# Horizontal vs. Vertical Transmission of Fertility Preferences

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**Abstract**

I study the cultural transmission of fertility preferences among second generation immigrant women observed in U.S. Censuses from 1910 to 1970. As hypothesized by [Bisin & Verdier, 2001], the transmission of preferences can be "vertical" or "horizontal". Using a unique source documenting the variation in fertility behavior in Europe before and after the first demographic transition (1830-1970), I unpack the influence of parents (measured by source-country fertility at the time of departure from Europe) versus the influence of peers (measured by fertility of the same-age cohorts living in the source country and transmitted by same-age recent immigrants). I find that the transmission mechanism is crucially affected by the number of foreign born immigrant peers living in the same MSA. On one hand, the "vertical" channel of transmission is stronger in places where there are few newly arrived foreign born immigrant couples from the same source countries. On the other hand, fertility choices of second generation women are strongly correlated with marital fertility choices measured over peer cohorts in the source countries whenever they live in MSAs densely populated by recently arrived immigrants.

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# 1 Introduction

Over the last fifteen years, economists have shown growing interest in the effect of culture on outcomes, social norms and traits such as living arrangements, labor force participation, level of trust and fertility decisions just to name a few.[1] However, the mechanism through which culture is transmitted is still a black box, for culture can be very "sticky" or rapidly evolving according to the social norm of interest (see Giavazzi, Petkov & Schiantarelli [2014] for a recent discussion). Following the seminal contribution of Bisin & Verdier [2001], papers documenting the persistent effect of culture have generally not been able to distinguish between the transmission channels through which the persistence in social norms occurs. In fact, [Bisin & Verdier, 2001] mention two distinct channels: the vertical one, that occurs from parents to children, and the oblique-horizontal one from peers (henceforth, I will simply refer to the latter channel as the horizontal one). In their model parents exhibit "imperfect empathy": their utility function is affected by children's choice to pick up one of the two social norms in the society.[2] Since parents' utility is increasing in their own social norm, they are willing to incur a cost in order to maximize the probability of children acquiring the parental social norm. Moreover, the socialization effort exerted by the parents decreases the larger its social group as the two channels substitute each other.

Previous empirical work studying the transmission of social norms across second generation immigrants has generally taken different approaches to measure the transmission of social norms among second generation immigrants.[3] The most popular of these is the epidemiological approach which I adopt in what follows. According to this strategy, the key explanatory variable capturing the persistence of preferences and social norms among immigrants and (or) their children should be measured in the country of origin of the parents that migrated (henceforth *source country* in this article) in order to reflect the prevailing social norm of interest.[4] However, a careful analysis of the previous literature shows that the choice of such variable has generally been limited by data availability. For instance, Alesina & Giuliano [2010], Algan & Cahuc [2010] and Ljunge [2014] use the same World Value Survey's waves to obtain dependent as well as independent variables when using the epidemiological approach. While this strategy generally shows that cultural norms play a role in determining several outcomes, it is problematic as it does not shed light on the transmission channel through which cultural

[1]See Guiso, Sapienza & Zingales [2011, 2006] for a thorough review on the effect of culture on several outcomes.

[2]In their model [Bisin & Verdier, 2001] assume that a monoparental family has one child which is born without one of the two existing cultural traits $\{a, b\}$. Parent chooses the optimal socialization effort level having perfect information of how many individuals in the population share its social norm.

[3]Henceforth in this paper, second generation immigrants are defined as U.S. born with at least one foreign born parent. First generation immigrants, i.e. those immigrants that were born outside the U.S., are here called foreign-born immigrants.

[4]See Fernández [2011] for a review of the advantages and drawbacks of this method. Other methodologies include the dummy variable approach (see Giuliano [2007] for an example), others have approximated the social norm simply averaging across migrants' population (Borjas [1995, 1992] Card, DiNardo & Estes [2000] provide examples of such studies).

norms persist.

My approach takes one step forward in trying to unravel what is the transmission mechanism that leads to cultural persistence. Focusing on individual fertility decisions of second generation married women living in the U.S. between 1910 and 1970, I perform a "horse race" between the vertical and horizontal transmission channels of preferences in Bisin & Verdier [2001]. The former channel is measured using lagged values of marital fertility rates in *source country s* (hereinafter $MFR_{s,t-30}$ where $t$ is the Census year in which a second generation woman is surveyed) as explanatory variable for the number of children a second generations woman had in her life. The reasoning underlying this choice is that, in presence of vertical transmission, I expect the number of children of second generation women to be correlated with the $MFR$ measured in their source countries at the time of migration of their parents. Measuring the horizontal channel, that is the transmission of values from foreign-born peers that migrated from the same source countries to second generation women, is more challenging. In fact, because of the reflection problem ([Manski, 1993]) one cannot plug in the $MFR_{s,t}$ computed among peers in the U.S. at the time of the Census. Hence, I use contemporaneous values of Marital Fertility Rates in the source countries (i.e. $MFR_{s,t}$) as a measure of the horizontal transmission of fertility preferences from foreign-born immigrants that migrated from Europe one generation after the parents of the second generation women in the sample. During the time window analyzed (1910-1970 U.S. Censuses) fertility rates underwent sharp changes in the source countries. Hence, the autocorrelation of $MFR$ is low and this enables the inclusion of both $MFR_{s,t}$ and $MFR_{s,t-30}$ in the same model. This strategy is possible as I have a unique source documenting fertility decisions for almost one hundred years (i.e. from 1880 to 1970) in almost thirty European countries before and after the first fertility transition occurred Coale & Watkins [1986].

As I use data from multiple U.S. Censuses, the longitudinal dimension allows me to control for a set of fixed effects that purge results from time-invariant unobservable characteristics. In the most demanding estimation, I include a fixed effect that captures MSA $\times$ year specific unobservables thus controlling for geographical and year level effects that might influence fertility decisions. Although I cannot fully test for the extent to which women in the sample are exposed to the influence of peers from the same source countries over their lifetime, I take advantage of the variation stemming from U.S. Metropolitan Statistical Areas (henceforth MSAs) having a greater (or smaller) fraction of newly arrived foreign born migrants relative to the population of second generation peers.[5]

In order to run the horse race, I use a pooled Negative Binomial model. While my results confirm past

[5]Results' internal validity is still challenged by the potential presence of time-varying unobservables. Previous studies relying on cross-sectional data such as: Fernández & Fogli [2009, 2006], Alesina & Giuliano [2010], Ljunge [2014] are potentially affected by the presence of both time varying and time invariant unobservables.

findings about the effect of cultural norms on family size (Fernández & Fogli [2009, 2006]), I find mixed evidence of both channels of transmission playing a role.[6] In line with the theoretical results in Bisin & Verdier [2001], I find that the presence of foreign-born married couples within the same MSA is strongly correlated with the horizontal transmission of fertility norms. Therefore, second generation women living in MSAs that underwent inflows of foreign born immigrants ended up having preferences that were closer to their peers in the source country rather than their parents' ones. Conversely, whenever an MSA did not experience inflow of foreign born peers, the vertical transmission channel dominates over the horizontal one. Since I do not observe where the women in the sample were born and lived before filing the Census, I cannot completely rule out that my results are driven by self-selection of immigrants into areas with a high (or low) density of foreign-born immigrants. If this is the case, my estimates are likely to be an upper bound of the horizontally and vertically transmitted cultural effect.

The rest of the paper is organized as follows: Section 2 reviews the literature about cultural transmission of preferences with a special focus on the studies looking at second generation migrants and using the epidemiological approach. Section 3 describes Coale & Watkins [1986] data on fertility. Moreover, this section explains how individual data on married couples was chosen for Censuses from 1910 to 1970. Section 4 explains the identification strategy adopted together with its advantages and drawbacks with respect to what has been done in the past. Section 5 shows the results of the pooled Negative Binomial estimation and suggests a potential channel through which the transmission of preferences observed in the data occurred. Section 6 concludes.

## 2 Literature Review

Previous work attempting to single out the role of culture on a set of diverse outcomes has used foreign-born migrants and, more often, their children.[7] Guiso, Sapienza & Zingales [2004] were among the first to use migrants data to show that, within Italy, variation in the level of social capital had a causal impact on the use of formal credit and checks. However, differences in choices among foreign born migrants might reflect an "endowment effect", that is, they might be partially caused by early life experiences such as growing up in places with different institutional environments. In order to address this criticism, in a series of original articles Fernández & Fogli [2006, 2009] analyzed fertility choices and labor force participation of second generation women in the U.S. Indeed, differently from their parents, migrants' children who were born and raised within

[6]The persistent effect of fertility preferences is such that an increase of one child in the *source country* marital fertility rate is associated with an increase by a factor of 1.07 in the number of children a second generation woman had.

[7]Guiso et al. [2006] define culture as *the set of customary beliefs and values that ethnic, religious, and social groups; transmit fairly unchanged from generation to generation* , for a thorough discussion see Guiso et al. [2011].

the identical institutional environment of a single country, represent the ideal individuals on which is possible to test the persistence of preferences inherited from their parents. In a series of articles, the authors showed that fertility and labor force participation (henceforth abbreviated with LFP) measured in the 50's in the *source country* explains the variation in preferences for the number of children as well as for LFP's decision of second generation's migrants women.[8] This attempt to single out "cultural" from "environmental" beliefs using a variable measured in the country of origin of the parents is called epidemiological approach and has now been adopted widely in economics.[9] At the same time of Fernández & Fogli [2006, 2009] other articles showed that the heterogeneity in outcomes and choices of second generation's migrants within the U.S. is accounted for by the variation at the parents' country of origin level. Namely, Giuliano [2007] for instance, shows that important decisions such as living arrangements of second generation's migrants in 1970's and 2000's are highly correlated with the ones in place in the country of origin of the parents. Similarly, Alesina & Giuliano [2010] use the beliefs about the family from the World Value Survey as a proxy for second generation's "cultural baggage" inherited from their parents. The authors demonstrate that culture has high explanatory power with respect to women's as well as youth's LFP measured from the CPS data and the American Time Use Survey. Furthermore, the authors also find that the "cultural baggage" variable affects a wide array of choices such as: family size, home production, living arrangements and geographic mobility of second generation migrants.

Since the sample of analysis consists of a cross-section of individuals, these articles also face some limitations due to the absence of the longitudinal dimension. For instance, it is impossible to control for place-of-origin unobservable characteristics that might be driving the results through a spurious correlation. Algan & Cahuc [2010] were able to control for *source country* unobservables by looking at different cohorts of immigrants' descendants over time. In order to study the effect of trust on GDP per-capita growth in a set of countries, the authors estimate values of trust for the beginning of the twentieth century (1910) by looking at GSS answers of second, third and fourth generation U.S. citizens whose parents moved to the U.S. around 1910. Provided that the transmission of trust is vertical (i.e. from parents to child) and that immigrants' descendants are not influenced by shocks occurring in the *source country* after their ancestors left, the trust level should differ over consecutive cohorts of immigrants. The main problem of the paper lies in the fact that the transmission of trust across generations need not be vertical. Different sources of transmission can occur through the interaction with newly arrived immigrants from the same *source country* of their ancestors. Alternatively, higher generations could be assimilating and simply reflect the trust level of the country in which they are living.

[8] The authors use information on the country of origin of the father to define the *source country* of second generation women observed in the 1970 U.S. Census and in multiple GSS waves.

[9] See Fernández [2011] for an introduction to the epidemiological approach.

As a matter of fact, Bisin & Verdier [2001] show that there are multiple channels through which heterogeneous preferences can persist over time. In their model, the authors hypothesize the existence of two channels of transmission: vertical (i.e. through the parents) and horizontal-oblique (i.e. through peers, teachers etc.) and show that both substitutability and complementarity among the two channels can sustain stationary states in which heterogeneous traits persist in the population. In light of this theoretical result, one cannot be sure that a second or higher generation immigrant will acquire his social trait *exclusively* from his family. In fact, if consecutive generations from the same *source country* have different social traits, socialization among them will increase the probability of acquiring a trait that differs from the one of their parents.

Mostly because of data shortage, studies documenting the persistent effect of cultural norms on preferences and choices could not check for the presence of these two channels. Fernández & Fogli [2009, 2006] for instance, use 1950 female LFP and fertility from a set of *source countries* as epidemiological variables explaining the variation in economic outcomes between women aged thirty to forty years old in 1970. Therefore, 1950 is not an ideal choice as their parents were certainly born at the beginning of the century when values for women LFP and fertility were certainly different and, because of the fertility transition, not highly correlated with the values observed in 1950. Hence, from their studies, it is not clear which transmission channel among the vertical and the horizontal one is driving the correlation. By the same token, many articles applying the epidemiological approach suffer from this problem: Alesina & Giuliano [2010] for instance, employ the independent variables as well as the key right hand side one from surveys conducted roughly at the same time. Among the recent literature, Ljunge [2014] studies the inter-generational transmission of trust among the children of immigrants in several European countries. Unfortunately, the author measures trust in the source countries, i.e. the epidemiological variable, through waves of the World Value Survey that are collected at the same time of the ones measuring trust among second generation, i.e. the dependent variable. In the same way, Algan & Cahuc [2010] use trust measured in the parents' source countries as independent variable to estimate the inter-generational transmission of this value among second and higher generation of migrant in the U.S. However, both the left and right hand side variables are again measured at the same time using World Value Survey waves. Finally, Giavazzi et al. [2014] analyze the convergence of a set of values among immigrants up to the fourth generation within the U.S. and finds substantial heterogeneity in this process. Namely, the authors show that persistence is specific to some topics such as religious ones as well as linked to descendants whose ancestors came from specific countries.

# 3 Data Description

## 3.1 Fertility Data for European Countries 1880-1970

I use data on marital fertility from the following source: *The decline of fertility in Europe: the revised proceedings of a conference on the Princeton European Fertility Project* [Coale & Watkins, 1986], which to date represents the most complete source of information on European fertility during the nineteenth and early twentieth centuries. The main goal of this study was to date the onset of the fertility transition in every European region. Specifically, for every country $s$ and different years $t$, this source includes the Marital Fertility Rate. Coale & Watkins [1986] also reports another variable: $I^g_{st}$ which is a ratio of the number of births occurred to married women divided by a hypothetical fertility plateau that would be reached if all women in the population were to adopt the Hutterites' fertility schedule.[10] Throughout the rest of the paper I use $MFR_{st}$ as right hand side variable, I also replicate my analysis using $I^g_{st}$ in the Appendix's Section A.3. Data frequency differs by country, France, for instance, has data from 1831 until 1961. Other countries like Romania and Bulgaria have only three data points starting from 1900 and ending in 1956. In general, most of the countries in the sample have at least four different observations divided by a 30 years lag between each other starting from 1880 until 1970.[11]

I use these data exclusively to have a measure of the MFR for almost thirty countries in a time window of almost one hundred years. Since the first fertility transition occurred in Europe mostly during the second half of the nineteenth and the first half of the twentieth centuries this implies that, as shown in Table 1, the autocorrelation of $MFR_{st}$ (as well as $I^g_{st}$) is relatively low when these variable are opportunely spaced using lag of 30 years.[12]

Figure 1 shows the variation in the MFR data for four countries for which the frequency is particularly high. As it is evident, fertility rates are sticky when observed over short (ten years') intervals, however, once they are opportunely spaced over thirty years intervals, the figure shows more longitudinal variation.

An obvious limitation of using data aggregated at the national level is losing the within country heterogeneity dimension. As suggested by Spitzer & Zimran [2013], one should be careful in using national averages when making inference on a heterogeneous population. Indeed, Coale & Watkins [1986] collected data at a finer level

[10] The Hutterites are an Anabaptist sect that migrated from Europe to the north central regions of the U.S. as well as south central Canada in order to avoid religious persecution. Since any sort of contraception or abortion is strictly forbidden within this sect, their Fertility rate is taken as an upper bound by Coale & Watkins [1986]. Additional details on how the variables are constructed are included in the Section A.1 of the Appendix.

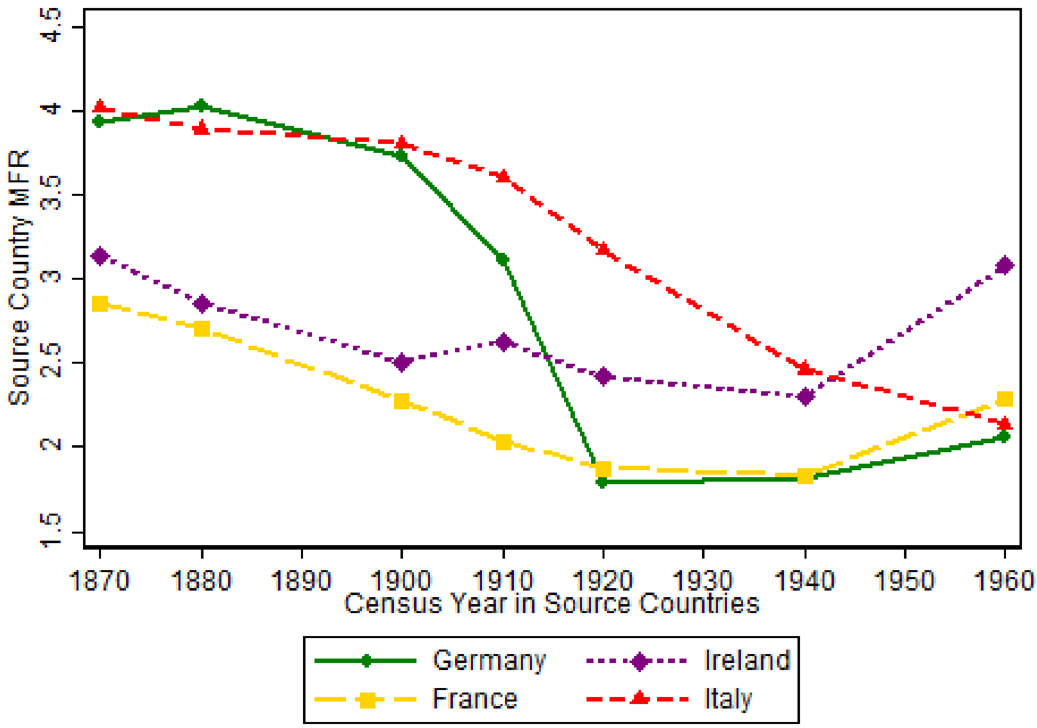
[11] Table 9 in Appendix A.1 shows data availability for the countries in this study.

[12] The choice of 30 years can also be interpreted as a "generational" lag.

Table 1: **Autocorrelation of the two variables with a 30 years lag**

| | $MFR_{st}$ | $I^g_{st}$ |
|---|---|---|
| $MFR_{st-30}$ | 0.5536 | |
| $I^g_{st-30}$ | | 0.7436 |

Figure 1: **Marital Fertility Rates over time for four countries**



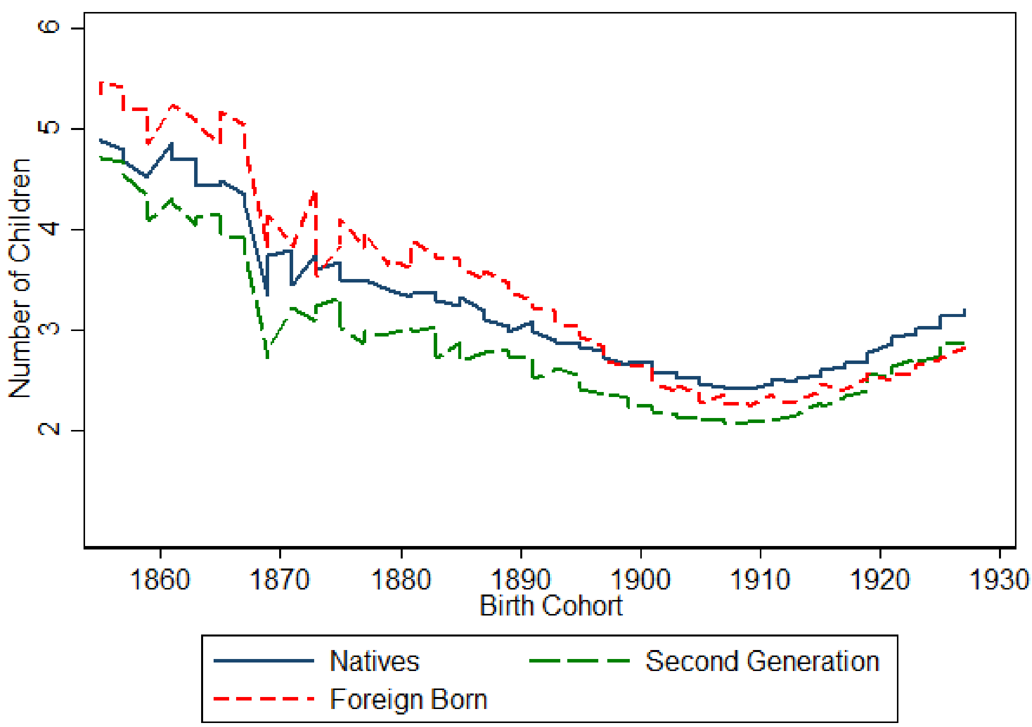

*Source:* author's calculation using data from Coale & Watkins [1986].

than the national one (a pattern visible in Figure 4 in the Appendix). In general, in my study, I am unable to take advantage of the within country variation displayed in this source. However, the within country dimension allows me to have fertility data for regions that later became countries such as the Baltic states, Czechoslovakia and Yugoslavia. A within country analysis would require building a matching algorithm that infers the region of origin of the parents based on their last names, a fact that is clearly impossible for women since their last name changes after marriage. Table 8 in the Appendix Section A.1.1 replicates one of the main regressions of [Fernández & Fogli, 2009] using [Coale & Watkins, 1986] data showing that results are comparable to the ones she obtained using her dataset.

### 3.2 Data on Fertility in the U.S. 1910-1970

I use individual information on married women born in the U.S. with at least one foreign born parent from the following Censuses: 1910, 1940, 1950 and 1970.[13] I restrict my sample to married women between 20 and 50 years of age as Coale & Watkins [1986] computed their variables using the same age group.[14] The choice of the Censuses is led by the presence of the following variables that are important for the empirical analysis: number of children that a woman had at the time she was filing the Census, within-state geographical identifier, place of birth of the parents and husband's presence within the household. As I am studying the fertility choices of women in different age groups, I cannot use the 1920 as well as the 1930 Censuses as they only ask the number of children living within the household at the time the Census was filed.[15] I could not use the 1960 Census as it lacks detailed geographical identifiers. Similarly, it is not possible to use later Censuses (i.e. 1980 onward) as they lack data on parents' country of birth, while the CPS fertility supplement has this data, the sample size of each wave is dramatically reduced to four thousand individuals.

Figure 2: **Number of Children for Different Birth Cohorts: Natives and Immigrants**




*Source:* author's calculations selecting women older than 49 in the 1900, 1910, 1940, 1950 and 1970 Censuses.

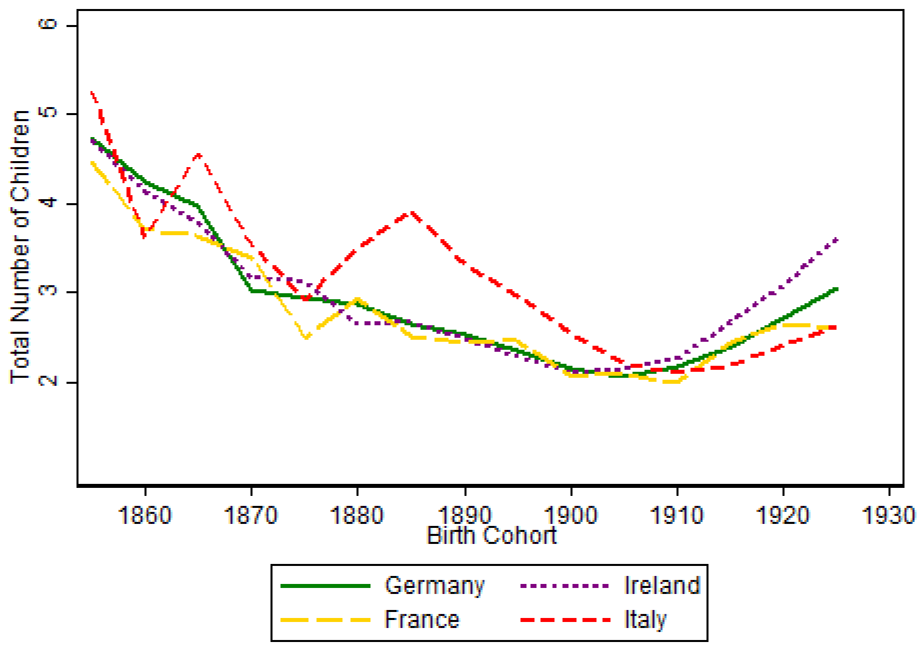
[13] For every year I downloaded the 1% sample from IPUMS, for 1970 the sample I used the 1 % Metro fm2 one.

[14] I understand that the age distribution of the European countries during the years for which the variables were constructed affects their values and might well differ from the age distribution of second generation women in the U.S. observed in the Censuses.

[15] This would imply that for the women in the age group 40-50 years old I would systematically underestimate the number of children they had as some of them might have already moved out of the household.

In Figure 2 I plot the completed fertility for women in different birth cohorts disaggregated by nativity status. Overall, this figure shows that the data on the number of children that second generation women had display a common trend with respect to natives and foreign born immigrants. However, plotting the completed marital fertility rates by *source country*, as it is done in Figure 3, shows that there are persistent differences over time within second generation immigrants. A detail to bear in mind, when looking at Figures 2 and 3 is that these data are taken from consecutive cohorts of second generation women whose parents' social and economic background might differ. As the composition of immigrants changed over time, the sample reflects the variation in migrants' source countries over time.

Figure 3: **Number of Children for Second Generation Women from Different Source Countries**




*Source:* author's calculations selecting women older than 49 in the 1900, 1910, 1940, 1950 and 1970 Censuses.

Every column of Table 2 shows, in percentage terms, the sample composition by source country in each Census included in the study. That is the sample of second generation women in 1910 is mainly composed by Germans, Irish and English.[16] This is because the early comers in the U.S. were mainly from these three countries while at the beginning of the twentieth century immigrants came disproportionately from Eastern and Southern Europe.[17] This pattern can be seen in the following Censuses where the fraction of women whose parents came from countries like Poland, Italy and Russia increases. As the U.S. Census never asked question

[16] In Table 2 I select second generation women as having at least one parent foreign born and when both parents are foreign born and come from two different countries I assign the woman to belong to the mother's source country see Table 10 in the AppendixA.2 to have a full list of women whose parents were foreign born.

[17] For more details on the Age of Mass Migration and immigrants composition over time see Hatton & Williamson [1998].

on religiosity, I am certainly missing this important dimension of heterogeneity by only looking at country of origin of the parents. As a matter of fact, Irish fertility differed according to the religious faith (a fact that is somewhat visible from Figure 4 where the regions nowadays part of Northern Ireland have lower values of $I_g$ in 1900). In order to remove the descendants of Jewish immigrants from the sample I follow Angrist [2002] and look at Census question on the mother tongue (as well as mother tongue of the parents for those in 1910 Census) so that I can remove all native Yiddish and Hebrew speakers.

Table 2: **Sample composition by year: selected countries in % of the total sample**

| **Countries** | **Census year** | | | | |
|---|---|---|---|---|---|
| | 1910 | 1940 | 1950 | 1970 | Total |
| Scandinavian Countries | 6.5 | 11.7 | 10.1 | 7.3 | 8.6 |
| England | 11.8 | 7.7 | 5.7 | 5.3 | 7.6 |
| Scotland | 3.1 | 2.2 | 1.9 | 2.5 | 2.5 |
| Ireland | 22.6 | 9.2 | 6.9 | 5.7 | 11.3 |
| Italy | 0.9 | 10.1 | 17.3 | 23.7 | 13.6 |
| Austria | 2.0 | 3.7 | 5.6 | 4.5 | 3.9 |
| Czechoslovakia | 0.1 | 2.8 | 3.1 | 3.7 | 2.4 |
| Germany | 45.3 | 24.6 | 13.8 | 8.3 | 22.5 |
| Poland | 0.2 | 8.6 | 12.4 | 12.3 | 8.4 |
| Baltic States | 0.0 | 1.2 | 1.8 | 1.8 | 1.2 |
| Russia | 1.0 | 8.0 | 10.9 | 10.6 | 7.6 |
| # of Second Gen. Women | 22,761 | 13,102 | 18,713 | 24,514 | 79,090 |

*Source:* 1910, 1940, 1950 and 1970 1% US Census

# 4 Empirical Strategy

## 4.1 Identification and Challenges to Internal Validity

In this paper I apply the epidemiological approach to study the persistence of cultural heritage on fertility choices of second generation migrant women during the period 1910-1970. As discussed in Section 2, this identification strategy uses a variable measured in the source country to capture the effect of the "cultural heritage" on a certain outcome. This approach relies on the assumption that there is no omitted variable systematically correlated across different countries, if this is the case, then the epidemiological approach fails as the key right hand side variable might be capturing a spurious correlation driven by the omitted variable.[18]

The main difference between my reduced form identification strategy and previous articles using a similar approach is that I take advantage of the longitudinal dimension of the dataset in order to purge estimates

[18]See Fernández [2011] for additional details on the caveats of using the epidemiological approach to identify the transmission of preferences.

from time-invariant unobservables. The variation in fertility rates over time is a product of the long time frame considered as well as of the differential timing in which the first fertility transition occurred among European countries. Moreover, I argue that this feature allows me to shed light on the mechanism underlying the preference transmission.

Throughout the paper, the dependent variable is the number of children ever born observed at the individual (i.e. married woman) level. As shown in Table 2 the sample is composed of more than seventy nine thousand observations. However, the empirical estimation relies on the variation observed at the country-year level. Since the outcome of interest is a discrete nonnegative integer, I estimate a count data model as it is more interesting to understand the effect of the epidemiological variables on having one, two or more children rather than being able to tell what is the effect of the conditional mean. In order to address overdispersion of the dependent variable I run a pooled negative binomial model.[19] I list the regressors of matrix $\boldsymbol{Z}$ in equation (NB2) in more detail in equation (1) and discuss them below.

$$\boldsymbol{Z}'\boldsymbol{\delta} + \epsilon_i = \alpha_s + \boldsymbol{\gamma}_1^{'}\boldsymbol{X}_{it} + \beta_1\left(MFR_{st}\right) + \beta_2\left(MFR_{s(t-30)}\right) + \tau_t + r_m + \epsilon_{ismt} \tag{1}$$

In order to test the cultural transmission of preferences I run a "horse race" between contemporaneous $MFR$ (i.e. $MFR_{st}$ in equation (1)) and lagged $MFR$ (that is $MFR_{s(t-30)}$ in the same equation) measured in the parent's *source country*. The subscript $t$ labels the year in which the $MFR$ has been measured in the *source country*. That is, in order to explain fertility choices of women in the sample, I include two observations of the $MFR$ measured with a lag of thirty years. For example, a second generation woman of French ancestry observed in the 1910 Census will have a value of $MFR_{s(t-30)} = 2.70$ (i.e. the recorded $MFR$ for France in 1880 retrieved from [Coale & Watkins, 1986]), this variable is included to capture the vertical transmission of preferences. The rationale for doing so is the following: if transmission of fertility preferences occurs from parents to daughters, then the $MFR$ in 1880 is the closest measure of the fertility norm of the parents. Besides, the same woman is assigned a $MFR_{st} = 2.03$, which is the $MFR$ for France in 1910 and measures the horizontal transmission of

[19]Equation (NB2) shows the general expression of the Negative Binomial model:

$$\begin{aligned} f\left(y_i|\boldsymbol{Z}_i u_i\right) &= \frac{e^{-(\boldsymbol{Z}_i u_i)}(\boldsymbol{Z}_i u_i)^{y_i}}{y_i!} \\ \boldsymbol{Z}'\boldsymbol{\delta} + \epsilon_i &= \ln\lambda_i + \ln u_i \\ \mathbb{E}\left(y_i|\boldsymbol{Z}_i, \epsilon_i\right) &= \exp\left(\boldsymbol{Z}_i'\boldsymbol{\delta} + u_i\right) \end{aligned} \tag{NB2}$$

The Negative Binomial estimation requires assuming that the individual heterogeneity term $\exp^{\epsilon_i} = u_i$ is distributed as a Gamma (with parameters $\alpha = \theta \quad \beta = \theta$) so that the conditional mean of $y_i$ given $\boldsymbol{Z}_i$ equals to $\lambda_i$. See Cameron & Trivedi [2013] for a discussion on the Negative Binomial model. For robustness, in Section A.3 of the Appendix I present results when a pooled OLS is used.

preferences that the woman experiences from her interaction with French born immigrants. The choice of the thirty years lag reflects the change of fertility norms across two generations, this can also be seen from Figure 1 where I plotted the change of $MFR$ for France and other three countries over time. Note that, while most papers reviewed in Section 2 provided a great contribution in showing the presence of cultural transmission among second generation immigrants, they are unable to distinguish among the two channels as the right and left hand side variables are generally measured during the same time window in Alesina & Giuliano [2010], Fernández & Fogli [2006, 2009], Ljunge [2014]. Therefore, authors of these papers mostly emphasize the role of parents in the inter-generational transmission while this article attempts to distinguish between the two. The variation in fertility at the source country level is crucial as the relatively low autocorrelation of $MFR$ allows me to use, for each woman in the sample, two distinct observations of it as proxies for distinct channels of fertility preferences' transmission. In particular, measuring the horizontal channel vis-à-vis the convergence of fertility norms towards the natives' ones is complex as an alternative approach that would use the observed $MFR$ among foreign born immigrants and natives currently living in the U.S. would suffer from the reflection problem ([Manski, 1993]). In the next paragraphs I discuss the explanatory variables used in the estimation as well as how the time dimension allows me to control for the fertility rates at the MSA-year level.

The dependent variable $y_{ismt}$ is the number of children ever born to woman $i$ whose parents came from country $s$, living in MSA $m$ and surveyed in Census $t$. $\boldsymbol{X}_{it}$ is a set of individual characteristics correlated with fertility measured in Census $t$. Namely, these variables are: age, a set of dummies for husband's age and a dummy for farm status.[20] The choice of using women from consecutive Censuses suffers from the drawback that some questions changed over time. In fact, the 1910 Census did not ask for the years of completed education of respondents, therefore, I cannot control for this important determinant of fertility. The concern here is that the cultural effect might be upward biased as it is capturing the outcome caused by parents' underinvestment in education rather than fertility preferences *per-se*. Past studies analyzing the intergenerational transmission of fertility have taken different stances on whether including LFP and education status. On the one hand, Fernández & Fogli [2009] control for as many variables as possible thus including LFP status and educational attainment to avoid the upward bias discussed above. On the other hand, [Blau, Kahn, Liu & Papps, 2013] omit women's education level and LFP status when analyzing preferences' transmission arguing that fertility preference might be the cause leading to the choice of not investing in education (or entering the labor market). The authors argue that if this is the case, their inclusion among the controls biases downward the estimate of the cultural transmission coefficient. I choose to estimate the model above with and without LFP status, since

[20] I generate husband dummies in 10 years interval, from 25 to 34, then 35 to 44 and so on.

results are generally identical, I only report models in which LFP status is included. In order to have a proxy for family's income, I create a dummy for high earnings occupation based on the occupation score assigned to the husband in the household. I compute the sex ratio at the MSA level following Angrist [2002]'s aggregation procedure among *source countries* as well as generating the sex ratio for each individual *source country*.[21]

The advantages of the time dimension in the fertility data are manifold as I can control for time-invariant unobservables both at the geographical and country of origin level. In fact, $\alpha_s$ in equation (1) is a *source country* fixed effect, i.e. it equals one for all second generations women whose parents came from country $s$. In order to control for Census specific FE I add $\tau_t$ in my specification.[22] As the period studied is one of sharp changes in women LFP within the U.S., I include a FE for each MSA labeled with $r_m$ in equation (1) to control for different labor market opportunities at the MSA level.[23]

I also run a more demanding specification where I augment equation (1) interacting the MSA FE $r_m$ with the Census Year FE $\tau_t$, in doing so, I control for unobservables characteristics that change over time at the geographical level. There are, in fact, several factors affecting fertility whose impact might be changing over time such as: infant mortality, female labor market opportunities in the different MSAs.[24] Note that, adding the interaction term $(r_m \times \tau_t)$ is equivalent to add the $MFR$ measured at the MSA-year level, that is, a regressor that absorbs the fertility within the MSAs in different Census years. Namely, the inclusion of this interaction term guarantees that the coefficient estimated on $MFR_{st}$ does not capture the transmission of fertility preferences from natives to second generation women. Instead, the estimated coefficient on $MFR_{st}$ measures exclusively the horizontal transmission of preferences from *source country* peers. Lastly, unobserved human capital transmission from parents as well as variation in women's education level represent a major threat to internal validity as I cannot control for them in the specification above. Since I only have education data from 1940 onward, I replicate the most important estimations excluding the 1910 Census, reassuringly results are unchanged when education dummies are added to the set of covariates in equation (1).

In Section 5.1 I first run the horse race to assess what is the prevailing channel of transmission of fertility preferences among second generation women. Following a short discussion of results, I try to explain what is the underlying mechanism and provide evidence about it in Section 5.3.

[21] Whenever a woman lived outside an MSA I computed this value in the smallest identifiable geographical area, that are respectively: counties for 1910 Census, state economic areas (SEA) for 1940 and 1950 Censuses and County Groups (CNTYGP97) for 1970, see IPUMS website for additional details on these variables.

[22] Note that, since my sample does not have as many observations for the 1940 and 1950 Censuses as for the 1910 and 1970 ones, I treat them as a unique Census when adding $\tau_t$. Results with the Census Year FE treating 1940 and 1950 Censuses separately are available upon request and do not change much with respect to those shown in the following Sections.

[23] Fogli & Veldkamp [2011] document the transition of female LFP participation in the U.S.

[24] That is, female labor market opportunities (or child mortality) in Chicago in 1910 are not the same as the ones in Chicago in 1970.

# 5 Results

## 5.1 The Horse Race Contest

In order to show how results and coefficients change when only one of the two $MFR$ is added, I initially run equation (NB2) including only one of the two epidemiological variables among the right hand side ones. Therefore, the first two columns of every table that follows report results when only the peers' fertility (i.e. $MFR_{st}$) is included among the regressors. In particular, the first column of every table reports the specification without interacting Census year FEs with MSA ones while in column 2 I interact the two FEs with each other.[25] By the same token, the ensuing two columns report results of the two specifications having only lagged fertility ($MFR_{s(t-30)}$) as epidemiological variable. In order to be consistent, columns (3) and (4) have, respectively, the same set of FEs as columns (1) and (2). Finally, the last two columns, i.e. (5) and (6) of each table, display results of the horse race estimation. Standard errors are clustered at the parents' *source country* level and reported in parentheses.[26]

Table 3: **Horse Race between Current and Lagged Fertility Norms**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 1.078*** | 1.086*** | | | 1.060* | 1.068** |
| | (0.027) | (0.027) | | | (0.032) | (0.029) |
| $MFR_{st-30}$ | | | 1.069*** | 1.073** | 1.051 | 1.052* |
| | | | (0.027) | (0.030) | (0.032) | (0.031) |
| Labor force status | 0.775*** | 0.773*** | 0.775*** | 0.773*** | 0.775*** | 0.773*** |
| | (0.006) | (0.006) | (0.007) | (0.007) | (0.007) | (0.007) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 79090 | 79090 |
| Log. Pseudolik. | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Year FE | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are marginal effects estimated from a Negative Binomial model, controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

[25] The bottom of each table has a list of which FE are included in the regression.

[26] Note that significance tests on the Incidence Rate Ratios are run against the null hypothesis that if the regressor has no effect on the number of children ever born then $\exp^{\hat{\beta}} = 1$.

The Negative Binomial coefficients reported in Table 3 are Incidence Rate Ratios, i.e. "exponentiated" coefficients ($\exp^{\hat{\beta}}$) that can be given a multiplicative interpretation. The Incidence Rate Ratios of the first four columns show that a one child increase in the *source country's* $MFR$ is associated with an expected increase of the number of children ever born by a factor of 8% (7% for lagged values $MFR_{st-30}$). When the two variables are horse raced, the lagged measure $MFR_{st-30}$ is marginally significant at the 10% level while the coefficient (and its incidence rate ratio) of the contemporaneous $MFR_{st}$ remains significant and its size decreases only marginally. Overall, Table 3 shows that both proxies for $MFR$ explain fertility choices of second generation women. The obvious question stemming from this result is whether the two variables are simply noisy proxy of each other or if the two measures of $MFR$ actually estimate the two distinct channels of preference transmission in [Bisin & Verdier, 2001]. Indeed, a Wald test for the equality of the coefficients cannot be rejected in Columns (5) and (6). However, in section 5.3 I show that the two variables are capturing different channels of preferences' transmission. In the next section I also address the possibility that results above are driven by measurement error in $MFR_{s,t-30}$.

In Section A.3 of the Appendix I include several robustness checks. The most important of these, addresses the concern that results in Table 6 are driven by unobserved human capital among women in the sample. Dropping the 1910 sample, I generate education dummies and replicate 6 in order to check if results are unchanged.[27] Results are shown in Table 11 (Section A.3 of the Appendix) and display that Incidence Rate Ratios on lagged and contemporaneous fertility are greater in magnitude than the ones in Table 6. Therefore, not including human capital among regressors causes a downward bias in the estimated coefficients. Besides, I show that results are qualitatively identical if, instead of using a negative binomial model, I run a pooled OLS keeping the right hand side variables unchanged with respect to the ones in equation (1).

### 5.2 Measurement Error in the Lagged Fertility Rates

A possible criticism to the results of the previous section is that measurement error in the lagged fertility rates (i.e. in $MFR_{s,t-30}$) is causing the variable to be marginally significant as some of its explanatory variable is captured by $MFR_{s,t}$. In order to address this concern, I use an alternative source of historical fertility to implement a control function and instrumental variable approach ([Wooldridge, 1997]).

[27] The dummies flag the following education achievement: High School degree, college attendance in the past, college degree or more.

Table 4: 2SLS and Control Function Estimates

| | Dependent Variable Children Ever Born | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **OLS** | **OLS** | **2SLS** | **2SLS** | **Neg. Bin.** | **Neg. Bin.** | **Poisson** | **Poisson** |
| $MFR_{st}$ | 0.216** | 0.220*** | 0.210** | 0.215*** | 1.096*** | 1.105*** | 1.098*** | 1.105*** |
| | (0.091) | (0.072) | (0.088) | (0.069) | (0.035) | (0.029) | (0.034) | (0.028) |
| $MFR_{st-30}$ | 0.123** | 0.128** | 0.142*** | 0.144*** | 1.036* | 1.038* | 1.043** | 1.044** |
| | (0.055) | (0.050) | (0.049) | (0.049) | (0.021) | (0.020) | (0.021) | (0.020) |
| Residuals | | | | | | | 0.946 | 0.951 |
| | | | | | | | (0.075) | (0.073) |
| # Countries | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| # Observations | 71317 | 71317 | 71317 | 71317 | 71317 | 71317 | 71317 | 71317 |
| Adj. R-Sq. | 0.169 | 0.172 | 0.169 | 0.172 | | | | |
| Log. Pseudolik. | | | | | -1.35e+05 | -1.35e+05 | -1.33e+05 | -1.33e+05 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA*Census Year FE | × | ✓ | × | ✓ | × | ✓ | × | ✓ |

The first two columns report estimated coefficient from OLS regression so that they can be compared with the 2SLS of columns (3) and (4). Coefficients shown in columns (5) to (8) are incidence rate ratios estimated using a a Negative Binomial model (5-6) and a Poisson regression (7-8), controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. The row labeled "Residuals" reports the coefficient on predicted residuals obtained from the first stage estimation using $GFR_{s,t-30}$ as an instrument for $MFR_{s,t-30}$. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

The International Historical Statistics is a compendium of international socio-economic data from 1750 to 2010 [Mitchell, 2003]. Among its data these volumes report data on Crude Birth Rates and population breakdown by age and gender for several countries in the world over time. In particular, twenty four out of the twenty seven countries for which [Coale & Watkins, 1986] report data are included in this dataset. Therefore, I compute the Generalized Fertility Rate, hereinafter *GFR*, for every country-year available. The *GFR* is the number of total live births for a thousand women in reproductive age (20-49). This source has both advantages and disadvantages. Among its advantages there is the feature that these data have been published continuously since 1970 and thus purged from possible mistakes in the [Coale & Watkins, 1986] data. As a matter of fact, the authors of [Mitchell, 2003] explicitly exclude some country-years available in the data from the Princeton Population project as they deem them unreliable.[28] The disadvantage of this source is that it does not report Marital Fertility Rates, therefore, is not directly comparable with the data used so far.

I assume a linear relationship between *GFR* and *MFR* so that the former can be used as an instrument for $MFR_{s,t-30}$ and implement a two stage least square estimation in order to show that both the estimated coefficients measuring current and past fertility rates are indeed significant and attenuation bias and autocorrelation are not driving $MFR_{s,t}$ to be significant and its lagged counterpart to be insignificant. Under the assumptions of linear measurement error if the instrument $GFR_{s,t-30}$ is uncorrelated with the error term in (1) the 2SLS estimates will identify the true coefficient. Results are in Table 4, the first two columns show the OLS coefficients with the sample reduced to reflect data availability in the instrument' source. These can be compared to the 2SLS results in columns (3) and (4). As usual the 2SLS coefficient is slightly larger than the OLS one but the significance is not affected when instrumenting for $MFR_{s,t-30}$.

In section 5.1 as well as in the remainder of the paper, I use a Negative Binomial model to estimate the transmission channel. Therefore, I provide evidence that results are unchanged when using the Generalized Fertility Rate as an instrument for $MFR_{s,t-30}$. As above I assume a linear relationship $MFR_{s,t-30} = GFR_{s,t-30} * \xi + v_{s,t-30}$ and that $GFR_{s,t-30}$ is uncorrelated with the error term in (1) and $v_{s,t-30}$. I therefore implement a control function approach ([Wooldridge, 1997], [Wooldridge, 2002]) estimating the reduced form first stage relationship between the two variables adding all the controls in (1) and inserting the predicted residuals among the right hand side variables of a Poisson regression that has the same explanatory variables used for the horse race of Table 3. The last two columns of Table 4 report IRR of a Poisson regression and can be compared to the Negative Binomial coefficient of columns (5) and (6) where I replicate the horse race of the previous table with the reduced sample for which the instrument is available.[29]

[28] This implies that I lose around ten percent of the sample when using the data.

[29] In order to estimate a Negative Binomial regression, I would need to assume that $y_i|v_{s,t-30}$, $MFR_{s,t-30}$ and $GFR_{s,t-30}$ has

### 5.3 Mechanism Underlying the Horse Race Result

The vertical transmission of preferences alone is unable to explain the result in Table 3. Indeed, while the significance of $MFR_{s(t-30)}$ is consistent with this channel, this mechanism does not explain the finding on $MFR_{st}$. As previously found in [Fernández & Fogli, 2009], the role of second generation peers might be important in amplifying the transmission effect of preferences in multiple ways. For instance, the role of social reward or punishments associated with different behavior might vary with the fraction of individuals of the same ancestry living in a woman's neighborhood or city. However, I argue that second generation cohorts alone are unlikely to know what are the prevailing contemporaneous fertility norms in their *source countries*. Because of the particular time frame studied, fertility norms in the *source countries* changed considerably, so that, second generation women (as well as their husbands) cannot "learn" from their parents what the contemporaneous fertility norms are in their *source countries*. In order to substantiate this claim, I construct a variable, called $AncestryRatio$, that is the ratio of second generation immigrants over the total population at the MSA level.[30] Table 5 displays that once this variable is interacted with $MFR_{st}$ (or $MFR_{s(t-30)}$), it is not significant in explaining fertility choices of the women in the sample. Moreover, comparing the coefficients of the epidemiological variables in Tables 5 and 3, it is straightforward to notice that results are not sensitive to the inclusion of these variables.

Since the variation in the presence of second generation immigrants across the U.S. does not explain the transmission effect arising from the data, the natural question to ask is how second generation women in the U.S. are exposed to contemporaneous fertility preferences from their source countries. In order to understand if the channels of transmission causing the two coefficients to be significant are actually distinct from each other, I investigate the role of foreign born immigrants as "catalysts" of the fertility norm measured with $MFR_{st}$. In other words, I analyze the role of social learning between foreign born immigrants and second generation women in the transmission of fertility preferences. Indeed, differently from second generation immigrants, foreign born ones are directly exposed to the most recent fertility norm of their country as they were born and partially raised abroad. Table 6 provides evidence of this as it displays results after estimating the Negative Binomial model of equation (1) on a sample of foreign-born married women. In this case, the horse race has a clear winner as lagged values of $MFR$ are never significant. This result shows that fertility preferences of foreign born immigrants in the U.S. reflect the ones of their overseas peers. Since the data used is based on

a Negative Binomial distribution with exponential mean, the Poisson regression does not requires this assumption. Results are unchanged with a Negative Binomial estimation or a GMM approach (results available on request).

[30] Whenever a woman in the sample was not living in a MSA, I computed this figure for the smallest geographical area which were, respectively, counties (in 1910 Census), state economic areas (in 1940 and 1950 Censuses) and county groups (in 1970 Census)

Table 5: **Horse Race and presence of Second generation immigrants**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 1.088*** | 1.088*** | | | 1.070* | 1.070** |
| | (0.032) | (0.030) | | | (0.038) | (0.035) |
| $MFR_{st-30}$ | | | 1.069** | 1.066** | 1.050 | 1.051* |
| | | | (0.035) | (0.032) | (0.034) | (0.032) |
| $AncestryR * MFR_{st}$ | 0.853 | 0.982 | | | 0.857 | 0.990 |
| | (0.149) | (0.173) | | | (0.144) | (0.172) |
| $AncestryR * MFR_{st-30}$ | | | 1.020 | 1.185 | | |
| | | | (0.244) | (0.211) | | |
| Ancestry Ratio | 2.537 | 1.797 | 1.508 | 0.921 | 2.481* | 1.744 |
| | (1.445) | (1.043) | (1.392) | (0.610) | (1.324) | (0.969) |
| Labor force status | 0.775*** | 0.773*** | 0.775*** | 0.773*** | 0.775*** | 0.773*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 79090 | 79090 |
| Log. Pseudolik. | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Census Year FE | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are incidence rate ratios estimated from a Negative Binomial model, controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

country-year averages, one might be concerned that migrants' self selection might cause the fertility data to be not representative of their realized fertility preferences. Therefore, the result in Table 6 bolsters the validity of the data used as it shows that foreign-born immigrants effectively carried a fertility norm similar to their overseas peers.

The role of social learning and behavioral change is not new in the analysis of fertility preferences. In a recent paper, [Spolaore & Wacziarg, 2014] argue that the fertility decline, occurred during the first demographic transition in Europe, was the result of the diffusion of new social norms and behavioral changes from the innovator (i.e. France) to the countries nearby and, gradually, to the rest of Europe. Given the time frame considered, alternative channels of transmission such as television, newspapers and the radio are unlikely to play a decisive role in shaping fertility preferences.[31,32] Moreover, Bisin & Verdier [2001] model provides the

[31] [LaFerrara, Chong & Duryea, 2012] show that soap operas shaped women's preferences for lower fertility rates in Brazil.

[32] In order to test whether women living closer to Europe are more likely to "be in touch" with their respective source countries, I analyzed whether the distance between the MSAs where the women in the sample lived and European capitals is correlated with

theoretical foundation of the proposed channel: the authors show that, parents' socialization effort (i.e. the effort to *directly* transmit their social trait) is reduced whenever they perceive their social trait to be widespread in the society. Of course, measuring this channel would require having more detailed data than Censuses' ones. As a matter of fact, I would need to observe women's (as well as their husbands') network of peers since their early life which is not possible with Census data.

Table 6: **Placebo Horse Race on Foreign Born Immigrants**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 1.146*** | 1.137*** | | | 1.138*** | 1.129*** |
| | (0.034) | (0.031) | | | (0.033) | (0.030) |
| $MFR_{st-30}$ | | | 1.094 | 1.090* | 1.064 | 1.062 |
| | | | (0.061) | (0.053) | (0.056) | (0.048) |
| Labor Force Status | 0.746*** | 0.745*** | 0.746*** | 0.745*** | 0.747*** | 0.746*** |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 35344 | 35344 | 35344 | 35344 | 35344 | 35344 |
| Log. Pseudolik. | -7.92e+04 | -7.81e+04 | -7.83e+04 | -7.82e+04 | -7.83e+04 | -7.81e+04 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Census Year FE | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are incidence rate ratios estimated from a Negative Binomial model, controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of foreign born married women from the 1910, 1940, 1950 and 1970 U.S. Census. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the country of birth level.

Since Table 6 shows that foreign born immigrants' fertility choices are unambiguously explained by the most recent fertility rates in their source countries, I investigate whether their presence within MSAs has indeed an effect on the transmission of the horizontal fertility norm from foreign born to second generation women. In order to measure foreign born influence over second generation women, I computed a ratio that weights their presence among the source country immigrant population of every MSA. Namely, for each source country and Census year in the data, the ratio computes how large the pool of foreign born immigrants is with respect to the one of second generation within the geographical area of residence. This variable, labeled $MigRate$, takes values between zero and one. The numerator of $MigRate$ counts, by source country and Census year, the number of childbearing age couples with at least one member being born overseas residing within the MSA. Similarly,

the transmission of preferences, finding no significant results (regressions available upon requests).

the denominator of the ratio counts how many foreign born and second generation couples live within the same MSA over which the numerator has been computed.[33] By construction, $MigRate$ does not take into account the relative size of the immigrant population with respect to natives. The reason for this choice is linked to the result in Table 5 where I show that the relative size of the second generation population over the native one does not help to explain the transmission channel. An obvious caveat to bear in mind here is that I cannot control for selective migration of the women in the sample inside or outside geographical areas with more or less peers from the same *source country*. Since $MigRate$ essentially counts, for each ancestry, how many foreign born couples there are as fraction of the ancestry group itself, the variable does not point at a specific mechanism. Indeed, foreign born immigrants can act as role of models for second generation women thus increasing the incentive to behave according to a specific social norm, or, their overwhelming presence might simply increase the likelihood of a second generation woman marrying a foreign born man. While I am unable to tear these potential channel apart, all of them are consistent with the "horizontal" transmission of preferences.

In Table 7 I augment equation (1) interacting the newly generated variable with the current and lagged values of $MFR$. The first column of Table 7 shows that $MFR_{st}$ is no longer significant once the interaction with $MigRate$ is added to the regression. Moreover, the interaction term's Incidence Rate Ratio is larger than the one for $MFR_{st}$ in Table 3. The interaction term is not significant in the more demanding specification of column 2 where I interact Census year FEs with MSA's ones. In Table 12 of the Appendix A.3, I perform several robustness checks where I show that the interaction of $MigRate$ with $MFR_{st-30}$ is not significant in explaining fertility preferences. This result is consistent with the idea that the transmission of parents' norms to their daughters is not amplified in MSAs where there are many foreign born couples of childbearing age. Note that the inclusion of this interaction term has no effect on the horse race results (shown in columns (5) and (6) of Table 12) nor any other specifications that include $MFR_{st}$. The significance of the lagged fertility's coefficient in the horse race specifications of columns (3) and (4) in Table 7 implies that there is some residual variation captured by this variable. Namely, fertility preferences of a fraction of the sample are captured by lagged fertility in their source countries.

A possible interpretation for results in the first four columns of Table 7 is that the marriage market matters in the transmission of social norms. Indeed, a simple way to test this would be dropping women that are married to foreign born husbands. Results of this exercise are in Columns (7) and (8) of Table 7, once the sample only includes women married to U.S. born husbands the vertical channel "wins" the horse race.[34]

[33]The main geographical areas are MSAs, whenever a woman was not living in a MSA, I computed this figure for the smallest geographical area which were, respectively, counties (in 1910 Census), state economic areas (in 1940 and 1950 Censuses) and county groups (in 1970 Census).

[34]Since only one household member was asked questions about nativity in the 1940 and 1950 Censuses, I have to drop observations

According to [Bisin & Verdier, 2001], parents' socialization efforts to instill a specific social norm increase the smaller their own ethnic group size in the population. Namely, in the data I should find that parents' socialization effort was higher in MSAs where second generation women were less likely to socialize with foreign born peers from the same source country (i.e. where values of $MigRate$ are low). Despite the fact that I cannot directly observe parents' socialization efforts or selective migration to specific MSAs by foreign born or second generation immigrants, I estimate the horse race model of Table 3 dropping from the sample women living in areas where values of $MigRate$ for their respective *source countries* is equal or above 0.5. Results are shown in columns (5) and (6) of Table 7 and show that, in MSAs with a small share of foreign born couples in childbearing age the vertical channel of transmission significantly explains fertility choices of second generation women. Note that a test for the equality of the estimated Incidence Rates Ratios on $MFR_{s,t}$ and $MFR_{s,t-30}$ in columns (5) and (6) rejects the hypothesis that the two are equal, bolstering the interpretation that the two variables measure different channels of preference transmission among the women in the sample.

from these Censuses in order to be sure not to keep husband that were born abroad.

Table 7: **Mechanisms of the Two Transmission Channels**

| | Dependent Variable Children Ever Born | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Fertility | | Horse Race | | Reduced Sample | | Marriage Market | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $MFR_{st}$ | 1.032 | 1.040 | 1.001 | 1.009 | 1.017 | 1.017 | 1.033 | 1.039 |
| | (0.029) | (0.042) | (0.033) | (0.033) | (0.018) | (0.016) | (0.023) | (0.025) |
| $MFR_{st-30}$ | | | 1.057* | 1.058** | 1.105*** | 1.104*** | 1.042** | 1.041* |
| | | | (0.032) | (0.030) | (0.015) | (0.014) | (0.022) | (0.022) |
| $MigRate * MFR_{st}$ | 1.083** | 1.082 | 1.107*** | 1.106** | | | | |
| | (0.035) | (0.059) | (0.037) | (0.054) | | | | |
| $MigRate * MFR_{st-30}$ | | | | | | | | |
| $MigRate$ | 0.893 | 0.881 | 0.846** | 0.834* | | | | |
| | (0.065) | (0.104) | (0.065) | (0.088) | | | | |
| Labor force status | 0.775*** | 0.773*** | 0.775*** | 0.773*** | 0.811*** | 0.811*** | 0.831*** | 0.828*** |
| | (0.006) | (0.006) | (0.007) | (0.006) | (0.009) | (0.008) | (0.006) | (0.006) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 36628 | 36628 | 48154 | 48154 |
| Log. Pseudolik. | -1.46e+05 | -1.45e+05 | -1.45e+05 | -1.45e+05 | -6.95e+04 | -6.93e+04 | -9.18e+04 | -9.16e+04 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA*Census Year FE | × | ✓ | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are incidence rate ratios estimated using a Negative Binomial model, controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. In columns (5) and (6) I drop from the sample women that have a foreign born husband. In columns (7) and (8) I drop women living in MSAs with a value of $MigRate$ below 0.5. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

# 6 Conclusions

The persistent effect of culture on economic outcomes has been widely documented in the economics literature. However, less attention has been devoted to how this effect can be measured and what is the mechanism underlying preferences' transmission. Previous studies have generally been silent on the channel of socialization through which second generation children picked up social traits that are displayed in their life choices.

In this paper, I analyzed observed fertility choices in a time frame in which the outcome of interest was experiencing sharp changes across countries of origin of immigrants to the U.S. The longitudinal variation in fertility norms in these countries allows me to run a horse race from which I find mixed evidence that both the "horizontal" channel as well as the "vertical" one matter in determining fertility choices of second generation women. Interestingly, I find evidence that vertical transmission acts as a substitute to the horizontal one, that is, women living in areas populated by immigrant couples from the same *source country* are more likely to adopt fertility choices similar to them. My findings are in line with the theoretical results of [Bisin & Verdier, 2001] who show that parents' socialization efforts decrease the larger their group size is in the population. These results come with some caveats: I am unable to account for women' self-selection into areas more (or less) populated by immigrants. Despite the 1910 Census lacks data on human capital accumulation, i.e. I cannot fully control for the impact of human capital on women's fertility decisions, I show robustness checks that mitigate these issues as results are virtually unchanged when I only use the Censuses for which education data is available. As measurement error in the variable measuring lagged fertility in migrants' source country might affect results, I show that they are robust using an instrumental variable approach.

More research is needed to shed light on the channel of transmission. For instance, it would be interesting to investigate the role that religion played on the horizontal vs. vertical transmission of fertility norms across the time frame considered. In addition, IPUMS linked samples might be analyzed in order to test whether self-selection into areas is an issue for the internal results of the paper.

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# A Online Appendix

## A.1 Coale & Watkins [1986] Data

In order to compute marital fertility rates over time I used Coale & Watkins [1986] data. Namely, the authors constructed, for every country, an index (called $I^f_{st}$) taking values between zero and one. The index expressed how close (or far) total fertility in country $s$ at time $t$ was with respect to an hypothetical plateau. The plateau is constituted by the Hutterites' fertility rate. The total fertility rate index $I^f_{st}$, computed over all women in reproductive age (i.e. 20 to 49), is composed by the following indices:

$$\overbrace{I^f_{st}}^{\text{Total Fertility Rate Index}} = \underbrace{I^m_{st} * I^g_{st}}_{\text{Marital Fertility Rate Index of Country } s \text{ in Year } t} + (1 - I^m_{st}) * I^h_{st} \quad \text{(A)}$$

Where $I^f_{st}$ is the ratio of the actual number of births over the hypothetical number that women would have were they to adopt the Hutterite fertility schedule. $I^g_{st}$ is the ratio of the actual number of births occurring to married women aged twenty to forty nine years old over the hypothetical number that would be observed if the distribution of married women would adopt the Hutterite fertility schedule. Finally, $I^m_{st}$ is a measure of the contribution of marital status to the overall rate of childbearing, this ratio is a weighted average of the proportion of married women in different age groups in the population. $I^f_{st}$ can be written as in equation (A.1) below:

$$I^f_{ct} = \frac{B_{st}}{H^m_{st} \int_{20}^{49} h(a)w(a)_{st} \mathrm{d}a} \quad \text{(A.1)}$$

Where $B_{st}$ is the total number of children born by every woman and $\int_{20}^{49} h(a)w(a)_{st}\mathrm{d}a$ is the plateau of maximum attainable fertility if every woman in age group $w(a)_{st}$ would follow the Hutterites' fertility schedule $h(a)$.

$$\text{where } I^g_{st} = \frac{B^m_{st}}{\int_{20}^{49} h(a)m(a)_{st}\mathrm{d}a} \qquad I^m_{st} = \frac{\int_{20}^{49} h(a)m(a)_{st}\mathrm{d}a}{\int_{20}^{49} h(a)w(a)_{st}\mathrm{d}a} \quad (1)$$

$$H^m_{st} = \int_{20}^{49} h(a)m(a)_{st}\mathrm{d}a$$

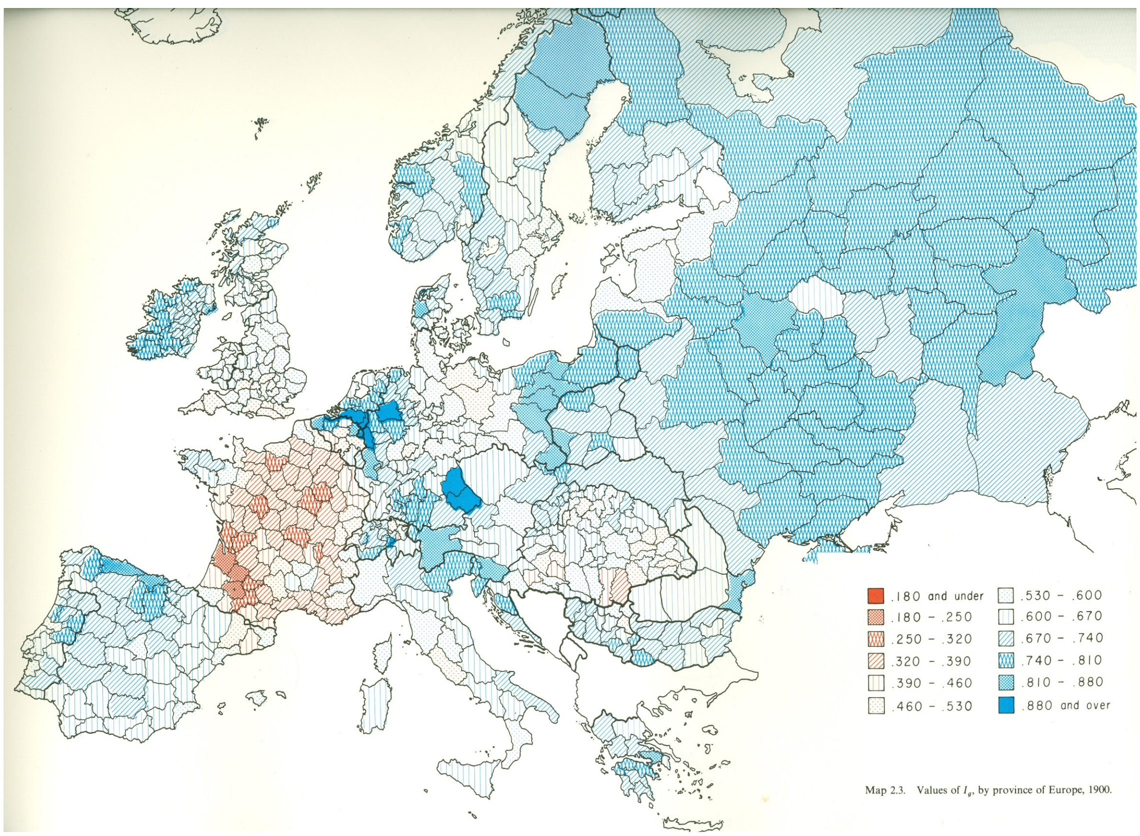
$$B^m_{st} = \text{\#of births occurred to married women}$$

$$m(a)_{st} = \text{\#married women at age } a \text{ in country } s \text{ at time } t$$

$$h(a) = \text{Hutterite's yearly fertility schedule}$$

In order to compute MFR for country $s$ in year $t$ the authors multiply the MFR's index ($I^m_{st} * I^g_{st}$) with the Hutterites' MFR (that is 10.94 children per woman). Since marriage market and age at marriage in European countries might differ from the one in the U.S., $I^g_{st}$ is a variable measuring the degree to which married women restricted fertility in European countries during the time of analysis. As a matter of fact, $I^g_{st}$ creates a "ranking" among the countries in the sample, from the ones exerting very little fertility restrictions after marriage, i.e. those with a high value of $I^g_{st}$, to the ones exerting high fertility restrictions during the marriage, that is those displaying low values of $I^g_{st}$. Figure 4 shows the variation in $I^g$ for many European countries in year 1900. Regions in red are those having lower values of $I^g$, conversely, regions with a blue scale are those that exert little fertility control after marriage.

Figure 4: **Values of $I^g_{st}$ when $t = 1900$ across European Regions**




*Source:* Coale & Watkins [1986]

### A.1.1 Robustness of the Fertility Data

In order to show the validity of the data used, I run the baseline OLS regression in Fernández & Fogli [2009] and compare how results vary when substituting the epidemiological variable used by the authors with the one taken from Coale & Watkins [1986].[35] Table **??** replicates the regression in Column 8 of Table 2 in Fernández & Fogli [2009] using the two data sources for the epidemiological variable. Namely, column two of **??** uses the same data as the published paper while column one uses the data adopted to write this paper. Since there are only fifteen countries for which I have data from both sources I cannot replicate the regression with the same number of observations used in the original paper.[36] Despite these shortcomings and the fact that the size of the coefficient changes when compared to the results in the original paper, results are very similar when I use Coale & Watkins [1986] as a source for the MFR from the source countries. This fact is reassuring and signals that the data, at least for the period in which I have a comparable alternative source, are reliable.

Table 8: **Baseline Regression in Fernández & Fogli [2009] using Different Data Sources**

| Source of the Epidemiological Variable | | (1)<br># of children | (2)<br># of children |
|---|---|---|---|
| Fernández & Fogli [2009] | $TFR_{1950}$ | | 0.388***<br>(0.108) |
| Coale & Watkins [1986] | $MFR_{1950}$ | 0.457***<br>(0.091) | |
| $\boldsymbol{\beta}$ | | | |
| | $TFR_{1950}$ | | 0.1075*** |
| | $MFR_{1950}$ | 0.1045*** | |
| | # Countries | 15 | 15 |
| | # Observations | 4910 | 4910 |
| | MSA FE | Yes | Yes |
| | Adj. R-Sq. | 0.043 | 0.042 |

* p<.1, ** p<.05, *** p<.01 S.E. in parentheses Clustered at the *source country* of the parents level.

## A.2 Data on Second Generation Migrants: Additional Details

Table 9 shows the availability of the indices for various countries over time.

[35] Fernández & Fogli [2009] use data from the United Nations reporting Total Fertility rates available here.

[36] Moreover, Fernández & Fogli [2009] dropped the countries that signed the Warsaw Pact of 1955 which are included in this study.

[37] The last observation for France, Ireland, Austria, Yugoslavia, Poland, Switzerland, Hungary, Denmark, Spain, Sweden, Norway and Netherlands is in 1960.

[38] The last observation for Germany is in 1962.

[39] The last observation for England Scotland and Wales is in 1961.

[40] The last observation for Italy is in 1961, the closest observation to 1940 comes from the 1936 Census.

[41] Information about Baltic States comes from Russia's disaggregated data.

[42] The last observation for Greece is in 1961

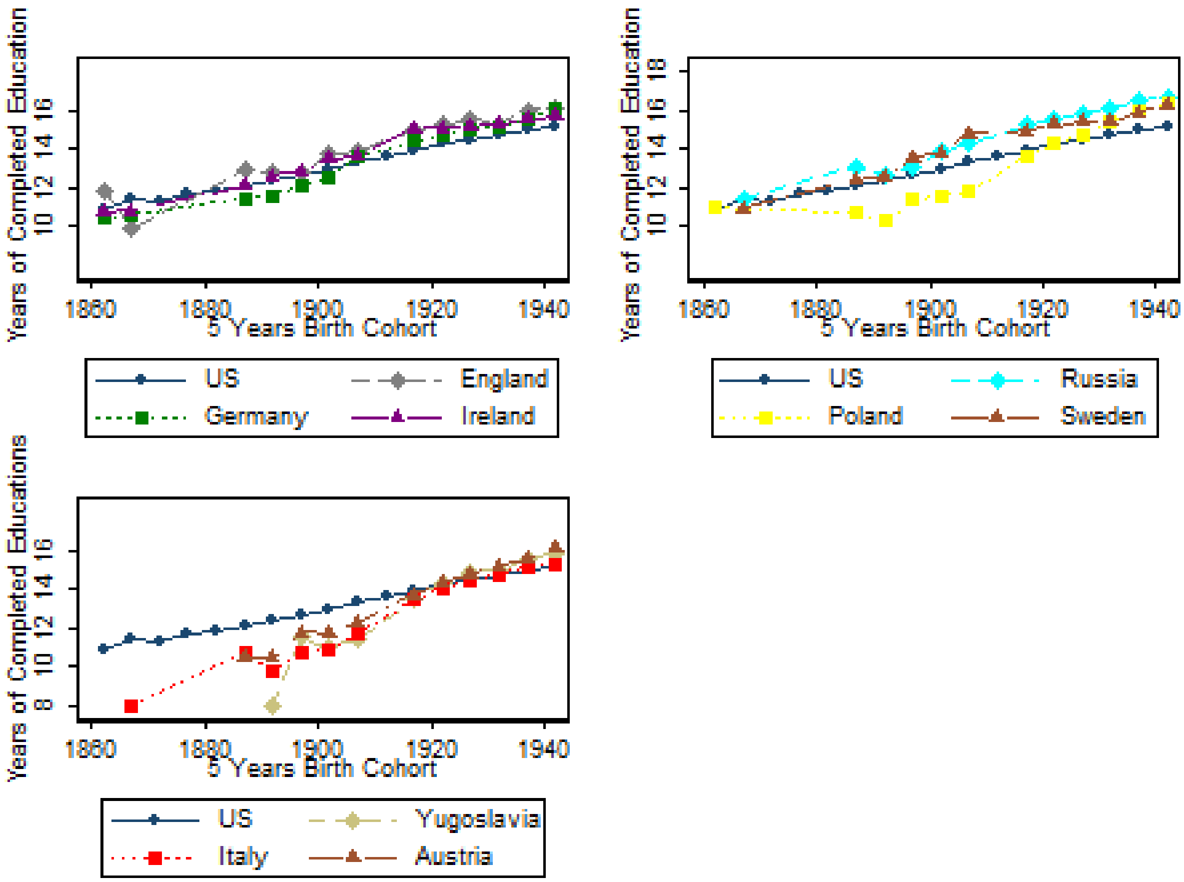
[43] Information about Czechoslovakia before the country was established comes from Austro-Hungarian Empire's Censuses.

[44] The last observation for Romania is in 1956

Table 9: **Data Availability by Year and Country from Coale & Watkins [1986]**

| **Country** | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1870 | 1880 | 1900 | 1910 | 1930 | 1940 | 1970 |
| France[37] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Germany[38] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ireland | ✓ | ✓ | ✓ | × | ✓ | × | ✓ |
| England[39] | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Scotland | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Wales | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Italy[40] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Russia | ✓ | × | ✓ | × | ✓ | ✓ | ✓ |
| Baltic States[41] | × | × | ✓ | × | ✓ | ✓ | ✓ |
| Norway | × | ✓ | ✓ | × | ✓ | × | ✓ |
| Sweden | × | ✓ | ✓ | × | ✓ | × | ✓ |
| Finland | ✓ | ✓ | × | ✓ | × | ✓ | ✓ |
| Denmark | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Austria | × | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Hungary | × | ✓ | ✓ | × | ✓ | × | ✓ |
| Spain | × | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Portugal | × | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Belgium | × | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Netherlands | × | ✓ | ✓ | ✓ | ✓ | × | ✓ |
| Greece[42] | × | × | ✓ | × | ✓ | × | ✓ |
| Yugoslavia | × | × | × | × | ✓ | × | ✓ |
| Czechoslovakia[43] | × | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Poland | × | × | ✓ | × | ✓ | × | ✓ |
| Switzerland | ✓ | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Romania[44] | × | × | ✓ | × | ✓ | × | ✓ |

Figure 5: **Average Education of Second Generation Married Women**




*Source:* Author's calculation using 1940, 1950 and 1970 Censuses.

Table 10: **Distribution of Second generation immigrant women across the four Censuses**

| | Census year | | | | |
|---|---|---|---|---|---|
| | 1910 | 1940 | 1950 | 1970 | Total |
| Denmark | 237 | 300 | 263 | 325 | 1,125 |
| Finland | 18 | 137 | 238 | 224 | 617 |
| Norway | 721 | 497 | 604 | 624 | 2,446 |
| Sweden | 533 | 811 | 859 | 801 | 3,004 |
| England | 2,690 | 1,050 | 1,095 | 1,370 | 6,205 |
| Scotland | 708 | 303 | 367 | 657 | 2,035 |
| Wales | 327 | 107 | 103 | 75 | 612 |
| Ireland | 5,199 | 1,262 | 1,338 | 1,539 | 9,338 |
| Belgium | 57 | 54 | 83 | 139 | 333 |
| France | 414 | 194 | 202 | 273 | 1,083 |
| Netherlands | 231 | 189 | 267 | 408 | 1,095 |
| Switzerland | 309 | 159 | 160 | 179 | 807 |
| Greece | 0 | 26 | 103 | 538 | 667 |
| Italy | 215 | 1,388 | 3,347 | 6,364 | 11,314 |
| Portugal | 57 | 94 | 160 | 345 | 656 |
| Spain | 30 | 23 | 64 | 185 | 302 |
| Austria | 439 | 448 | 1,007 | 1,048 | 2,942 |
| Czechoslovakia | 21 | 379 | 608 | 978 | 1,986 |
| Germany | 10,381 | 3,375 | 2,654 | 2,219 | 18,629 |
| Hungary | 44 | 220 | 486 | 677 | 1,427 |
| Poland | 0 | 1,111 | 2,312 | 2,816 | 6,239 |
| Romania | 0 | 57 | 134 | 187 | 378 |
| Yugoslavia | 0 | 85 | 222 | 584 | 891 |
| Estonia | 0 | 1 | 2 | 11 | 14 |
| Latvia | 0 | 6 | 26 | 27 | 59 |
| Lithuania | 0 | 143 | 289 | 343 | 775 |
| Russia | 130 | 683 | 1,720 | 1,578 | 4,111 |
| Total | 22,761 | 13,102 | 18,713 | 24,514 | 79,090 |

### A.3 Robustness Checks

Table below shows results estimating a Negative Binomial model with the same covariates of (1) and three education dummies. Although the sample is different, these are the same regressions shown in columns (1), (3) and (5) of Table 3.

Table 11: **Horse Race Results with Education Data 1940-1970**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 1.102*** | 1.106*** | | | 1.088** | 1.091*** |
| | (0.041) | (0.040) | | | (0.039) | (0.037) |
| $MFR_{st-30}$ | | | 1.066** | 1.068** | 1.055 | 1.056* |
| | | | (0.032) | (0.031) | (0.034) | (0.032) |
| LFP | 0.782*** | 0.781*** | 0.782*** | 0.781*** | 0.781*** | 0.781*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) |
| High School Degree | 0.888*** | 0.890*** | 0.890*** | 0.891*** | 0.888*** | 0.890*** |
| | (0.016) | (0.016) | (0.017) | (0.017) | (0.017) | (0.017) |
| Some College | 0.962*** | 0.960*** | 0.962*** | 0.959*** | 0.962*** | 0.960*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| College Degree | 0.881*** | 0.879*** | 0.881*** | 0.879*** | 0.883*** | 0.880*** |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 56329 | 56329 | 56329 | 56329 | 56329 | 56329 |
| Log. Pseudolik. | -98746.357 | -98589.977 | -98751.955 | -98596.893 | -98727.149 | -98570.574 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Year FE | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are incidence rate ratios estimated using a Negative Binomial model. Regression controls include woman's age, age squared, ten years dummies for husband's age group, women's education dummies, sex ratio among migrants from the same source country within the MSA in which they live computed at the time of the Census and source country's GDP per capita. The sample is made of second generation married women from the 1940, 1950 and 1970 U.S. Census. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

In order to test robustness of results shown in sections 5.1 and 5.3 I take two different approaches. I first estimate a Pooled OLS model rather than the Negative Binomial of equation (1). In addition, I also used $I^g_{st}$ as epidemiological variable instead of $MFR$.Tables 13 and 14 replicate respectively Tables 3 and 7 of the paper using a Pooled OLS model instead. The only results the differ significantly when using this method instead of Negative Binomial are the ones in the first four columns of Table 14. As it is evident, all the remaining results are unchanged.

Table 12: **Robustness Checks on Results of Table 7**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 1.031 | 1.038 | | | 0.990 | 0.999 |
| | (0.028) | (0.037) | | | (0.033) | (0.031) |
| $MFR_{st-30}$ | | | 1.060 | 1.057 | 1.084** | 1.079*** |
| | | | (0.039) | (0.042) | (0.037) | (0.031) |
| $MigRate * MFR_{st}$ | 1.067** | 1.061 | | | 1.142*** | 1.133*** |
| | (0.028) | (0.053) | | | (0.027) | (0.044) |
| $MigRate * MFR_{st-30}$ | 1.032 | 1.041 | 1.015 | 1.027 | 0.956 | 0.965 |
| | (0.043) | (0.044) | (0.042) | (0.044) | (0.038) | (0.037) |
| MigRate | 0.838 | 0.813 | 1.051 | 0.999 | 0.905 | 0.878 |
| | (0.114) | (0.126) | (0.126) | (0.123) | (0.112) | (0.131) |
| Labor force status | 0.775*** | 0.773*** | 0.775*** | 0.773*** | 0.775*** | 0.773*** |
| | (0.007) | (0.006) | (0.007) | (0.007) | (0.007) | (0.006) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 79090 | 79090 |
| Log. Pseudolik. | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 | -1.46e+05 | -1.45e+05 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Year FE | × | ✓ | × | ✓ | × | ✓ |

The coefficients shown are incidence rate ratios estimated using a Negative Binomial model. Regression controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. In columns (5) and (6) I drop from the sample women that have a foreign born husband. In columns (7) and (8) I drop women living in MSAs with a value of *MigRate* below 0.5. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

Table 13: **Horse Race using Pooled OLS**

| | Dependent Variable Children Ever Born | | | | | |
|---|---|---|---|---|---|---|
| | Current Fertility | | Lagged Fertility | | Horse Race | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $MFR_{st}$ | 0.194*** | 0.158*** | | | 0.181*** | 0.119** |
| | (0.048) | (0.040) | | | (0.049) | (0.046) |
| $MFR_{st-30}$ | | | 0.091* | 0.143** | 0.065 | 0.111* |
| | | | (0.047) | (0.053) | (0.052) | (0.055) |
| | (0.134) | (0.152) | (0.174) | (0.179) | (0.141) | (0.158) |
| LFP | -0.485*** | -0.494*** | -0.482*** | -0.495*** | -0.484*** | -0.494*** |
| | (0.024) | (0.023) | (0.024) | (0.024) | (0.024) | (0.023) |
| $\boldsymbol{\beta}$ | | | | | | |
| $MFR_{st}$ | 0.53*** | 0.43*** | | | 0.18*** | 0.12** |
| $MFR_{st-30}$ | | | 0.43* | 0.14** | 0.06 | 0.11* |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 79090 | 79090 |
| Adj. R-Sq. | 0.197 | 0.200 | 0.196 | 0.200 | 0.197 | 0.200 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × |
| MSA*Year FE | × | ✓ | × | ✓ | × | ✓ |

Regression controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live computed at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.

Table 14: **Mechanisms of the Two Transmission Channels: Pooled OLS**

| | Dependent Variable Children Ever Born | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Fertility | | Horse Race | | Marriage Market | | Reduced Sample | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $MFR_{st}$ | 0.123 | 0.111 | 0.066 | 0.052 | 0.080 | 0.090* | 0.055 | 0.057** |
| | (0.080) | (0.110) | (0.077) | (0.075) | (0.049) | (0.050) | (0.035) | (0.027) |
| $MFR_{st-30}$ | | | 0.159** | 0.163** | 0.132*** | 0.130*** | 0.270*** | 0.268*** |
| | | | (0.073) | (0.068) | (0.047) | (0.046) | (0.042) | (0.040) |
| $MarMigRa * MFR_{st}$ | 0.078 | 0.109 | 0.085 | 0.116 | | | | |
| | (0.069) | (0.136) | (0.057) | (0.108) | | | | |
| $MigRate$ | 0.039 | -0.074 | -0.118 | -0.234 | | | | |
| | (0.154) | (0.289) | (0.140) | (0.226) | | | | |
| Labor force status | -0.496*** | -0.503*** | -0.495*** | -0.502*** | -0.444*** | -0.454*** | -0.488*** | -0.489*** |
| | (0.025) | (0.025) | (0.023) | (0.023) | (0.022) | (0.022) | (0.027) | (0.026) |
| # Countries | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 |
| # Observations | 79090 | 79090 | 79090 | 79090 | 36628 | 36628 | 48154 | 48154 |
| Adj. R-Sq. | 0.174 | 0.177 | 0.177 | 0.180 | 0.145 | 0.148 | 0.145 | 0.148 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Census Year FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA FE | ✓ | × | ✓ | × | ✓ | × | ✓ | × |
| MSA*Census Year FE | × | ✓ | × | ✓ | × | ✓ | × | ✓ |

Regression controls include woman's age, age squared, ten years dummies for husband's age group, sex ratio among migrants from the same source country within the MSA in which they live at the time of the Census. The sample is made of second generation married women from the 1910, 1940, 1950 and 1970 U.S. Census. In columns (5) and (6) I drop from the sample women that have a foreign born husband. In columns (7) and (8) I drop women living in MSAs with a value of *MigRate* below 0.5. * p<.1, ** p<.05, *** p<.01 S.E. in parentheses clustered at the *source country* of the parents level.