for a large percentage of the observed fertility variation among immigrants and across countries. Furthermore, I demonstrate that home country's birth rates play a crucial role in explaining substantial fertility differentials between immigrants and natives reported in earlier research (see, e.g., Mayer/Riphahn, 2000; Milewski, 2010).

Given the focus on first-generation immigrants, I face the challenge of separating the effect of cultural imprint from the mechanisms of self-selection and adaptation that may also affect immigrant fertility. I therefore discuss the interdependencies between these different mechanisms. I also show evidence suggesting that the positive relationship between home country's TFR and immigrants' fertility is potentially underestimated because of bias from both selection into migration and adaptation. These results support the argument by Fernandez (2007) that the behavior of a randomly moved individual would be even more affected by home country's culture. However, I leave for future research the challenging question of whether different duration of exposure may affect the strength of cultural effects. Recently, by using a larger data set, Stichnoth/Yeter (2013) show that cultural influences persist among the second-generation migrants in Germany, but the influences are much weaker in magnitude. Unfortunately, the authors are not able to control for important confounding factors such as number of siblings or religious affiliation and, therefore, to disentangle between the effects of a woman's own family experience and culture of the country of ancestry (Fernandez/Fogli, 2006). By using first-hand collected data for 82 Turkish women, Nosaka/Chasiotis (2010) show that patterns of intergenerational fertility transmission may indeed be relevant for immigrants in Germany. Beyond the issue of cultural transmission across immigrant generations, further effort needs to be devoted to investigate the role of other channels such as family members left behind, neighborhoods, or ethnic networks in transmitting cultural traits.

I conclude that childbearing behavior of first-generation immigrants is affected by fertility culture prevailing in their countries of origin. Because the birth rates in the major source countries have been declining continuously for decades (World Bank, 2013), we may expect that completed fertility of recent immigrant cohorts will successively approach the low native levels. In line with previous research for the U.S., my results also suggests that beside policy interventions, institutions, and technology, culture indeed affects individuals' behavior. This finding is qualitatively important not only for fertility, but has implications for various other economic outcomes.

Data Appendix

Country-specific total fertility rates (TFRs)

The annual country-specific TFRs are reported by the World Bank (2009) for years 1960 – 2009. To conform to the country classification used in the SOEP, in some cases I grouped countries. For example, for immigrants from "Ex-Yugoslavia" I averaged TFRs of Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Slovenia, and the former Yugoslav Republic of Macedonia. Other generated countries are "Eastern Europe" (Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, and Ukraine), "Kosovo-Albania" (Albania and Kosovo), "Benelux" (Belgium, Netherlands, and Luxembourg), "Kurdistan" (Turkey, Iraq, Iran, and Syrian Arab Republic), "Free State of Gdansk" (Poland), and "Korea" (Republic of Korea and Dem. People's Republic of Korea). For some source countries the TFR for single years was missing. Although the main results are robust to exclusion of these observations, I imputed the TFR for the intervening periods by using a linear interpolation between the most recent and first future available values. For a few immigrants who arrived before 1960, I use the data reported by the United Nations (2010). These TFRs represent estimates of five-year average TFRs for every country in the world since 1950 – 1955 onwards. I use the constant-fertility scenario. Finally, for 3 observations from "Eastern Europe" who arrived in 1949 I use the respective 1950 – 1955 value.

Number of siblings

The information on respondent's number of brothers and sisters is available in SOEP waves 1991, 1996, 2001, 2003, and 2006. I added up the number of brothers and sisters and eventually use the largest number of siblings a woman ever reported to the SOEP. If this procedure generated a missing value, I incorporated the information on the number of children born to a woman's mother. My main results are robust to alternative definitions of this variable such as, e.g., inclusion of indicators for the originally missing values.

Religious affiliation

Religious affiliation is available in the waves 1990, 1997, 2003, and 2007. I use the first religious affiliation that a woman ever reported to the SOEP. If this procedure generated a missing value, I imputed the information by using either her mother's or her father's religious affiliation. The main results are robust to alternative definitions of this control variable such as, e.g., inclusion of indicators for the originally missing values.

Self-assessed language proficiency: spoken German

The SOEP question on German language proficiency distinguishes five levels: very well, good, fairly, poorly, and not at all. Every tenth immigrant in the estimation sample reports to speak German very good, 23 percent good, 27 percent fairly, 19 percent poorly, and 3 percent not at all. For nearly 19 percent immigrants the value is missing. I include five dummies for language proficiency. The reference category is very good spoken German. This variable is set to zero for natives. The main results are robust to alternative definitions of this variable such as, e.g., inclusion of indicators for the highest or lowest level of spoken German that a woman has ever reported to the SOEP.

Migration background of the spouse

I use the information on household composition and determine whether a woman has ever reported to live with a spouse who has migration background. With respect to the spouse, I do not distinguish between immigrant generations. This control variable indicates therefore if a woman ever cohabited with an (first or second-generation) immigrant, which applies to 4.5 percent of natives and 11 percent of immigrants in the estimation sample.

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Table Appendix

Table A.1

Main Estimation Results

	(1)	(2)	(3)
Immigrant indicator	0.776 ***	0.244 ***	
	(0.104)	(0.086)	
Difference in TFRs		0.450 ***	0.495 **
		(0.058)	(0.226)
Constant	1.854 ***	1.866 ***	–0.027
	(0.047)	(0.030)	(0.112)
Highest completed degree			
ISCED-1			0.4846 **
			(0.219)
ISCED-2			Ref.
ISCED-3			–0.428 ***
			(0.023)
ISCED-4			–0.322 ***
			(0.062)
ISCED-5			–0.180 ***
			(0.023)
ISCED-6			–0.255 ***
			(0.023)
Number of siblings			0.049 ***
			(0.005)
Ever married			3.162 ***
			(0.050)
Age at first marriage			–0.059 ***
			(0.002)
Non-religious			Ref.
Catholic			0.450 ***
			(0.023)
Protestant			0.455 ***
			(0.016)
Muslim			0.957 ***
			(0.359)

Continued next page

Table A1 continued

	(1)	(2)	(3)
Other religion			0.458 ***
			(0.152)
Year of birth dummies	yes	yes	yes
Socio-demographic variables			yes
Country of origin dummies			yes
Year of migration dummies			yes
Observations		8,208	

Note: Coefficients estimated by using OLS regressions. Each column is a separate regression. Dependent variable is completed fertility. Robust standard errors in parentheses account for clustering at year of migration-country level (301 clusters). ***/**/* indicate significance at the 1%, 5%, and 10% level.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) as of the time of migration from the World Bank (2009) and the United Nations (2010).

Table A.2

Summary Statistics by Immigrants' Citizenship

	Immigrants			
	German citizenship		non-German citizenship	
Variable	Mean	St. Dev.	Mean	St. Dev.
Completed fertility	2.17	1.43	2.84	1.81
Socio-demographic variables				
Year of birth	1946.82	10.73	1943.42	8.10
Highest completed degree				
ISCED-1	0.03	0.17	0.31	0.46
ISCED-2	0.23	0.42	0.40	0.49
ISCED-3	0.31	0.46	0.18	0.38
ISCED-4	0.14	0.35	0.05	0.22
ISCED-5	0.11	0.31	0.01	0.12
ISCED-6	0.20	0.40	0.05	0.22
Number of siblings	3.13	2.49	4.05	2.57
Indicator if ever married	0.97	0.17	0.99	0.12
Age at first marriage	22.97	6.98	22.13	6.03
Catholic	0.45	0.50	0.39	0.49
Protestant	0.30	0.46	0.02	0.14
Muslim	0.07	0.26	0.29	0.45
Other religion	0.08	0.28	0.25	0.44
Non-religious	0.09	0.29	0.05	0.21
Migrant-specific variables				
Age at migration	31.26	7.67	27.98	7.23
Year of migration	1978.08	12.97	1971.41	7.17

Country-specific TFR at the time of migration				
TFR in home country	2.67	1.13	3.23	1.37
TFR in Germany	1.70	0.43	1.95	0.44
Difference in TFRs	0.96	1.13	1.28	1.46
Observations	311		812	

Note: Means and standard deviations are calculated by using unweighted samples.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) from the World Bank (2009) and the United Nations (2010).

Table A.3

Trade-off Between Sample Size and Representativeness

Panel A: Pros and Cons

SOEP waves	pooling waves	dropping repeated observations
1991, 1999, 2007	+ sufficient sample size + few repeated observations(a woman enters up to 3 times)	− smaller sample size − arguable representativeness
	+ minimizes missing values on control variables	
	✓ **baseline sample**	
1984 − 2010	+ large sample size − many repeated observations(a woman enters up to 27 times)	+ large sample size − arguable representativeness
	− meaningful number of missing values on control variables	

Panel B: Results

SOEP waves	pooling waves	dropping repeated observations
1991, 1999, 2007	0.495** (0.226) N=8,208 ✓ **baseline result**	0.370* (0.213) N=5,647
1984 − 2010	0.455** (0.224) N=73,301	0.411** (0.181) N=7,251

Note: Dropping repeated observations refers to keeping only the first interview given by a woman aged 45 or above.

Source: Own calculations based on SOEP; pooled waves 1991, 1999, and 2007. Total fertility rates (TFRs) from the World Bank (2009) and the United Nations (2010).