Cultural Remittances and Modern Fertility*

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Abstract

We argue that migrants played a significant role in the diffusion of the demographic transition from France to the rest of Europe in the late 19th century. Employing novel data on French immigration from other European regions from 1850 to 1930, we find that higher immigration to France translated into lower fertility in the region of origin after a few decades - both in cross-region regressions for various periods, and in a panel setting with region fixed-effects. These results are robust to the inclusion of a variety of controls, and across multiple specifications. We also find that immigrants who themselves became French citizens achieved lower fertility, particularly those who moved to French regions with the lowest fertility levels. We interpret these findings in terms of cultural remittances, consistently with insights from a theoretical framework where migrants act as vectors of cultural diffusion, spreading new information, social norms and preferences pertaining to modern fertility to their regions of origin.

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1 Introduction

France started its fertility transition in the second half of the 18th century, about a century before other European countries.[1] The empirical evidence points to a gradual diffusion of modern fertility across European societies, from its origin in France. For instance, Spolaore and Wacziarg (2022) provided evidence that low fertility disseminated from France to other European regions along cultural and linguistic lines, and Beach and Hanlon (2023) argued that the gradual diffusion of modern fertility came from the spread of new information and social norms. However, the precise mechanisms whereby this process of cultural diffusion took place are not well understood.

In this paper, we ask how French fertility norms and behaviors crossed European borders. We begin by noting that, during the 19th and early 20th century, the French were exceptional not just for fertility but also for being a land of immigration. At a time when the rest of Europe entered in the "Age of Mass Migration" (Hatton and Williamson, 1998), the French rarely left France even in hard economic times. France did not have major settler colonies except for Algeria, and very few French nationals emigrated to the New World or to other European countries.[2] Therefore, French *emigrants* could not have been major disseminators of French cultural norms to the rest of the Europe. In contrast, starting in the middle of the 19th century, France became a major destination for *immigrants* from other European countries, being second only to the United States in terms of the volume of immigration. In this paper, we argue that immigrants to France, by sending back modern fertility norms to their regions of origin, acted as important vectors of diffusion of the fertility transition. In other words, immigrants influenced fertility in their regions of origin by sending them cultural remittances: transfers of novel cultural traits, values, attitudes, and behaviors. In documenting this process, we shed new light on the mechanisms that drove the diffusion of modern fertility across Europe, and provide empirical evidence that cultural remittances were operative in the unique historical context of the European fertility transition - a central milestone in the process of socioeconomic modernization.

This paper makes several contributions. First, we construct a new dataset of migrants and naturalizations in France during the second half of the 19th century and the first three decades of the 20th century, allowing us to estimate how migrants that located in different regions of France affected fertility in their regions of origin. Our sources for the number of foreign residents in France by country of origin are various releases of the French national census (*Annuaire Statistique de la*

[1] According to data collected in the landmark Princeton European Fertility Project, the French had already transitioned to lower fertility levels by the first two decades of the 19th century (Coale and Watkins, 1986). Blanc (2022), using new crowd-sourced genealogical data, places the onset of French fertility decline in the 1760s. The fertility decline in Britain began over a century later, around 1890 - even though Britain, unlike France, had been at the frontier of the Industrial Revolution since the second half of the 18th century. Some of the hypotheses that have been advanced to explain the early onset of the fertility transition in France include secularization (Blanc, 2022), the role (and social acceptance) of contraception (e.g., Drewett, 2021), and equal inheritance rules instituted by the French Revolution (Gay et al., 2023).

[2] For every French person leaving France between 1870 and 1914, about one hundred Italians left Italy over the same period (Hatton and Williamson, 1998).

France), which are available from 1851 onward and include data on migrants to France from over thirty European nations. We supplemented this census information with data on naturalizations from the French National Archives. These data are compiled from decrees that list individual naturalizations from 1883 to 1930 and provide detailed information for each naturalized person. As part of the construction of this novel dataset, we have mapped the towns of birth from naturalization records to the regional nomenclature of the Princeton European Fertility Project data (Coale and Watkins, 1986) to obtain the number of naturalization records by region of origin. Assuming that the origin-region distribution of naturalized immigrants in a given period is a good proxy for the origin-region distribution of all immigrants from a given country twenty years before, we construct a measure of the stock of migrants from each sub-national region of origin. By combining the data on the share of each sub-national region of origin of migrants from naturalization records with aggregate census data on the number of immigrants from each origin country, we obtain the key treatment variable used in the empirical analysis: exposure to France in each region of origin, through immigrants living there.

Second, to guide our empirical analysis, we provide a model of fertility choice and social influence capturing the relations between immigration, cultural change, and fertility decisions. In our model, immigrants who move from regions with more traditional fertility norms to regions with more modern fertility norms not only reduce their own fertility due to social influence from the region of destination, but also affect fertility rates in their region of origin through cultural remittances. Our model delivers several testable implications. First, fertility in the origin region at a given time should be decreasing in the number of immigrants to the destination region in France in the previous period. Second, as more and more regions transition to modern fertility norms, this effect should decrease over time. Third, in each period, the fertility of immigrants from a given country to a region of France with lower fertility will be lower than the fertility of immigrants from that same origin country to a region of France with higher fertility. All these effects should hold controlling for the intrinsic determinants of fertility (income, education, infant mortality, and so on).

Third, we test the empirical implications of our model using data pertaining to the regions of Europe. Our tests feature both cross-regional regressions, with country fixed-effects and numerous regional controls, and panel-data regressions, where we control for region fixed effects. The main dependent variable in these regressions is the index of marital fertility developed by the Princeton European Fertility Project (Coale and Watkins, 1986). This variable measures the actual number of children born to married women at a point in time, divided by the maximum number of children that could have been born given the observed age structure of that population. We also carry out an individual-level analysis of the fertility of immigrants who became French citizens, to examine if they were influenced by the fertility norms of their region of destination in France.

The cross-regional evidence for various periods of the late 19$^{\text{th}}$ and early 20$^{\text{th}}$ century is consistent with our model of diffusion through migrants' cultural remittances. That is, we find that the effect of exposure to French fertility norms through migrants is negative: exposure reduces fertility in the regions of origin of the migrants. We also find that the effect diminishes in absolute value over time, as more and more regions transition to lower fertility, consistent with a gradual process of diffusion. Indeed, the coefficient's standardized beta is almost −20% for the 1871-1890 period while it goes down (in absolute terms) to around −5% for the 1901-1920 period. As we include country fixed effects, our findings are a stringent test of our hypothesis, because the main effect is identified only from within-country, cross-regional variation.

Panel-data regressions also support our theoretical hypotheses. Using an unbalanced panel of 445 regions, we find that higher exposure to France is indeed associated with lower subsequent fertility. This is an even more demanding test of our main hypothesis, as the estimates reflect within-region, cross-time variation: regions that send large waves of immigrants to France subsequently experience reductions in fertility. The effect is substantial, with the standardized beta on exposure equal to −16.5%. We also find that, consistent with our theoretical framework, early exposure delivers a quantitatively stronger effect on fertility compared to later exposure.

In our empirical analysis, we are also able to exploit the fact that French regions of destination differed quite widely in their fertility rates. While France overall experienced its fertility transition early, large regional variation in fertility persisted into the late 19^{th} century. For instance, in 1881 marital fertility averaged 0.48 across the 87 French *départements*, ranging from 0.27 in Lot et Garonne to 0.82 in Finistère (Coale and Watkins, 1986). We test whether migrants who located in French regions with higher fertility would have a lower impact on their origin region fertility by adding, as a regressor, the average fertility of destination regions in France of migrants from each origin region, weighted by the distribution of these migrants across French regions. Consistent with our theoretical framework, the coefficient on this variable is positive and statistically significant, while exposure to France continues to bear a negative coefficient. Thus, holding constant exposure to France, European regions who sent migrants to French regions with lower fertility experienced a sharper decline in their own fertility.

By interacting exposure to France with measures of geographic and linguistic distance, we find that such factors mitigate the effect of exposure on fertility in the regions of origin of the migrants. For example, the effect is −64.2% for French-speaking regions and only −9.7% for the regions that are linguistically most distant from French. These findings show that it was much easier to transfer new fertility norms and behavior back to the sending regions when the migrants originated from areas that are geographically and linguistically closer to France, consistent with the findings in Spolaore and Wacziarg (2022).

When we analyze the individual fertility of naturalized migrants in France, we find that, overall, they do tend to adopt the French norms of their regions of destination. However, their fertility is also associated with that of their region of origin, showing that the norms of their regions of origin do not vanish completely but exhibit some persistence.[3] In other words, naturalized migrants in France are influenced by the fertility rate of the French region in which they live, even though they

[3]This is consistent with studies of migrants' fertility in other contexts (e.g., Fernández and Fogli, 2006, and Di Miceli, 2019).

do not fully adjust their fertility behavior to the French norm. Interestingly, the estimated effect of fertility in the French region of destination is mainly driven by older naturalization applicants (at the time of the naturalization decree, i.e. about 20 years after immigration), who are more likely to have completed their fertility and for whom fertility data are more reliable.

In sum, we find that immigration to France led to lower fertility in the migrants' region of origin after a few decades, consistent with the timing required to change migrants' own preferences and behaviors and to export them to their communities back home as cultural remittances. The results hold both in cross-regional regressions with country fixed-effects and numerous regional controls, as well as in a panel of European regions where we control for region fixed effects. We also find that migrants who became French citizens achieved lower fertility levels, and these effects were larger for those who went to the regions of France with the lowest fertility levels.

Related Literature. To our knowledge, this paper is the first study to theoretically motivate and empirically show that migrants to France affected the fertility of their regions of origin during the European demographic transition in the 19^{th} and early 20^{th} century. Thus, we build a bridge between the vast literature on the determinants of the demographic transition (e.g., Galor, 2012; Murtin, 2013) and a much less explored area of research: the analysis of the effects of cultural remittances – that is, the study of how people that move to societies with different norms and values may affect culture and behavior in their own regions of origin.

While there exists an extensive literature in sociology and anthropology documenting the role of "social remittances" in determining social and culture change in the migrants' home societies (for instance, Levitt and Lamba-Nieves, 2011; Isaakyan and Triandafyllidou, 2017), the effects of migrants on the diffusion of modern norms and behaviors across societies are relatively under-explored by economists (for a recent overview, see Tuccio and Wahba, 2020). Most economic analyses of the relation between immigration and culture focus on the extent to which immigrants' cultural traits and attitudes from their societies of origin persist when they move to new countries (Giuliano, 2007; Fernández and Fogli, 2006; Fernández, 2011; Alesina et al., 2011; Giavazzi et al., 2019; Di Miceli, 2019; Bau and Fernández, 2023). And yet, migrants can also be agents of cultural change in their own regions of origin, as they transfer new ideas, values, and beliefs horizontally across national borders. In this paper, we denote such transfers as *cultural remittances*, following the terminology in Rapoport et al. (2020). The concept is analogous to that of social remittances, which originated in sociological studies of immigration, echoing the more familiar concept of remittances (monetary and in-kind transfers). Specifically, Levitt (1998) introduced the term "social remittances" to illustrate how migrants from the Dominican Republic to Boston, in addition to money, "exported" norms, practices, identities, and behaviors back to their sending communities through family and social networks.

In recent years, social remittances have been studied, for instance, with respect to their effects on political preferences, electoral outcomes, and institutional norms in the migrants' home countries (Spilimbergo, 2009; Batista and Vicente, 2011; Chauvet and Mercier, 2014; Barsbai et al., 2017; Manacorda et al., 2024).[4] Our paper broadly contributes to this line of research on social remittances and cultural transformation, while being much closer to a small but growing literature that focuses more explicitly on the effects of migration on fertility and gender norms (Fargues, 2007; Beine et al., 2013; Bertoli and Marchetta, 2015; Daudin et al., 2019; Diabate and Mesplé-Somps, 2019).

Most notably from the perspective of this study, the demographer Philippe Fargues, looking at data on fertility and migration in 1960-2000, conjectured that observed differences in fertility between high-emigration communities in Egypt, on the one hand, and in Morocco and Turkey, on the other hand, might partly stem from the fact that Egyptians mostly migrated to higher-fertility societies such as the Gulf states, while Moroccans and Turks tended to move to lower-fertility destinations in Western Europe (Fargues, 2007). However, these hypotheses were not subjected to rigorous empirical testing. In one of the very first systematic econometric analyses of the relationship between international migration and origin-country fertility at the macroeconomic level, Beine et al. (2013), using a database of international bilateral migration for the year 2000, argued for a significant transfer of fertility norms from the host countries to the home countries. This study focused on contemporary fertility patterns, and did not investigate the historical dynamics of the diffusion of the demographic transition over the long run, or the special historical role that France played in that process.

As already mentioned, the "frontier" role of France in the demographic transition has been noted and discussed extensively in the literature (for example, see Coale and Watkins, 1986; Spolaore and Wacziarg, 2022; Blanc, 2022), but very little research has been done on the connection between migration and the diffusion of modern fertility from the French regions at the forefront of the process of fertility decline. A notable exception is Daudin et al. (2019), who connected the convergence towards low fertility rates across French *départements* in the second half of the 19$^{\text{th}}$ century to the spread of cultural and economic information through internal migration – especially by migrants to and from Paris. In their analysis, Daudin et al. (2019) focused on the diffusion of modern fertility within France and on internal migrants' key role in that process. In contrast, our paper is about the diffusion of modern fertility norms outside of France and the crucial role played by people who moved to France from other countries.

In a nutshell, the central contribution of our paper is to show that migrants to France were important vectors of diffusion of a specific cultural trait that was central to the broader process of socioeconomic modernization: the spread of preferences and norms favoring lower fertility. The specific historical context of our study also provides a unique setting to empirically document

[4] A sizeable literature also investigates technological remittances that migrants may send back to their home countries. For instance, Saxenian (2002 and 2005) studied how Asian-born computer engineers in Silicon Valley influenced the development of the information industry in their countries of origin. Coluccia and Dossi (2023), in related work, examine the effect of migrants from the UK to the US between 1870 and 1940 on innovation in the UK. See also Bahar and Rapoport (2018) for a more contemporary application, showing technological spillovers in origin countries from migrants to technologically advanced destinations, as well as from other developing countries.

the phenomenon of cultural remittances, improving our understanding of the mechanisms underlying the diffusion of cultural traits and technologies across societies. In this respect, our paper contributes to the growing literature on the relations among migration, cultural change, and the spread of innovations in a global context (Bahar et al., 2024; Andersson et al., 2022).

2 Historical Background

2.1 The History of French Immigration

Early and massive immigration sets France apart from the rest of Europe. Noiriel (2010b, p.34) states: "One of the singular features of France as compared to other European countries is the earliness of its immigration. France became a country of net in-migration in the 19^{th} century, at a time when other European countries were still lands of emigration" (our translation). Immigration accounted for 39% of net population growth in France over the 1851-1891 period (Simon, 1998, p. 544). By comparison, in the decades between 1850 and 1890, the share of the US population growth attributable to net immigration varied between 26% and 32% (Carter et al., 2006).[5] An important reason for early mass migration to France was the chronic shortage of labor in France since the 19^{th} century, itself caused by France's early fertility transition and its resulting low fertility rate. Late industrialization also implied slow rural-urban migration (Noiriel, 1986, pp. 754-758).

2.1.1 Waves of Immigration

France experienced two great waves of immigration before the Second World War: the first one after 1850 and the second after 1920. French authorities started to count foreigners in France starting with the 1851 national census; thus, there is no accurate information on the foreign-born population before this date. However, various sources mention the presence of foreigners in France since the first half of the 19^{th} century.[6] France also gave asylum to refugees fleeing conflicts in Europe, such as the Poles after the 1830 revolt against Russia or the Spanish during the Civil Wars of the 1830s (De Saint Pol and Monso, 2006, p. 36).[7]

Figure B1 in the appendix depicts the evolution of the stock of foreigners residing in France and the stock of naturalized foreigners who acquired French citizenship. Both should be considered jointly because, once naturalized, an individual ceases to be counted as a foreign resident. The two waves of immigration are clearly identifiable, with a first surge between 1851 and 1891 and a second one starting in 1911 and accelerating in the 1920s.

[5] Data can be found in Table 2-2 at: https://nap.nationalacademies.org/read/23550/chapter/5.

[6] For example, there were an estimated 30,000 Germans in 1820 (and 50,200 in 1851), representing the first major wave of immigration into France. Source: https://www.histoire-immigration.fr/caracteristiques-migratoires-selon-les-pays-d-origine/les-pionniers-allemands-1820

[7] Testifying to the early presence of foreigners in France, an 1832 law forced Polish, Italian and Spanish refugees to reside in certain towns selected by the government (Diaz, 2012).

The First Wave. From 1851 to 1891, the number of foreigners residing in France increased from 380,000 (out of 35.7 million inhabitants) to 1.13 million (out of 39.9 million inhabitants), according to Census data. However this increase does not totally reflect the extent of French immigration: during the same period, the number of naturalizations rose from 13,500 to 170,700. If return migration (for which scant data are available) were taken into account, one can reasonably assume that at least one million foreigners migrated to France during this period (Sauvy, 1989, p. 314). Even this figure is likely an underestimate. Turquan (1894, p. 418) writes: "After the events of 1870-1871, (...) the territories ceded to Germany contained 46,000 Germans and 20,000 other foreigners, particularly from Switzerland, Belgium and Luxembourg". Despite this, censuses conducted just before and just after the Franco-Prussian War show that the number of foreigners in France still rose by 105,000 between 1866 and 1872.

After the First Wave. Over 1891-1901, the foreign population decreased from 1.13 million to 1.03 million (a 9% fall), due to two main causes: Meuriot (1912, p. 559) mentions an increase in naturalizations, as well as a reduction in immigration. The rise in naturalizations resulted from an 1889 law that simplified access to French citizenship, especially for foreigners born in France. Hence, foreigners counted in the census are mainly the foreign-born: according to Turquan (1894, p. 430), in 1891 two-thirds of the foreigners residing in France were born abroad.

Second Wave. According to Noiriel (2010b, p. 32), during the second wave of immigration in the 1920s, "France experienced the highest rate of immigration in the world, ahead of the United States". The number of foreigners almost doubled compared to the pre-WWI period (Guillen, 1991, p. 38). Figure B1 shows that the number of foreign residents rose from 1.5 million in 1921 to almost 2.7 million in 1931, and then declined after 1931. This reduction was partly due to return migration, and partly to naturalizations: the latter increased from 250,000 in 1921 to 361,000 in 1931 and 1.3 million in 1954 (Dupâquier and Vejarano, 1986, p. 33).

2.2 Characteristics of Immigration

Countries of origin. French immigration evolved over time in several ways. In the second half of the 19$^{\text{th}}$ century, migrants came from neighboring countries but, in the early 20$^{\text{th}}$ century, they increasingly came from farther origins within Europe. Figure B2 in the Appendix shows the number of foreigners residing in France by country of origin for the five main countries, at selected dates between 1851 and 1946. Most of the 380,000 foreigners in 1851 came from neighboring countries, namely Belgium, Italy, Germany, Spain and Switzerland. Historically, Belgians represented by far the most numerous group until the 1901 census, with a peak of more than 480,000 residents in France in 1886 (i.e. 82.4 out of 1,000 Belgians).

Later, the importance of northwestern European countries such as Belgium, Germany, Switzerland, Luxembourg and the Netherlands progressively decreased. They gave way in the first half of the 20$^{\text{th}}$ century to migrants from Eastern and Southern Europe, particularly Italy, Spain and

Poland as well as (later) Portugal. These countries sent migrants to France on a large-scale, with a peak in the second wave of immigration. For instance, Italians have always had an important presence in France, becoming in 1911 the largest group of foreigners, and reaching a peak of 800,000 residents just before WWII. The second wave of immigration, in the 1920s, was also marked by a diversification of countries of origin including non-border countries such as Poland, Russia, Hungary, Yugoslavia or Greece. Poles, in particular, represented the second most important group in the 1931 and 1946 censuses (Figure B2).[8]

Regions of destination and origin. The first big wave was characterized by migrants who came from the closest neighbouring regions, to work across the French border. For instance, Belgians settled in the North (Nord-Pas-de-Calais region) and the Picardie region, Germans and Luxemburgers in the East, Italians in the Alpes and the Provence-Côte-d'Azur region and the Spanish in the Southwest (De Saint Pol and Monso, 2006, p. 34). The biggest French cities, Paris, Lyon and Marseille, were exceptions, attracting important migrant flows without being close to the border. However, according to Meuriot (1912, p. 556), the greatest number of foreigners in 1851-1866 were located in the Nord *département*, rather than in the Seine *département*, which includes Paris.

Similarly, foreigners often came from border regions in initial waves, and from farther regions in later waves. For example, in the mid-19th century, Belgians mostly came from the neighboring Western Flanders and Wallonia. Later, they tended to come in greater proportion from Eastern Flanders and non-border Wallonia (Rainhorn, 2008, p. 11). Similarly, most of the Italians in France registered in the 1851 census came from neighboring Piedmont (Sirna, 2007, p. 5) while in the late 19th century, they also came from Liguria and Tuscany (Gharsallah, 2018, p. 5).

Temporary versus permanent migration. Another important feature of French immigration was an evolution from temporary to permanent migration. In early stages, migrant flows were temporary and took the form of seasonal migration in the agricultural sector over the summer period, implying numerous trips of foreigners between France and the origin region. Such was the case of Belgian seasonal workers: "During the last quarter of the nineteenth century, tens of thousands of seasonal workers left annually from Flanders to go to France and to work there in farms and sugar refineries" (Poulain et al., 2000, p. 234). Another example is that of Italians who came to the southern regions of France to work in salt production, or of Spaniards in wine production (Gharsallah, 2018, p. 6; Chatelan, 1967, p. 21). Such temporary migration, featuring mostly men, was often a first step toward a more permanent form of migration, including more and more women and children (Chatelan, 1967, p. 15). For example, in the Doubs *département*, Italian migration was initially temporary until the late 19th century when migrants started to take

[8]The rest of the countries in our sample are characterized by much weaker migration to France compared to the first two groups. This heterogeneous group encompasses quite different situations such as Russia with a peak of around 70,000 residents in France in the 1930s and Scandinavian countries each barely exceeding 3,000 residents, also in the 1930s.

up permanent residence (Voisin, 2000, p. 8). Seasonal migration from Belgium also turned into permanent migration in part as a consequence of mixed marriages (Poulain et al., 2000, p. 234).[9]

Spontaneous versus controlled migration. French immigration evolved from a spontaneous movement to a controlled and organized phenomenon. In the late 19th century, French borders were open and there was little control by French authorities. Immigration was organized through networks of relatives, friends or acquaintances helping newcomers in their search for jobs and accommodations in France (Sirna, 2007, p. 16). In 1888, a decree required foreigners to declare their residency with municipal authorities. An 1893 law further established a mandatory registry of all foreigners at the municipal level (Voisin, 2000, p. 11).

At the turn of the 20th century, employers began to recruit foreign workers collectively. In Marseille, some firms hired young Italians directly in their home country, paying a fee to their parents, and transported them to France in convoys (Gharsallah, 2018, p. 3). Textile and mining companies of the North hired Belgian workers through local agents ("pisteurs") as was the case with Flemish farmers called to take over unoccupied farms after the First World War.[10]

The last step started in the 1910s with the emergence of an explicit migration policy and the tightening of controls. Organized by the French authorities, immigration was regulated, selected according to the nationalities and industries' labor needs. As a result of this organized immigration, about $450,000$ foreign workers came to France between 1910 and 1918 (Larbiou, 2008).

2.3 The Behavior of Migrants in France

Fertility Behavior of Migrants. Various sources suggest that foreigners themselves adopted French fertility norms and behaviors rather quickly. Indeed, using census data, Sauvy (1989, p. 305, Table B "Naissances") shows that the birth rate of foreigners in France was only slightly higher than among the French.[11]

Brée (2014) documents congruent evidence by analyzing the fertility rate of the Parisian districts and of the communes of the Seine *département* in 1891. She shows that, following the arrival of migrants with high fertility in a given district, the aggregated fertility rate of the district temporarily increases but then rapidly falls back to the initial level, suggesting an adaptation of migrants to local fertility norms. She argues: "Indeed, diminished pressures from their families probably allowed

[9] Turquan (1894, p. 431) noted that foreigners differed in their propensity to settle in France in the 1890s. Indeed, Belgians tended to settle permanently as opposed to Italians who came most of the time for short stays.

[10] Rainhorn (2008, p. 24) notes that: "Around 1890, mining companies lacking workers started to recruit workers in Belgium itself, through "trackers" ["*pisteurs*"], and in the aftermath of the First World War, Flemish farmers were sought to take over farms in Nord-Pas-de-Calais, whose farmers had died in the war or had left the region" (our translation).

[11] However, Sauvy argues that this difference mainly came from differences in the age composition and marital status between the two groups. Taking these factors into account, he concludes that fertility behavior was very similar for both populations in France over the period (Sauvy, 1989, p. 306).

young couples to adopt practices (particularly regarding birth control) that they may not have used in their original environment" (Brée, 2014, p. 28, our translation).

Le Bras (1988) also argues that an almost immediate consequences of the settlement of foreigners in France was their alignment with destination region fertility behavior. He provides a stark example: "In the Lot-et-Garonne - a *département* that was particularly affected by depopulation - entire Italian villages were set up (in 1914 and then between the World Wars) (...) and these populations rapidly assimilated to the point of adopting the fertility rates of the surrounding region - therefore not solving at all the problem of low fertility" (Le Bras (1988), 1988, p. 16, our translation). The large sample observations we present below are consistent with these anecdotal observations.

A possible reason for migrants' convergence to French fertility norms is that the vast majority of foreigners married while in France and rarely did so abroad before migrating to France. For instance, in 1891, the number of married couples comprising at least one foreigner was around $180,000$ including only $20,000$ couples formed abroad before arriving in France (Sauvy, 1989). For the remaining $160,000$ households formed in France, marriage statistics by citizenship over 1888-1891 reveal that 60% of male foreigners married French women, who were in most cases born in France (Sauvy, 1989, p. 312-313).[12] These figures support the hypothesis that foreigners were indeed exposed to French fertility norms, which they could then potentially diffuse to their regions of origin.

The Cultural Remittance of Modern Fertility How could migrants to France communicate and diffuse new fertility norms to their regions of origin? One possible vector of diffusion was return migration. Indeed, seasonal migrations entailed numerous journeys between France and migrants' origin regions. For instance, large-scale temporary agricultural migration from Belgium to Northern France implied frequent returns of migrants often referred to as "Franchimans" when back at home (Rainhorn, 2008, p. 17).

A substantial fraction of foreigners living in France returned to their home countries at some point. Some of them did so of their own will, such as several thousand Italians who returned to serve in the military during the First World War (Gharsallah, 2018, p. 1). Others were expelled by the French government for their political and union activities, as was the case for Italians and Poles during the 1920s and 1930s (Rainhorn, 2008, p. 17). However, there is a lack of accurate data on the precise extent of return migration. In Noiriel (1988, p. 146-147), the author provides a rough estimate: "No statistic allows us to measure the extent of the phenomenon of return migration. In the United States, despite the obstacle formed by the ocean, between 1908 and 1957, it is estimated that one third of immigrants returned to their origin countries. In France (...) we only have clues. They tend to prove that returns were even more frequent" (our translation). He

[12]Vilfredo Pareto, born in Paris in 1848 from a French mother and an Italian father, was the offspring of one of these marriages. We thank Garett Jones for bringing this example to our attention.

goes on to cite Mauco (1937) for supporting data indicating that "between 1920 and 1935, out of 2 million immigrants whose entry in France was 'controlled', 1 million were repatriated".[13] However, we are mostly interested in the earlier periods of the late 19^{th} century and beginning of the 20^{th} century, where most of the cultural diffusion took place. For these earlier decades, we can only speculate about the extent of return migration. Given that most immigrants came initially for seasonal work and from bordering regions (and then countries), it must have been substantial.

A further type of contact with the region of origin consisted of temporary visits to the home region or village for important family events (baptisms, weddings, ...) or for vacations, as documented for Italian immigrants by Sirna (2007, p. 8-9). Another potential vector of diffusion of French fertility norms was written correspondence through letters. Indeed, immigration was often associated with a continuity in human relationships with the place of origin, for various reasons (Noiriel, 1988; Voisin, 2000; Sirna, 2007). First, migrants felt a moral duty to nurture relationships with those who remained in the region of origin. For instance, Noiriel (1988, p. 178-179) writes: "The exchange of correspondence is one of the forms of social duty that the immigrant imposes on himself" (our translation). Second, maintaining close links with those who remained at origin enabled the often nostalgic migrants to preserve the hope of returning home one day, as documented by Rainhorn (2008) for the Poles in France and by Sirna (2007) for the Italians. Third, links with the place of origin persisted after arriving in France, because migrants gathered there according to their village or region of origin, building strong networks. Thus, they maintained relationships with their place of origin and even developed new connections with their home region through new relationships created in France (Sirna, 2007).

As an illustration of the potential for written correspondence with the region of origin to matter for cultural remittances, Appendix Figure B3 provides a scatter plot, across French *départments* in 1876, between the share of foreigners in the total population and the share of international telegrams in all telegrams. The relationship is positive and significant, showing that locations with many migrants also had more international communication. This is suggestive evidence that, once in France, migrants communicated with their regions of origin and could conceivably transmit French fertility norms in this way.

3 A Model of Fertility Choice, Immigration, and Cultural Change

In this section, we present a model capturing the relationship among fertility choice, immigration, and cultural change within a simple analytical framework from which we derive testable empirical implications.

[13]Noiriel (2010a) further states: "Although we lack precise data on this subject, we can estimate that more than half of the foreigners who resided in France over the last hundred years returned to their country of origin or emigrated elsewhere" (our translation).

3.1 Fertility Choice at Time t

Households live for one period. Time is discrete and denoted by t. Let n_{it} be the number of children of household i living at time t, which will be chosen to maximize the following utility function:

$$U_{it} = \beta_{it} \ln(\mu_{it} n_{it}) + (1 - \beta_{it}) c_{it} + \theta_{it} \ln \frac{n_{it}}{n_{max}} \tag{1}$$

subject to $c_{it} + \delta_{it}\mu_{it}n_{it} = y_{it}$ and $n_{it} \leq n_{max}$.

In the above equations, β_{it} is the weight in the utility function coming from (surviving) children, μ_{it} is child survival rate, c_{it} is parents' consumption, δ_{it} is the (expected) cost of raising each surviving child, measured in units of resources, and y_{it} are the household's resources (income). Finally, θ_i is a parameter that measures the cost of reducing fertility below the maximum possible fertility level n_{max}.[14]

The solution for optimum fertility is:

$$n^*_{it} = \min\{\frac{(\beta_{it} + \theta_{it})y_{it}}{\mu_{it}\delta_{it}}, n_{max}\} \tag{2}$$

The interior solution:

$$\frac{(\beta_{it} + \theta_{it})y_{it}}{\mu_{it}\delta_{it}} \tag{3}$$

is consistent with the empirical literature on the determinants of fertility choice. It is decreasing in child survival μ_{it} (and therefore increasing in child mortality) and decreasing in the costs of raising children δ_{it}, which tend to go up with the level of human capital and literacy in society. Fertility is also increasing in the resources of the household (a Malthusian effect), all other things equal, but this does not imply automatically that households in richer, more developed societies would have higher fertility, because the overall level of development might also affect the unit cost of having children δ_{it}, with ambiguous effects on fertility choice n^*_{it}.[15]

The focus of our empirical analysis is on the determinants of the factors captured by the sum of parameters $\beta_{it} + \theta_{it}$. This sum captures the intrinsic benefits from having children and the forces

[14] θ_i can be thought of as the sum of three components: $\theta_{it} = \sigma_{it} + \tau_{it} + \alpha_i\sigma_{it}\tau_{it}$, where σ_{it} is the social stigma (perceived by members of household i based on their cultural characteristics) of having fertility below the maximum level n_{max}, τ_{it} is the cost in terms of utility of having to use contraception to reduce fertility below the maximum level (this cost can depend on the household's technical knowledge about contraception, as well as preferences), and the parameter α_i captures an interaction term – for example if $\alpha_i > 0$, the subjective cost from using contraception is higher when there is also a higher social stigma about reducing fertility. Finally, regarding n_{max}, it is "not the maximum fertility that is biologically achievable", as Coale and Watkins (1986, p. 34) write about the Hutterite fertility in the Princeton Project; in their view, "it is merely the highest recorded for a population". In our model, the correct interpretation is that it is the fertility that would imply zero social and technological costs to achieve in terms of using fertility controls. It might mean that no fertility controls are used at all (thus, close to a purely biological interpretation), or that the fertility controls that are used have no social or technological costs for all observed populations, including the populations with the most traditional social norms and behavior, like the Hutterites.

[15] For a discussion of the ambiguous effect of the rise in per capita income on fertility in the context of the historical fertility transition, see Galor (2011), chapter 4, p. 116.

that increase fertility because of social norms: the stigma from reducing fertility and/or the lack of technical information about effective contraception. Overall, we think of these two parameters - and especially the parameter θ_{it} - as depending on the cultural traits of the households, which can change in a process of cultural transmission over time and space. This process will be modeled in the rest of this section.

3.2 Cultural Change and Fertility

For simplicity, assume that income, child survival and the cost of raising children are a function of the characteristics of the region where the household resides (empirically, they can be captured using measures of development, human capital, and child mortality at the regional level), while the parameters $\beta_{it} + \theta_{it} \equiv \rho_{it}$ depend on the cultural traits of the household.[16]

Consider the simplest case where there are only two cultural types: "traditional,"with high $\beta_{it} + \theta_{it} = \rho_H$, and "modern,"with low $\beta_{it} + \theta_{it} = \rho_L < \rho_H$.

Let consider two regions (A and B). In region A, the native population at time t has size P_{At}, while in region B the native population has size P_{Bt}. At time t, a mass of migrants, of size M_t, moves from A to B.

At initial time t, we assume that everyone in region A is traditional and everyone in region B is modern. We make this simplifying assumption to eliminate any cultural motivation for migrating, while we focus on migration for economic reasons (the results can be extended to relax this simplifying assumption). Thus, we assume that region B is richer than region A: $y_{At} < y_{Bt}$, $\mu_{At} \leq \mu_{Bt}$, and $\delta_{At} \leq \delta_{Bt}$. For simplicity, we also assume that all solutions are interior.

All natives in region A have fertility equal to:

$$n^*_{Ant} = \frac{\rho_H y_{At}}{\mu_{At}\delta_{At}} \tag{4}$$

where subscript n denotes natives. All immigrants in region B have fertility equal to

$$n^*_{BAmt} = \frac{\rho_H y_{Bt}}{\mu_{Bt}\delta_{Bt}} \tag{5}$$

where subscript m denotes migrants. All natives in region B have fertility equal to

$$n^*_{Bnt} = \frac{\rho_L y_{Bt}}{\mu_{Bt}\delta_{Bt}} \tag{6}$$

We assume, quite sensibly, that $n^*_{Ant} > n^*_{BAmt} > n^*_{Bnt}$. However, as people move from region A to region B, we assume that two forces for cultural change start to act. The first force is cultural assimilation, which will cause a fraction of immigrants from region A to adopt modern cultural traits (and, therefore, lower fertility) through social influence from the native population in region B.

[16] Formally, changes in β_{it} and in θ_{it} have equivalent effects on equilibrium fertility. However, we expect that, empirically, cultural changes mainly affected θ_{it} during the demographic transition.

The second force, which we call cultural remittances, following the terminology in Rapoport, Sardoschau and Silve (2020), captures the social influence from the migrants now in B to their compatriots who remained in region A. That is, over time a fraction of natives in region A are socially influenced by the immigrants that moved from region A to region B and adopted modern fertility preferences (i.e., ρ_L). To keep things simple, we also assume that the process of modernization is irreversible (no modern household ever goes back to traditional fertility preferences).

To fix ideas, we model this process of social influence as follows. At time $t+1$, a household i shifts from traditional to modern if a fraction $\psi_t \geq \psi_{ci}$ of other households is already modern, where ψ_t is calculated over the relevant "reference group" for the household and ψ_{ci} is a critical value which is specific to household i: the more conformist the household, the higher is ψ_{ci}.

For the immigrants from region A to region B, the reference group is $(1-\zeta_a)M_t + \zeta_a P_{Bt}$, where $\zeta_a > 0$ is a parameter that captures the strength of cultural assimilation. For the natives in region A, the reference group is $(1-\zeta_r)P_{At} + \zeta_r M_t$, where ζ_r captures the strength of cultural remittances.

Assume that households' parameters ψ_{ci} are uniformly distributed between 0 and 1. At time t, all M_t are still traditional, and, therefore, nobody in region A turns modern at time $t+1$. On the other hand, in region B, as long as $\zeta_a > 0$, a positive number of immigrants turns modern at time $t+1$. To simplify, consider the extreme case when assimilation is maximal ($\zeta_a = 1$). Then, fertility rates at time $t+1$ are as follows:

All natives in region A have fertility equal to

$$n^*_{Ant+1} = \frac{\rho_H y_{At+1}}{\mu_{At+1}\delta_{At+1}} \tag{7}$$

All immigrants in region B have fertility equal to

$$n^*_{BAmt+1} = \frac{\rho_L y_{Bt+1}}{\mu_{Bt+1}\delta_{Bt+1}} \tag{8}$$

All natives in region B have fertility equal to

$$n^*_{Bnt+1} = \frac{\rho_L y_{Bt+1}}{\mu_{Bt+1}\delta_{Bt+1}} \tag{9}$$

At time t+2, a fraction of people in region A will also adopt the modern traits. They will be given by the fraction of the population for whom:

$$\psi_{ci} \leq \frac{\zeta_r M_{t+1}}{\zeta_r M_{t+1} + (1-\zeta_r)P_{At+1}} \tag{10}$$

Consequently, the fraction of households in country A that have adopted modern fertility preferences ρ_L at time t+2 is given by:

$$\psi_{cm} = \frac{\zeta_r M_{t+1}}{\zeta_r M_{t+1} + (1-\zeta_r)P_{At+1}} \tag{11}$$

while the remaining $(1 - \psi_{cm})$ fraction of households in country A continue to have traditional fertility preferences ρ_H at time t+2. Hence, average fertility in country A at time t+2 is equal to:

$$n^*_{Ant+2} = \frac{[(1 - \psi_{cm})\ \rho_H + \psi_{cm}\ \rho_L] y_{At+1}}{\mu_{At+1}\delta_{At+1}} \tag{12}$$

It is immediate to check that the average fertility rate in country A at time t+2 is decreasing in ψ_{cm}. That is, the derivative of the fertility rate with respect to ψ_{cm} is

$$\frac{-[\rho_H - \rho_L] y_{At+1}}{\mu_{At+1}\delta_{At+1}} < 0 \tag{13}$$

As ψ_{cm} itself is increasing in M_{t+1}/P_{At+1}, this immediately implies the following proposition:

Proposition 1 - *Fertility in region A (the origin region) at time $t + 2$ is decreasing in the number of immigrants in region B (the destination region) at time $t + 1$.*

The intuition for this proposition is straightforward: the larger is the number of immigrants that move from region A to region B, the stronger is their social influence on people who stay in region A. As these immigrants adopt the modern fertility norms of region B, an increase in their numbers causes a reduction in the fertility level of region A. This result can be easily generalized to $t + 3$, and so on, although eventually the effect will cease to operate as all households become modern over time. It is also immediate to verify that the proposition holds controlling for the other determinants of fertility, captured by the values of y_A, y_B, μ_A, μ_B, and δ_A, δ_B (which may also change over time). In the empirical analysis, we test the proposition by considering the number of immigrants to France (the analog of region B) from other countries, and their effect on fertility in the origin region, controlling for the other determinants of fertility.

A straightforward extension of the model is to break up region B into subregions inhabited by native populations that have adopted modern fertility norms ρ_L in different proportions at time t. For example, consider two subregions B1 and B2, such that every native household in region B1 has already adopted modern fertility norms at time t, but only a fraction of the population γ, larger than 0 but smaller than 1, has adopted modern fertility in region B2 at time t. For simplicity, assume that all other parameters in regions B1 and B2 are identical. Then, we will have that all immigrants to region B1 will have fertility equal to

$$n^*_{B1Amt+1} = \frac{\rho_L y_{Bt+1}}{\mu_{Bt+1}\delta_{Bt+1}} \tag{14}$$

However, all immigrants to region B2 will have a higher fertility rate, given by

$$n^*_{B2Amt+1} = \frac{[\gamma\rho_L + (1 - \gamma)\rho_H] y_{Bt+1}}{\mu_{Bt+1}\delta_{Bt+1}} \tag{15}$$

This can be summarized as the following:

Proposition 2 - *At time $t + 1$, the fertility of immigrants from region A to region B1 (the subregion of region B with lower fertility at time t) will be lower than the fertility of immigrants* *from region A to subregion B2 (the subregion of region B with higher fertility), controlling for the intrinsic determinants of fertility (income etc.)*

In the empirical analysis, we test this proposition by considering the fertility rates of immigrants to different regions of France with varying levels of fertility.

Our simple model could be further extended to allow for heterogeneous cultural effects of immigrants on their home countries depending on measures of distance (geographic, linguistic, cultural) between the country of origin and the destination country. In the empirical analysis, we indeed find that the effects of cultural remittances are larger for regions that are geographically or linguistically closer to France.

4 Data and Measurement

4.1 The Dependent Variable: Marital Fertility

The main dependent variable in our analysis is the index of marital fertility, Ig, developed by the Princeton European Fertility Project (PEFP) (Coale and Watkins, 1986).[17] This variable has been extensively described elsewhere (Spolaore and Wacziarg, 2022, for instance), so for our purposes we simply note the following:

First, Ig represents the actual number of children born to married women at a point in time, divided by the maximal number of children who could have been born from the female population given its observed age structure. The maximal number of children that women of different ages could conceivably produce is obtained using data from the Hutterites, an Anabaptist sect that practices no forms of contraception. The number of children and the age structure of the female population come from censuses.

Second, the PEFP collected marital fertility for 775 regions belonging to 25 European countries. The frequency of the data varies from country to country, requiring us to average marital fertility over periods of 20 years (in some cases, 30 years) in order to obtain a reasonably balanced panel of regions.

4.2 Data on Migrants

Our treatment variable is the exposure of origin regions to migrants located in France. This is not directly observed because the French Census does not record the region of origin of the foreign-born. We therefore construct a proxy based on: 1) country level migrant stocks in France and 2) the share of naturalized individuals from each region of origin.

[17]In some robustness checks, we examine the determinants of the date of onset of the fertility transition, defined as the first year when a region has experienced the first 10% cumulative decline in Ig. The cumulative distribution of these regional fertility transition dates is displayed in Appendix Figure B4, showing that the bulk of transitions in Europe happened between 1880 and 1920.

The data on the number of foreign residents in France by country of origin c in census year t, RES_{ct}, come from the different releases of the French national census ("Annuaire Statistique de la France") and are available every 5 or 10 years, from 1851 onwards, for 32 European countries or nations. Variation in the stock of foreigners by citizenship over time stems predominantly from four sources: migrant inflows, return migration, naturalizations (naturalized individuals are not counted as foreign residents in the census) and mortality.

The data on naturalizations come from the French National Archives.[18] These data have recently been released in electronic format, compiled from decrees listing individual naturalizations. These decrees contain a wealth of information on the individuals being naturalized including their name, basic demographic information, current region of residence in France, city of birth, marital status, number of children, etc. Assembling these data is one of the contributions of this paper: we painstakingly scraped these data from the National Archives website. We also mapped the city of birth from naturalization records to the regional nomenclature of the Coale and Watkins fertility data, to obtain the number of naturalization records by region of origin, the unit of observation in our empirical analysis. We kept only the records related to the decrees involving individuals living in France, namely 1. Residency permits ("admissions à domicile"), the first step before naturalization, 2. Naturalizations proper, 3. "Reintegrations" into French citizenship, mainly those of individuals from Alsace and Lorraine who were at one point Germans. We exclude naturalizations of those living abroad as well as colonial naturalizations. Appendix Table B1 contains further details.

The naturalizations data from the National Archives begin in 1883 and extend to 1930, unfortunately excluding one decade in the middle (1901-1912). We aggregated the records over four distinct periods to roughly match the census decades that define migrant stocks by country: 1883-1890 representing the first major increase in decrees up to the 1889 reform; 1891-1900 marked by the effect of the 1889 law and an increase in records, albeit less sharp than in the previous decade; 1913-1920 including the war period, with a slowdown in the decrees; and 1921-1930 (excluding 1928) corresponding to a rebound in naturalizations subsequent to the massive arrival of foreigners after the war. Based on these data, we calculate the variable n_{rcd}, i.e. the number of naturalization records of individuals from region r of country c in decade d.

Table B2 in the Appendix provides summary statistics for n_{rcd}, the number of records by region of origin r over each decade d.[19] Focusing on the first two decades, our main period of interest, the average number of records by region of origin is 76 over 1883-1890 and 69 over 1891-1900, ranging

[18] The data are extensively described in Appendixes A.2 and A.3.

[19] The variable is defined for every region belonging to a country with a least one record for any region of this country. For instance, regions from Norway or Sweden are always absent from our sample as we observe no naturalization record for any regions of these countries. However, Finish regions are including only during the last decade (1921-1930) because it is the only decade over which we observe at least one record for a Finish region. Thus, n_{rcd} is defined for 433 regions for both the 1883-1890 and 1891-1900 decades and for 442 and 501 regions for 1913-1920 and 1921-1930, respectively.

from 0 to 9,904 records.[20]

4.3 Construction of the Treatment Variable

In order to exploit detailed data on marital fertility in the region of origin of migrants, from Coale and Watkins (1986), it is necessary to construct a measure of the stock of migrants from each sub-national region of origin. This forms the basis for the main treatment variable used in the empirical analysis, the exposure of each region of origin to migrants living in France. To construct this variable, we combine the data discussed in Section 4.2, on the share of each *sub-national region* of origin of migrants, from naturalization records, with aggregate data on the number of immigrants from each origin *country*, from censuses.

We start by computing, for each country, the share of naturalized individuals from each country that come from each of that country's sub-national regions:

$$S^n_{rcd} = \frac{n_{rcd}}{n_{cd}} \tag{16}$$

where n_{rcd} is the number of individuals from region r of country c who were naturalized in decade d, and n_{cd} is the total number of individuals from country c who were naturalized in the same decade. We use the naturalizations data made available by the French National Archives to capture both n_{rcd} and n_{cd}.

Define a_{rcd} as the gross number of immigrants from region r of country c arriving in France in decade d (which is unobserved) and a_{cd} as the gross number of individuals from country c arriving in France in the same decade (a stands for *arrivals*, a measure of the flow of immigration into France). Further, define $S^m_{rcd} = a_{rcd}/a_{cd}$: the share of migrants, m, to France from each of a country of origin's sub-national regions.

Our maintained assumption is that $S^m_{rcd} = S^n_{rcd+2}$. This assumption has two components. The first is that the propensity of immigrants from each region of origin *of a given country* to become naturalized is equal to the share of individuals from that same country arriving from the same region of origin (we are *not* assuming that naturalization propensities are equal to migrant arrival shares across all regions of all countries).[21]

[20] Outside of Alsace and Lorraine, Italian regions were the main regions of origin of naturalized individuals in France. Piedmont represented by far the most important region, followed by Liguria, Campania and Lombardy. This distribution of naturalizations between Italian regions is in line with the few qualitative sources discussing the regional origin of Italian migrants. Indeed, according to some sources, the Piedmontese, especially from the frontier province of Cuneo, were well-known to represent the first region of origin of the Italian migrants in France, followed by Lombardy, Liguria and Tuscany (Sirna, 2007; Gharsallah, 2018). The second most important country of origin was Belgium, in particular regions such as Tournai, followed by Brussels, Ghent and Liege. This again echoes qualitative sources on the regional origin of the Belgian migrants in France. Indeed, northern French industries recruited Belgians from frontier regions around Tournai, Courtrai and Mouscron, and then later, from Flemish areas such as Poperinge, Bruges and Ghent (Rainhorn, 2008).

[21] Some validating evidence for this assumption can be obtained by aggregating records by country of origin. Figure

The second component is that individuals arriving in France in decade d and seeking naturalization, will become naturalized in $d+2$, i.e. two decades later. This assumption was buttressed by a systematic examination of a sample of 98 complete naturalization dossiers that we consulted in person at the French National Archives.[22] We found that the time span between arrival in France and naturalization had a mean of 20.66 years, a median of 20, and a standard deviation of 9.56 years. Appendix Table B3 contains more details on the timing and distribution of naturalizations.[23]

With this main assumption, we can calculate a_{rcd} as follows:

$$a_{rcd} = \frac{n_{rcd+2}}{n_{cd+2}}.a_{cd} \tag{17}$$

Since we observe the region of origin of naturalized individuals, we readily observe n_{rcd}/n_{cd}. What remains to be determined is a_{cd}, the number of residents of each country c arriving in France in decade d. This is a flow measure of foreigner arrivals, as opposed to a total stock of foreign residents.

To calculate a_{cd}, we use data from the census on the total stock of foreign residents from each sending country living in France in a census year t corresponding to the first year of the decade d, RES_{ct}. The change in RES_{ct} over the decade under consideration can be decomposed as follows:

$$\Delta RES_{ct} = a_{cd} - d_{cd} - n_{cd} - r_{cd} \tag{18}$$

In this formulation, the change in the number of foreigners from country c living in France between two successive censuses is equal to the gross number of arrivals of migrants to France in decade d (a_{cd}) minus those who died in that decade (d_{cd}) minus those who were naturalized (n_{cd}), minus those who returned to their country of origin (r_{cd}). We directly observe ΔRES_{ct} (number of foreign residents from each country of origin). For n_{cd} (naturalizations at the country of origin level, from

B5 plots the share of naturalizations (from the National Archives) against the share of residents in France (from the Census) by decade for major countries of origin, lagging the latter by 20 years compared to the former. We see that countries with a large share of residents have a large share of naturalizations 20 years later.

[22]Since the National Archives limit the consultation of complete dossiers to 5 units per individual per 3-week period, it took two researchers 10 visits to the National Archives to consult 102 dossiers - which took about one year. 4 dossiers pertained to individuals who were born in France, so we excluded these. Half of the dossiers pertained to the 1880s decade, and the other half to the 1890s decade. The choice of dossiers was otherwise random. Complete (and often handwritten) dossiers contain a wealth of information on naturalized individuals, including their arrival date in France and the date of publication of their naturalization decree. It is important to note that these dossiers are complete: they include the handwritten application forms providing the immigrants' arrival date in France, which is not included in the electronic naturalization records compiled by the National Archives. The latter only provide the date of publication of the naturalization decree, not the arrival date.

[23]Figure B6 plots the evolution of the annual records aggregated at the country level and of the residents in France by country of origin, for a set of six origin countries, providing further information on the timing of naturalizations relative to residency. A spike in presence in France is followed by a spike in naturalizations with a lag of 10 to 20 years. For instance, in the case of Spain, the peak in RES_{ct} in the 1911 census, corresponding to migrants present in the decade before, precedes an increase in naturalizations in the 1920s.

the census), we observe an exact decadal series starting in 1891.[24]

With additional assumptions on d_{cd} and n_{cd}, we can now back out a_{cd}. Our specific assumptions on d_{cd} and n_{cd} are as follows:

1) The number of foreign residents who die are a fixed percentage α of the total number of foreign residents RES_{ct}. In our baseline, we calibrate α as equal to the decadal death rate of foreign residents in France between 1888 and 1891, from Sauvy (1989, p. 302), i.e. 0.168.

2) The number of foreign residents who return to their country of origin is a fixed percentage β of the total number of foreign residents RES_{ct}. The only guidance we have on the value of β comes from Noiriel (1988) and Noiriel (2010a). As we discussed in Section 2.3, he mentions that half of all migrants who ever came to France ended up returning. We lack guidance on how the return propensity varied through time, so we assume a time-invariant value for β equal to 0.5 (in Section 5.2.3, we examine the robustness of our results to varying assumptions on α and β). With these assumptions we can back out a_{cd} as follows:

$$a_{cd} = \Delta RES_{ct} + (\alpha + \beta) RES_{ct} + n_{cd} \tag{19}$$

Then, region-level decadal arrivals (a_{rcd}) can be computed as:

$$a_{rcd} = \frac{n_{rcd+2}}{n_{cd+2}} . \left[\Delta RES_{ct} + (\alpha + \beta) RES_{ct} + n_{cd}\right] \tag{20}$$

One more step is needed to define our treatment variable, $EXPO_{rc,\tau}$, the region's exposure to France through migration to France in period τ. Models of social influence imply that the *stock* of individuals affect the adoption of norms. But a_{rcd} is the flow of arrivals of foreign individuals in decade d. To obtain $EXPO$, we accumulate this flow over up to three decades to arrive at a stock measure (τ corresponds to two decades in our baseline estimates), and take the inverse hyperbolic sine of this variable in order to preserve observations with entries equal to zero.

[24] To calculate n_{cd} before 1891 (for decades starting in 1851, 1861, 1871 and 1881), we use the shares of naturalizations of each country in the seven years starting in 1883, observed from the National Archives naturalization data, and multiply it by the aggregate number of naturalizations that occurred in each of the decades under consideration, available from the census. This gives a proxy for the number of naturalizations by country of origin for decades where n_{cd} is not directly observed in the census. The autocorrelation of naturalization shares by country of origin is about 0.7 for decades when this vector is observed, so this procedure seems reasonable to proxy for country shares in naturalizations in decades prior to 1890s. To calculate n_{cd} after 1891, we follow a similar procedure, but use the country shares of naturalizations for each relevant decade: we calculate the share of each country in total naturalizations using the archives data, and multiply it by the total number of naturalizations from the census to obtain the total number of naturalizations by country of origin. The reason we do this is that there are fewer countries of origin in the census data than in the archives data, and we wish to maximize the number of countries, so we take country shares from the archives rather than the census. On the other hand, we think the census naturalization totals are more likely to be comprehensive, so we take our naturalization totals from the census. To validate our procedure, we can correlate the resulting series of naturalizations by country of origin because, starting in the 1890s, we observe the number of naturalizations by country of origin, n_{cd}, directly from the census. The resulting correlation, decade by decade, is greater than 0.9.

4.4 Fertility of Destination Regions in France

Although France experienced its fertility transition very early, substantial regional variation in fertility persisted into the late 19th century. In 1881, the average marital fertility rate, Ig, was 0.48 across the 87 French *départements*, with a standard deviation of 0.13. Ig ranged from 0.27 in Lot et Garonne to 0.82 in Finistère (this regional variation is displayed graphically in Figure B7). Migrants from different origin regions also had different propensities to locate in different destinations in France. Appendix Figures B8 and B9 illustrate this variation across some regions of Belgium and Italy at two different dates: these figures shows that different regions sent migrants to French regions with very different fertility rates, and did so in ways that also varied across time.[25] This opens up the possibility of testing Proposition 2: if migrants remitted the fertility norm of the place where they resided in France to their region of origin, destination fertility should be predictive of subsequent origin fertility.

To test this hypothesis, for each region of origin, we constructed a variable capturing the average fertility rate of the French destination regions where migrants from a given region of origin tended to locate. First, based on the naturalization records, we calculated n_{rcft}, the number of individuals naturalized in decade d from region r of country c and residing in each French region f. Next, we calculated $\sum_f n_{rcfd}$ the number of individuals naturalized in d from region r and residing in all French regions f.[26] Third, we calculated the share of individuals naturalized in d from regions r, residing in each French region f:

$$S^n_{rcfd} = \frac{n_{rcfd}}{\sum_f n_{rcfd}} \tag{21}$$

This share is used to calculate a weighted average, to which we now turn. We construct for each region of origin r in country c, the variable $DestIg_{rcd}$ capturing the average fertility rate of the destination regions in France weighted by the distribution of naturalized migrants in decade d from region r across the French regions, as follows:

$$DestIg_{rcd} = \sum_f Ig_{ft} S^n_{rcf,d+2} \tag{22}$$

with Ig_{ft} the fertility rate of destination region f captured in year t, i.e., at the beginning of decade d. $S^n_{rcf,d+2}$ is measured in $d+2$, in line with our assumption that individuals seeking naturalization

[25]For example, in 1881, migrants from the Italian regions of Emilia and Trentino mainly went to the Seine département, with a relatively low fertility rate (Ig = 0.35) while migrants from Campania and Toscana mostly established in Bouches du Rhône with a higher Ig of 0.48. Migrants from Neufchâteau or Virton in Belgium, two Walloon regions mainly went to the Seine *département*, while migrants from Kortrijk and Tielt, two Flemish regions, overwhelmingly settled in the Nord *département*, with one of the highest Ig in France (Ig = 0.64). There is also substantial variation over time. For instance, one decade earlier, as of 1872, approximately half of the migrants from Kortrijk and Tielt had settled in Nord, whereas a much larger share were settled there as of 1881. Similarly, the proportions of Italians from Campania and Tuscany and residing in Bouches du Rhône substantially increased between 1872 and 1881.

[26]This sum is very close but not exactly equal to n_{rcd} as the residence city in France is missing in some naturalization records, which are therefore excluded here.

obtain French citizenship on average two decades after their arrival. The distribution of $DestIg_{rcd}$ is displayed in Appendix Figure B10, and like the distribution of marital fertility across regions of France, it also displays a lot of variation (however, here the variation is across regions of origin).[27]

5 Empirical Results

5.1 Summary Statistics

Table 1 displays some summary statistics. We observe substantial variation in regions' exposure to France through migration, our main treatment variable (Panel A). For example, over the first period (1861-1880), mean exposure was 2,335 with a standard deviation of 8,545, and values ranging from 0 to more than 121,235 (the region that sent the largest numbers of migrants to France was Piedmont). These numbers correspond to gross total arrivals of individuals in France from other European regions, as detailed in Section 4.3. Panel B provides statistics by terciles of exposure. Mean exposure is zero for the lowest tercile, whatever the period. In contrast, mean exposure is 11,100 for the the highest tercile for the 1871-1890. These are regions mostly located in Belgium, Italy and Switzerland, with the balance in England and Wales, Germany and the Netherlands. We observe similar substantial heterogeneity in exposure to France across regions for every 20-year period of the analysis.

Panel B also shows that the decline in the fertility rate between the two 20-year periods τ and $\tau+1$ is generally stronger for regions in higher terciles of initial exposure to France in period τ. This is in line with our main hypothesis, from Proposition 1, that sending more migrants to France is associated with more pronounced fertility declines subsequently. For example, mean marital fertility declined by 7.48% between 1861-1880 for regions in the highest tercile of exposure, whereas it declined by only 2.12% for the regions in the lowest tercile. This relationship is observed most strongly during the early periods, but no longer holds in the last period (1891-1930), once most regions have started their convergence to modern levels of fertility - consistent with our model.

5.2 Cross-Sectional Results

5.2.1 Specification

For a cross-section of regions for each period under consideration, we hypothesize that marital fertility in the regions of origin (the main dependent variable described in Section 4.1) is related to these regions' exposure, in line with Proposition 1. We use the following specification:

$$Ig_{rct} = \alpha_1 EXPO^{IHS}_{rc\nu} + X'_{rc}\alpha_2 + \alpha_c + \epsilon_{rct} \tag{23}$$

[27]This variable is available for fewer regions than our main treatment variable, $EXPO$, for two reasons: 1) it is not possible to calculate it for the regions of origin without any naturalizations and 2) the destination city in France was sometimes missing in the naturalization records, or could not be matched with a French region.

Table 1: Summary Statistics

Panel A. Means and standard deviations for the main variables of interest

	Obs	Mean	Std.dev	Min	Max
Exposure to France (1861-1880)	403	2,335	8,545	0	121,235
Exposure to France (1871-1890)	403	2,913	11,517	0	173,165
Exposure to France (1881-1900)	410	2,820	12,301	0	200,492
Exposure to France (1891-1910)	472	2,780	12,521	0	219,459
Destination Fertility (1861-1880)	239	0.43	0.07	0.28	0.68
Destination Fertility (1871-1890)	209	0.42	0.07	0.29	0.70
Destination Fertility (1881-1900)	162	0.40	0.06	0.23	0.58
Destination Fertility (1891-1910)	249	0.39	0.08	0.26	0.64
Origin Ig (1851-1870)	152	0.73	0.08	0.44	0.98
Origin Ig (1861-1880)	318	0.70	0.10	0.42	1.05
Origin Ig (1871-1890)	396	0.69	0.10	0.40	1.00
Origin Ig (1881-1900)	445	0.67	0.10	0.36	0.96
Origin Ig (1891-1910)	445	0.64	0.10	0.30	0.94
Origin Ig (1901-1920)	397	0.59	0.12	0.23	0.90
Origin Ig (1911-1930)	397	0.49	0.14	0.15	0.82
Origin Ig (1921-1940)	463	0.44	0.13	0.09	0.79

Note: Exposure to France: see Section 4.3. Destination Fertility: see Section 4.4. Origin Ig: see Section 4.1.

where Ig_{rct} is the average marital fertility rate of region r in country c over a 20-year period (t ranges from 1871-1890 to 1901-1920), $EXPO^{IHS}_{rc\nu}$ the inverse hyperbolic sine of the region's exposure to France measured as the sum of gross arrivals in France from region r over period ν (where ν ranges from 1861-1880 to 1891-1910, i.e. it is lagged 10 years compared to the dependent variable).[28] Allowing for a 10-year lag between the main treatment variable and the dependent variable maximizes the number of 20-year periods available for the analysis.

The regression includes additional controls: First, α_c is a country fixed effect based on 1866 borders. Its inclusion in the specification implies that our cross-section specification exploits only within-country, cross-regional variation in the data.[29] Second, X'_{rc} is a vector of time-invariant controls. In baseline regressions, it includes region r's population in the mid-19$^{\text{th}}$ century (in logs), as well as a set of geographic controls potentially correlated with both migration to France and Ig. These geographic controls are the geodesic distance to Paris, the absolute difference in longitudes

[28] The treatment variable, exposure, is entered into the regressions using the inverse hyperbolic sine transformation, which approximates the natural logarithm and retains zero-valued observations (Bellemare and Wichman, 2020).

[29] There is indeed substantial within-country, cross-region variation in Ig. For example, over the period 1871-1890, in Belgium Ig varies between 0.45 (in Philippeville and Thuin in Wallonia) and 1.00 (in Sint-Niklaas and Dendermonde in Flanders); in Switzerland Ig varies between 0.40 (in Geneva) and 0.85 (in Fribourg); in Spain Ig varies between 0.51 (in Barcelona) and 0.80 (in Oviedo and Lugo).

Panel B. Summary Statistics by Terciles of Exposure to France

	Tercile 1	**Tercile 2**	**Tercile 3**
Exposure to France (1861-1880)	0	45.95	9,905.66
ΔIg(1861-1880)-(1881-1900)	-2.12%	-3.68%	-7.48%
Exposure to France (1871-1890)	0	129.71	11,100.34
ΔIg(1871-1890)-(1891-1910)	-7.22%	-7.64%	-11.9%
Exposure to France (1881-1900)	0	128.61	11,026.21
ΔIg(1881-1900)-(1901-1920)	-12.82%	-11.76%	-17.79%
Exposure to France (1891-1910)	0	234.7	10,910.12
ΔIg(1891-1910)-(1911-1930)	-22.66%	-27.6%	-25.72%

Note: ΔIg = % Change in the Marital Fertility rate, Ig, between two 20-year periods.

to Paris, the absolute difference in latitudes to Paris, a dummy for a mountain range from France, a dummy for contiguity to France, a dummy for a common sea or ocean with France, a dummy for a landlocked region and a dummy for islands.[30] In additional results, we add more variables to X'_{rc}, particularly variables that capture the fundamental determinants of fertility and cultural distance of the origin regions of migrants to France. This exhaustive list of controls is meant to address possible omitted variables bias.

5.2.2 Baseline results

Table 2 reports the cross-sectional results for the different overlapping 20-year periods.[31] The coefficient on exposure is negative for every period, and both its magnitude and statistical significance decline from period to period (the standardized beta gradually declines in magnitude from -20.3% for the 1871-1890 period to -3.2% for the 1901-1920 period). This is consistent with our model of cultural diffusion through migrants' remittances, since the effect of exposure to French fertility norms (through migrants) should diminish as more and more regions transition to modern fertility norms. Indeed, the first European regions (outside France) to adopt modern fertility norms experienced their transitions during the first two periods of our data (17% did so during 1871-1890 and 28% did so during 1881-1900, while only 2.4% of the regions had their transition before 1871). Overall, this first set of regressions is consistent with the hypothesis that regions with a higher exposure to France through migration experienced a stronger decline in fertility, and that this pattern vanishes as the diffusion process unfolds. The inclusion of country fixed effects amounts to a stringent test of Proposition 1, since the main effect is identified only from within-country, cross-regional variation.

While Table 2 uses exposure as defined in Section 4.3 as the main independent variable, it is

[30]These variables are obtained from Spolaore and Wacziarg (2022).

[31]The sample varies from 373 regions from 15 countries for 1871-1890 to 403 regions from 17 countries for 1901-1920.

Table 2: Cross-Regional Regressions for the Marital Fertility Rate

	Marital Fertility, *Ig*			
	1871-1890	1881-1900	1891-1910	1901-1920
	(1)	(2)	(3)	(4)
Exposure to France 1861-1880 (IHS)	-5.274***			
	(1.914)			
Exposure to France 1871-1890 (IHS)		-4.151**		
		(1.876)		
Exposure to France 1881-1900 (IHS)			-3.947*	
			(2.243)	
Exposure to France 1891-1910 (IHS)				-0.931
				(2.428)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	373	396	396	403
Countries	15	16	17	17
R^2	0.444	0.326	0.281	0.368
Standardized Beta %	-20.298	-16.330	-14.444	-3.240

Note: All regressions include country fixed effects defined as per 1866 borders, an intercept term, as well as controls: population mid-19th (in ln), geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. *Ig* multiplied by 1,000 for readability of the estimates. In terms of 1946 borders, countries to which regions in the sample belong are as follows: column (1): Austria, Belgium, Czechoslovakia, England and Wales, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Romania, Russia, Spain, Switzerland, Yugoslavia; column (2): as in column (1) plus Luxemburg; column (3): as in column (2) plus Portugal minus Ireland; column (4): as in column (3) plus Finland, and Ireland, minus Greece. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

natural to ask what would happen if we used naturalizations directly as a proxy for the intensity of migration from the various regions of origin. This is more straightforward to include since we directly observe the stock of naturalizations at various points in time. In Table B4, we show estimates using naturalizations rather than $EXPO$ in the specification of equation 23.[32] It is important to note that while we enter naturalizations cumulated over a given 20-year period, say 1881-1900 in column (1), the goal is for this regressor to capture the intensity of migration from origin regions twenty years earlier, in this case 1861-1880 - since we established that there is an average lag of twenty years between migrant arrivals in France and subsequent naturalization. In this way, the lag structure of the four specifications of Table B4 is the same as that of Table 2.

[32] More specifically, in terms of the notation in Section 4.3, we enter the inverse hyperbolic since of n_{rcd+2} in the regression, instead of $EXPO_{rc\nu}^{IHS}$. The cross-regional correlation between $EXPO$ and the stock of naturalizations twenty years later is high - ranging between 0.89 and 0.94.

The results show that naturalizations twenty years hence, another proxy for regional variation in the intensity of migration to France, also exerts a negative and significant effect on fertility, which decline in magnitude as decades go by, in line with our diffusion model.

Table 3 includes additional controls in the baseline specification. To do so, we focus on the period during which the effect peaked, i.e. 1871-1890, the period during which the fertility transition is in full swing across the regions of Europe. Column (1) first includes linguistic distance from French, the main independent variable in Spolaore and Wacziarg (2022). This variable is defined as the the number of different linguistic nodes separating the languages of the historical regions of Europe, with "Français" (Langue d'Oïl), the language spoken in Northern France.[33] This control is especially important as it allows us to account for cultural factors potentially explaining both the extent of migration to France from region r as well as the fertility of region r. The effect of exposure to France is not impacted by the inclusion of this variable.[34]

Column (2) controls for additional factors associated with the intrinsic costs and benefits of fertility choices, namely the proximity to coalfields (an exogenous predictor of industrialization, obtained from Fernihough and O'Rourke, 2021), the literacy rate in 1880, population density in the mid-19$^{\text{th}}$ century, the urbanization rate in 1850 (from Spolaore and Wacziarg, 2022). These controls take the expected signs, namely distance to coal is associated with higher fertility whereas urbanization, density and literacy are negatively associated with fertility. While the sample is greatly reduced, from 373 regions to 212 regions, reassuringly sign and standardized magnitude of the coefficient on exposure are barely affected.[35] This specification helps address concerns that a common factor (economic modernity) may drive both migrants to France and fertility in origin regions.

Finally column (3) controls for infant mortality, as measured in Coale and Watkins (1986). This leads to an even more pronounced reduction in the sample, from 373 to 167 regions. We find that infant mortality is positively associated with marital fertility, consistent with a large literature on the relationship between these two variables (e.g. see Doepke, 2005). While the coefficient on exposure remains negative, and only declines modestly in magnitude, it is no longer statistically significant at conventional levels. This, however, is due almost entirely to the dwindling sample, rather than the addition of infant mortality to the regression: in column (4), which uses the same

[33] For further details on this measure of historical linguistic distance between the regions of Europe and Français, see Spolaore and Wacziarg (2022).

[34] Linguistic distance is positive but not significant in this regression, in a sample of 373 regions. The effect was positive and highly significant in Spolaore and Wacziarg (2022). The difference is due to different samples: whereas Spolaore and Wacziarg (2022) had 771 regions, here we lose all regions for which it was not possible to construct the exposure variable, including all the regions of France. Linguistic distance is positive but insignificant in a regression using the same sample, but without including exposure, indicating that the issue has to do with the sample rather than the inclusion of exposure in the specification.

[35] We verified that, when regressing exposure on these intrinsic determinants of fertility, none of them come out as statistically significant predictors of exposure. This may explain why their inclusion in Table 3 does not affect the coefficient on exposure. These results are available upon request.

sample but omits infant mortality, the coefficient on exposure barely changes.

We further assess the cultural remittance of modern fertility norms by breaking down our exposure variable by age. In Appendix Table B5, we break down the sample of naturalized individuals between adults and children (adulthood is assessed using the age of naturalization). We then compute our exposure variable based on the resulting age-group specific regional shares of naturalized individuals, entering the two resulting exposure variables together in the same specification as that of Table 2. We find that, across all periods of analysis, it is exposure to adult migrants to France, rather than to children, that has greatest explanatory power for origin region fertility levels. In Table B6, we conduct a similar exercise, but breaking down adults into two groups: those between the ages of 20-45 and those older than 45 (as of the date of naturalization). We find negative effects of exposure to both groups on origin region fertility levels, but a quantitatively stronger effect of exposure constructed using only naturalizations of those between the ages of 20 and 45. The evidence in Tables B5 and B6 is consistent with the idea that prime-age individuals, who are more likely to themselves be involved in making fertility decisions, have the biggest impact on sending back modern fertility norms to their regions of origin.

5.2.3 Robustness

We conducted a series of robustness checks, all of them presented in the Appendix.

First, we include a set of additional controls reflecting traditional family types, as defined by Emmanuel Todd (see Todd, 1985,1990 and Duranton et al., 2009). Different types of families (nuclear, stem, egalitarian, communitarian) may have direct effects on fertility (as shown in Spolaore and Wacziarg,2022) and also may affect propensities to migrate. In Appendix Table B7, we find indeed that dummies for different family types prevalent across regions in the sample significantly affect fertility in all periods, but that their inclusion does not modify our main inference: exposure continues to strongly predict marital fertility particularly in the early periods.

Second, we changed our assumptions on the time span over which variables are measured, and on the lag structure of the specification. In Table B8, we use 30-year periods to measure both exposure and marital fertility, instead of 20 years as in our baseline. Wherever possible, we also include exposure either contemporaneously or with a 10-year lag. In Table B9, we lag exposure by 20 years rather than 10 years. In both tables we continue to find a significant effect of exposure on marital fertility across the regions of Europe. The effect peaks when marital fertility is measured in the early periods, irrespective of whether exposure is entered contemporaneously, with a 10 year lag, or with a 20-year lag. As before, the absolute magnitude of the effect declines with time and becomes less significant statistically in the later periods.

Third, we examine the robustness of our results to our assumed delay between arrival in France and the time of naturalization. As discussed in Section 4.3, we assumed a delay of 20 years, based on a time-consuming review of 98 naturalization dossiers. In Table B10, we instead assume lags of

Table 3: Cross-Regional Regressions with Additional Controls

	Marital Fertility, *Ig* 1871-1890			
	(1)	(2)	(3)	(4)
Exposure to France 1861-1880 (IHS)	-5.241***	-3.980**	-3.392	-4.065
	(1.914)	(1.939)	(2.709)	(2.724)
Linguistic distance	9.457			
	(10.09)			
Distance to closest coal centroid		0.0716		
		(0.0501)		
Population density at mid-19th		-0.0105***		
		(0.00196)		
Urbanization rate 1850		-37.92*		
		(20.17)		
Literacy rate 1880		-0.384		
		(0.380)		
Infant mortality rate			1.798***	
			(0.295)	
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	373	212	167	167
R^2	0.444	0.497	0.378	0.184
Standardized Beta %	-20.171	-17.372	-13.509	-16.189

Note: All regressions include country fixed effects defined as per 1866 borders, an intercept term, as well as controls: population mid-19th (in ln), geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. *Ig* and Infant mortality rate multiplied by 1,000 for readability of the estimates. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

10 or 30 years when constructing the exposure variable. The results are to be compared to those of Table 2, and show little change either qualitatively or quantitatively.

Fourth, we assessed whether our assumptions on the death rate and return rate of immigrants, used to calculate exposure in Section (4.3), affect the main result. In our baseline, we assume that the sum of the decadal death rate of foreign residents and their propensity to return, $\alpha+\beta$, equals 66%. In Tables B11 and B12, instead, we assume respectively a lower bound of 20% and an upper bound of 80% for $\alpha+\beta$. The standardized magnitudes of the main effect changes little compared to the baseline.

Fifth, we conducted a Placebo exercise, entering exposure as measured completely *after* marital fertility (so, for instance, we regress marital fertility in 1851-1870 on *later* exposure to France in 1871-1890). If a time-persistent omitted regional characteristic explained both variables, fertility measured later than exposure could still respond to it. We find that this is not the case, as subsequent exposure is not significantly predictive of prior fertility in any of the columns (Table B13).

Sixth, we conducted a systematic analysis of outliers and sample choices. The results are reported in Tables B14 and B15 for, respectively the 1871-1890 period and the 1881-1900 period. In a first test, we identified the outliers visually by plotting partialled-out fertility against partialled-out exposure (Figure B11). We then excluded these outliers and reran the specification of equation (23) (column 2). In both periods, the magnitude of the main effect actually increased as a result (Figure B12 plots fertility against exposure after removing the outliers). In a second test, we excluded 3 regions from Alsace-Lorraine which, either completely or partially, became part of Germany after the Franco-Prussian war of 1870 (column 3). These regions sent many "migrants" to France in the subsequent period. Excluding these regions barely affects our main coefficient of interest in either period. In a third test, we excluded all regions that sent no migrants to France, i.e. we now only look at the intensive margin of migration (column 4). This roughly doubles the standardized magnitude of the effect of exposure in both periods.

Seventh, we examined whether the main result in Table 2 is driven by regions that are contiguous to France. Indeed we noted that many of the early migration came from contiguous regions, primarily of Italy and Belgium. In Appendix Table B16, we show that the effect of exposure on origin fertility is very pronounced for such contiguous regions, with a standardized beta of about 55%. However, our main finding also holds for a sample of non-contiguous regions, with a magnitude commensurate with that of the full sample. We conclude that our finding is not entirely driven by contiguous regions, from which migration to France tended to be an early phenomenon. In Section 5.5, we return to the idea that the effect of exposure on fertility might wane spatially when moving farther away from France.

Eighth, we replicated our results using the date of the onset of the fertility transition, instead of the marital fertility rate, as the dependent variable. Coale and Watkins (1986) present a series of dates of onset defined as the first date at which a 10% reduction in marital fertility is achieved, as mentioned in Section 4.1. Our model implies that regions that sent more migrants to France should experience an earlier transition to modern fertility, so it is natural to look at this alternative cross-sectional dependent variable. The results are presented in Appendix Tables B17, B18 and B19. We find a consistent pattern of negative coefficients on exposure, measured at different dates (columns 1-4 of Table B17), with the effect becoming insignificant when exposure is measured over the last period (1891-1910), consistent with the idea that exposure to French fertility norms through migrants should matter most during the period when the diffusion of modern fertility norms was in full-swing.[36] Finally, our results on fertility transition dates do not hinge materially on whether

[36] Given the likely presence of a lag in migrants affecting origin-region fertility norms, migrant stocks measured in 1891-1910 are expected to affect fertility norms one or two decades after the midpoint of this period, i.e. after most regions of Europe are well-engaged into their fertility transitions. Recall that our dependent variable - the fertility transition date - captures the onset of the transition: a large proportion of regions in our sample had undergone this

we control for fundamental determinants of fertility (Table B18), despite losing almost half of the sample.

5.3 Panel Results

As we have multiple observations through time for both marital fertility and exposure, this opens up the possibility of a panel analysis with region fixed effects, exploiting only within-region variation over time. We use the following specification:

$$Ig_{rct} = \beta_1 EXPO^{IHS}_{rc\tau} + \beta_{rc} + \beta_t + \epsilon_{rct} \tag{24}$$

where Ig_{rct} is the average marital fertility rate of region r in country c over three 20-year periods t (1871-1890, 1891-1910 and 1911-1930) and $EXPO^{IHS}_{rc\tau}$ is the region's exposure to France measured as the sum of gross arrivals in France from region r lagged by 10 years (1861-1880, 1881-1900 and 1901-1910).[37] β_{rc} represents region fixed effects, capturing the various cross-region, time invariant controls that were included in the cross-section regressions, as well as other unobserved time-invariant regional characteristics. β_t consists of period fixed effects, capturing period effects that are common to all regions.

Table 4: Fixed Effects Panel Regressions for the Marital Fertility Rate, 1871-1930

	Mean Marital Fertility *Ig*, decades *d* and *d*+1		
	Full sample	Expo(1861-1880)>0	Expo(1861-1880)>0 & Expo(1881-1900)>0
	(1)	(2)	(3)
Exposure to France *d*-1 and *d* (IHS)	-5.914**	-9.300***	-12.16***
	(2.470)	(2.961)	(3.628)
Region FE	X	X	X
Period FE	X	X	X
N	1,172	687	639
Regions	445	242	224
R^2	0.668	0.672	0.682
Standardized Beta %	-15.802	-17.084	-20.456

Note: *Ig* is measured over the three periods: 1871-1890, 1891-1910 and 1911-1930. Exposure to France measured over 1861-1880, 1881-1900 and 1901-1910. Column (2) drops the regions with no exposure to France over 1861-1880 and column (3) drops the regions with no exposure to France over 1861-1880 and over 1881-1900. *Ig* multiplied by 1,000 for readability of the estimates. All regressions include period and region fixed effects. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

onset by 1910.

[37] In line with the cross-sectional specification of equation (23), the measurement periods of exposure are lagged by 10 years compared to those of marital fertility. However the last period only lasts 10 years because we do not have data on exposure past 1910.

Table 4 reports panel estimates. Column (1) uses an unbalanced panel of 445 regions (this is the union of all the cross-sectional, period-specific samples of Table 2, plus some regions available only in the 1911-1930 period), amounting to $1,172$ observations. We find that a higher exposure to France is associated with lower subsequent fertility. This result is an important test of Proposition 1 because the specification is demanding: the proper interpretation of the estimates is in terms of within-region, cross-time variation: we find that if a region experienced a particular surge in exposure (i.e. migration) to France in period τ, that region experienced a subsequent decline in marital fertility in period t. The effect is quantitatively meaningful, with a standardized beta of -15.8%.

Columns (2) and (3) of Table 4 separate the sample into two subsamples: one that is characterized by positive exposure in the first period (1861-1880) and the other with positive exposure in both periods 1 and 2. These sample restrictions are an attempt to isolate the sample for which there was positive exposure to France in early periods, as presumably if a region is exposed to France in the last period, we would not be able to detect an effect on its measured fertility given the lag structure. In line with this intuition, we find that positive early exposure delivers a quantitatively stronger effect on marital fertility compared to the baseline.

In sum, in a demanding panel specification with region fixed effects, we find that higher exposure to France is associated with a decline in the fertility rate of this region over time.

5.4 The Fertility of Destination Regions

We now test Proposition 2 of our model. Our measure of exposure to France used so far did not take into account variation in the fertility rate to which migrants were exposed in France. However, French regions of destination differed quite widely in their marital fertility rate, as illustrated by Figure B7 in the Appendix. This opens up the possibility of testing whether migrants who located in French regions with high fertility would have a lower impact on their origin region fertility: if migrants remitted to their region of origin the fertility norms of their location of residence in France, the fertility of their region should reflect fertility norms in their region of residence in France.

To test this hypothesis, we augment our cross-sectional specification by adding as a regressor $DestIg_{rcit}$, the average fertility of the destination regions in France of the migrants from region r weighted by the distribution of these migrants across the French regions. Table 5 shows the results. The addition of destination fertility reduces the sample somewhat. However, the coefficient on this variable is positive, consistently with Proposition 2. The effect is statistically significant for the 1881-1900 period (column 2) and the 1891-1910 period (column 3). In those same periods, destination fertility has a sizeable standardized magnitude, of respectively 14.2% and 24%. In this specification exposure to France continues to bear a negative coefficient across all periods.[38] In

[38] In this restricted sample, the effect of exposure is significant across all periods, but it first rises and then declines, consistently with Proposition 1.

sum, holding constant exposure to France, European regions who sent migrants to French regions with lower fertility rates experienced a sharper decrease in their own fertility rate.

Table 5: Cross-Regional Regressions with Destination Fertility

	Marital Fertility *Ig*, decades *d* and *d*+1			
decades *d* and *d*+1:	1871-1890	1881-1900	1891-1910	1901-1920
	(1)	(2)	(3)	(4)
Exposure to France *d*-1 and *d* (IHS)	-21.37***	-22.41***	-23.89***	-8.134
	(4.192)	(5.865)	(8.139)	(5.519)
Destination Fertility *d*-1 and *d*	0.113	0.210**	0.475***	0.00739
	(0.0882)	(0.0909)	(0.182)	(0.122)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	227	207	164	237
R^2	0.437	0.362	0.322	0.334
Standardized Beta % of Destination fertility	7.804	14.207	24.041	0.484

Note: *Destination Fertility* = Weighted average fertility rate of the destination regions in France of migrants from region r in country c over the two-decade period d-1 and d. All regressions include country fixed effects defined as per 1866 borders, an intercept term, as well as controls: population mid-19th (in ln), geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. *Ig* multiplied by 1,000 for readability of the estimates. Robust standard errors in parentheses: * p < 0.1; ** p < 0.05; *** p < 0.01.

5.5 An Analysis of Interaction Terms

Analyzing how exposure to France interacts with other regional characteristics can help shed light on possible mechanisms through which it operates to lower the fertility of migrants' origin regions. We therefore estimate cross-sectional regressions in which $EXPO$ is interacted with different distance variables. The results are reported in Table 6, for the 1871-1890 period, over which we observe the strongest effect of exposure.

Exposure is first interacted with different measures of geographic distance from Paris: geodesic distance (column 1), the absolute difference of longitudes (column 2) and the absolute difference of latitudes (column 3). We find that a higher exposure to France in region r is associated with a lower fertility in this region but this effect is magnified if this region is geographically closer to France. For instance, based on column (1) estimates, for the closest region of our sample (215 km), the standardized effect of exposure is -40.6%, whereas it is -20% for a region at the mean distance of our sample.[39] We find broadly similar interaction effects when considering longitudinal

[39] The effect of exposure becomes zero for regions at a distance of 1,335 km or more from Paris, which is the case

Table 6: Cross-Regional Regressions with Distance Interactions

	Marital Fertility *Ig*, 1871-1890			
Interacted variable:	Geodesic distance (1)	Longitude difference (2)	Latitude difference (3)	Linguistic distance (4)
Exposure to France 1861-1880 (IHS)	-12.76***	-11.90***	-7.826***	-14.02**
	(3.654)	(3.085)	(2.930)	(5.490)
Interaction term	9.479**	0.749**	0.672	1.267**
	(4.302)	(0.304)	(0.755)	(0.620)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	373	373	373	373
R^2	0.445	0.446	0.438	0.514

Note: Interacted variables in column (1): Geodesic distance to Paris (divided by 1,000 for readability); in column (2): Absolute difference in longitudes to Paris; in column (3): Absolute difference in latitudes to Paris; in column (4): Number of different nodes with *Français*. All regressions include country fixed-effects defined as per 1866 borders as well as controls: Population mid-19th century (ln), Geodesic distance to Paris (divided by 1,000), Absolute difference in longitudes to Paris, Absolute difference in latitudes to Paris, Mountain range from France, Contiguity to France, Common water with France, Landlocked region, Island. *Ig* multiplied by 1,000 for readability of the estimates. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

and latitudinal distance, with the former quantitatively more relevant than the latter.

Next, in column (4) we include the interaction between exposure and the linguistic distance from French. This reveals that linguistic distance to French also mitigates the effect of exposure on origin region fertility: the standardized effect of exposure is -64.2% for French-speaking regions, and only -9.7% for the regions that are most linguistically distant from French.

Our interpretation of these results is that it is easier to send back cultural remittances (here, fertility norms) to migrants' origin regions if these regions are geographically and linguistically closer to France, in line with the idea that social influence from migrants to origin regions mediates the effect of exposure to migrants on origin fertility.

5.6 Individual-level Analysis

We now turn to an analysis of the fertility behavior of individuals who became naturalized French citizens. This analysis can shed light on a central element of the hypothesis we put forth in this paper: in order for migrants to France to send fertility norms back to their regions of origin, they need to be exposed to these norms. They are also more likely to remit destination fertility norms to their regions of origin if they adopt these norms themselves. Thus, we investigate whether naturalized citizens adopted the norms of the French locations where they resided.

for 14% of the regions of our sample.

The naturalization decrees discussed in Section (4.2) report the number of children who were naturalized along with the main applicant (usually the father / head of household), giving us a measure of the fertility of naturalized households. We estimate the following specification for a cross-section of 71,805 naturalized individuals for whom we know both their origin and destination regions:

$$Fert_{irc,t} = \alpha_1 Ig_{f,t} + \alpha_2 Ig_{rc,t} + X'_{irc,t}\alpha_3 + \alpha_d + \alpha_t + \alpha_r + \alpha_f + \epsilon_{irc,t} \tag{25}$$

where $Fert_{irc,t}$ is the applicant's fertility measured by the number of children listed on the naturalization application, $Ig_{f,t}$ is the marital fertility rate of the individual's destination region f in France at the beginning of decade t, $Ig_{rc,t}$ is the fertility rate of his origin region r at the beginning of decade t, X' is a vector of individual controls including age, age squared and a dummy for married individuals, α_d is a decree type fixed-effect, α_t is a decade fixed-effect, α_f is a French destination region fixed-effect and α_r is a region of origin fixed-effect.

Two caveats are in order. First, we note that $Fert_{irc,t}$ underestimates the total fertility of naturalized individuals because (i) naturalization decrees only list children for whom naturalization was obtained, and some migrants' children, for instance some of those born in France and thereby entitled to obtain citizenship upon turning 18, may not appear on the naturalization decree; (ii) naturalization applicants may not have completed their fertility, i.e. they may have more children after becoming naturalized French citizens. However, there is no obvious reason for the extent of this downward bias to be correlated with the fertility of the French region of destination, the main treatment variable of interest in equation (25), especially when conditioning on the rich set of fixed-effects that we include. However, to further address the problem of imperfect fertility measures from naturalization records, we will look at different samples broken down by the age of the applicant, to isolate data where the households under consideration is more likely to have completed their fertility.

Second, migrant selection could be an issue in these regressions: households that are more likely to anticipate low fertility may wish to locate in regions of France where fertility is lower, in order to conform to local norms. If this were the case, we could be capturing selection rather than treatment. However, we consider this possibility to be unlikely given that the location choices of migrants are likely to be complex and multifaceted decisions, and given the demanding specification that we adopt. In particular, the rich set of fixed effects that we include, particularly region of destination fixed effects, implies that we identify our effects out of within-destination-region variation in fertility over time. Selection would have to happen on anticipated *changes* in destination region fertility for the objection to be valid. The proper thought experiment consists of comparing two naturalized migrant families from the same origin region locating in same French region at times when the destination region displays different fertility levels. Our hypothesis is that the household that located in the destination region when that region had lower fertility will itself have lower fertility than the other household.

With these caveats in mind, the results presented in column (1) of Table 7 show that the fertility rate of the destination region in France positively affects the fertility of naturalized migrants in

France. Interestingly, we also find that the their fertility is also associated with that of their home region, consistent with the idea that the norms of their regions of origin persist (Fernández and Fogli, 2006; Di Miceli, 2019). In sum, naturalized migrants in France do not fully adjust their fertility behavior to the French norm, but they are influenced by the fertility rate of the French region in which they live.

Table 7: Individual-level Regressions for Migrants' Fertility

	Individual fertility						
	Full sample	Age<30	≥30	<35	≥35	<40	≥40
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Destination *Ig*	0.430***	-0.0946	0.502***	0.222*	0.475***	0.340***	0.494**
	(0.119)	(0.101)	(0.144)	(0.116)	(0.169)	(0.124)	(0.204)
Origin *Ig*	0.137**	-0.0669	0.235***	0.0771	0.275***	0.0653	0.312***
	(0.0555)	(0.0463)	(0.0673)	(0.0527)	(0.0789)	(0.0566)	(0.0948)
Married	0.374***	0.171***	0.412***	0.178***	0.457***	0.248***	0.486***
	(0.0104)	(0.0115)	(0.0122)	(0.0112)	(0.0141)	(0.0114)	(0.0167)
Age	4.754***	-3.210***	5.984***	-0.270	5.554***	0.0142	2.752***
	(0.145)	(0.723)	(0.266)	(0.700)	(0.395)	(0.554)	(0.603)
Age^2	-5.046***	8.509***	-6.258***	2.612**	-5.875***	2.060**	-3.446***
	(0.161)	(1.473)	(0.271)	(1.276)	(0.381)	(0.920)	(0.551)
Decree FE	X	X	X	X	X	X	X
Period FE	X	X	X	X	X	X	X
Origin FE	X	X	X	X	X	X	X
Dest. FE	X	X	X	X	X	X	X
N	71,806	14,714	57,092	25,111	46,695	35,727	36,079
R^2	0.093	0.109	0.092	0.093	0.092	0.092	0.096

Note: Destination region Ig = fertility rate of the individual's destination region in France; Origin Ig = fertility rate of the individual's region of origin. All regressions include individual controls: dummy for married individuals, age (divided by 100), squared age, as well as decree fixed effect, period (decade) fixed-effects, origin regions fixed-effects and destination regions fixed-effects. Robust standard errors in parentheses: * p < 0.1; ** p < 0.05; *** p < 0.01.

To address the issue of the incomplete fertility of the households in our sample, we split the sample by different age thresholds of the main applicant (30, 35 and 40 years old). We hypothesize that we are more likely to capture completed fertility using data covering older applicants. This is indeed what we find in columns 2-7 of Table 7. First, destination region fertility has no effect on observations for which the applicant is less than 30 (column 2). It also has a quantitatively smaller effect for applicants who are less than 35 or 40 (columns 4 and 6). But it has a pronounced effect for the subsample of those older than 30, 35 and 40 (columns 3, 5 and 7). In sum, the estimated effect of destination fertility in column (1) is mostly driven by households with older naturalization applicants, who are more likely to have completed their fertility, and for whom fertility data is more likely to be reliable.

To further exploit the richness of our individual-level naturalizations data, we conduct a further test. In Appendix Table B20, we isolate the sub-sample of decrees where applicants list at least one child (column 2). For this sub-sample, we continue to see a significantly positive effect of destination fertility on the number of children listed in the decree, and of origin fertility as well. In fact, these effects are quantitatively larger than in the full sample.

Overall, the regressions in Tables 7 and B20 show that naturalized migrants in France did tend to adopt the French norms of their regions of destination. This implies that naturalized migrants were exposed to the fertility norm of the destination region, and helps shed light on the causal linkages connecting exposure to France with the diffusion of fertility norms to migrants' origin regions.

6 Conclusion

In this paper, we asked how the process of diffusion of French fertility norms and behaviors crossed European borders. We argued that cultural remittances from migrants to France back to their regions of origin played an important role in this process. Our starting point was the observation that, during the 19$^{\text{th}}$ and early 20$^{\text{th}}$ century, France was exceptional not only because of its low fertility rates but also because it attracted a large number of immigrants from the rest of Europe – in part as a result of lower population growth due to its pioneering role in the demographic transition. As so many people moved to France, they had an effect on the spread of French fertility to the rest of Europe.

We approached the diffusion of the demographic transition from France to other European societies as a unique setting in which we could study an important and under-explored question: the effects of cultural remittances from the destination country on norms and behaviors in the regions of origin. In this respect, our analysis differs from the majority of economic studies exploring the relationship between international immigration and culture, which tend to focus on the persistence of cultural traits that migrants bring with them from their country of origin to the destination country.

In order to investigate the relation between cultural remittances and modern fertility, we put together a new dataset of immigration to France from a large set of European countries and regions for the period 1850-1930, using French census data on the number of immigrants in France by country of origin. We used newly assembled data from French naturalization records to assign these immigrants to the subnational regions of their countries of origin. Thus, we created a systematic dataset of the flows and stocks of migrants to France from their subnational European regions of origin.

We found that immigration to France indeed translated into reduced fertility in the immigrants' region of origin after a few decades, consistently with the timing required to change immigrants' own preferences and beliefs and transfer them to their peers and relatives back home. The results hold both in cross-regional regressions with country fixed-effects and numerous regional controls, as well as in a panel of European regions where we control for region fixed-effects. We also found that immigrants who became French citizens achieved lower fertility levels. These latter effects were larger for those immigrants who moved to French regions with the lowest fertility rates. This empirical evidence is consistent with the implications of a simple theoretical model of fertility choice that allows for social influence by immigrants and cultural change associated with the effects of migrants on their own regions of origin.

While we identified a unique historical setting where it was possible to document the significance of cultural remittances, future work should seek to investigate this mechanism in other settings. Cultural remittances constitute a potentially central channel of cultural diffusion across societies, as the incipient literature on this topic has begun to document.

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Online Appendix

A Naturalizations

A.1 Historical Background on Naturalizations in France

A.1.1 The Evolution of Legislation on Naturalization

France has had a long legal tradition of favoring citizenship by birthplace (*jus soli*). This standard facilitated the acquisition of French citizenship by the descendants of immigrants, in contrast with countries with large-scale emigration, such as Germany in 1912, that ended up favoring citizenship by descent (*jus sanguinis*). According to Noiriel (2010a), this enabled the large worldwide German diaspora to maintain "an attachment to their country of origin".

The reasons behind the evolution of French citizenship legislation were twofold. The first goal was to facilitate immigration in order to increase the size of the labor force in France, to compensate for low French fertility and human casualties due to wars. The second goal was to increase the size and homogeneity of the French population that could be mobilized in case of war. For these purposes, legislation facilitated the assimilation of an increasing number of foreigners, through naturalization.

The evolution of citizenship laws reflected these dual objectives. In the wake of the 1848 Revolution, a decree greatly liberalized naturalizations: individuals could become French after only five years of permanent residence, provided they obtained a certification from authorities at the *département* level. In 1849, requirements became more stringent. Foreigners first had to obtain a resident permit ("*autorisation d'admission à domicile*") and then wait for ten years before applying for naturalization. This permit gave foreigners civil rights comparable to those of French citizens (Barbiche and Nicolas, 2013, p. 2).

As migration to France increased in the mid-nineteenth century, French authorities started to worry about the decreasing weight of French citizens in the total population (Ministère de l'Intérieur, 2013). As a consequence, an 1851 law eased naturalization by descent, allowing every child born on the French territory from a father himself born in France to acquire French citizenship (the rule was extended to mothers in 1893). The children of naturalized citizens, even born abroad, could choose to be French. A 1867 decree further eased access to French citizenship by reducing from ten to three years the minimum compulsory waiting period between obtaining a residency permit and applying for naturalization. These successive reforms substantially facilitated the acquisition of French citizenship.

The military defeat against Prussia in 1871 and the loss of Alsace-Lorraine led the French government to develop a process of "reintegration" of formerly French people who had lost their French citizenship. People could lose French citizenship when being naturalized abroad or, for women, when marrying a foreigner. Reintegrations mainly involved people from Alsace-Lorraine after 1872, as well as the French women who lost their citizenship when marrying a foreigner and willing to recover it after widowhood, a divorce or the French naturalization of their husband.

The military defeat of 1871 also led authorities to seek to increase the number of French citizens who could join the military and fight for France in the event of another conflict (Ministère de l'Intérieur, 2013). Indeed, an 1889 law eased naturalization rules. This law confirmed the minimum three-year period between obtaining a resident permit and naturalization (and reduced the period to one year for the male foreigners who married a French woman), enabled the naturalization of any foreigner able to prove a 10-year period of continuous residency in France, automatically provided French citizenship to foreign women who married a Frenchman and to every individual born in France and residing there until their majority (albeit with the option for them to decline French citizenship). Finally, it precluded for "individuals born in France from foreigners themselves born in France, the possibility of repudiating French citizenship" (Dupâquier and Vejarano, 1986, p. 34, our translation).

The 1889 law introduced a new type of naturalization, "by declaration" by the applicant as opposed to the traditional form of naturalization by decree from authorities. Until then, according to the French civil code, a child born in France from foreign parents could claim French citizenship in the year after attaining majority (namely between 21 and 22 years old), which gave rise to naturalization by decree (Barbiche and Nicolas, 2013, p. 2). After 1889, naturalization in such cases is automatic unless the person repudiates it. Since few made the affirmative step to repudiate French citizenship, the practical effect was to institute the automatic naturalization of the second generation (Guillen, 1991, p. 36; Simon, 1998, p. 545).

The First World War was an opportunity for more easing of naturalization rules. A 1914 law facilitated the reintegration into French citizenship of foreigners who served in the French army as well as persons from Alsace-Lorraine. At the conclusion of the war, German residents of Alsace-Lorraine were given an opportunity to gain French citizenship (Barbiche and Nicolas, 2013, p. 2). A 1927 law further liberalized naturalization rules. In particular, it removed the requirement of a residency permit (*"autorisation d'admission à domicile"*).

A.1.2 The Naturalization Process

The naturalization process reached a vast scale. Indeed, between 1891 and 1911, the French population grew from 37,240,000 to 38,472,000 inhabitants, and according to Sauvy, 1989, "at least half of the growth of the French population was due to changes in citizenship" (p. 319-320, our translation). Figure B1 presents the evolution of the actual number of naturalizations since 1851, according to various the French national censuses. The number of naturalizations remained stable and limited until the 1870s and then dramatically increased to reach a total of $250,000$ naturalizations in the 1920s. This increase reflects the vast expansion of migrant flows during the Third Republic, and the impact of the 1889 naturalization law (Voisin, 2000, p. 9). In addition to an increasing number of foreigners arriving in France, a growing proportion of foreign residents applied for naturalization.[40]

A.2 Construction of the Naturalization Records Database

To construct our database of naturalization records, we proceed in several steps. We begin from 3,443 decrees that were recently digitized and made available by the French National Archives on a comprehensive basis for two periods: 1883-1900 and 1913-1930.[41] The information from these decrees was extracted by us from the website of the French National Archives ("Les Archives Nationales de la France").

Each decree lists naturalizations or other types of legal actions related to naturalizations, as detailed below. A single decree lists multiple *dossiers* that can pertain to either a household or an individual (there are 215,111 dossiers in the database). In our data collection effort, we defined a *record* as pertaining to a *single individual* (in other words, we disaggregated the dossiers into individual records). From the dossiers, we obtained 387,209 records related to naturalizations. Each record provides information on the individual who is covered by the decree, the issue date of the decree, the type of decree as well as on the individual's identity, marital status, number of children, age, occupation, citizenship and city of origin and of residence in France.

For the 387,209 records mentioned in the decrees database, we first coded the individual's city of origin and matched it to a subnational region of the fertility dataset from Coale and Watkins (1986). It was possible to do so for 258,655 individuals but not for the remaining 128,554, for various reasons. First, there are 5,258 individuals who are main applicants, for whom the city of origin was not mentioned. Second, based on the city of origin mentioned in the record, we identified 35,375 individuals born in countries outside Europe, thus in regions outside the geographic coverage of Coale and Watkins (1986). Third, for 38,495 individuals, a city of origin is indicated in the record but it was not possible to match it with a region from the fertility database, either because of a possible misspelling of the city name or because of a city name change. The potential bias in the data is limited as 70% of these unusable records were issued after 1913, i.e. after our main period of interest. Moreover, the number of concerned records never exceeds one thousand a year during the 1880s and the 1890s. Fourth, in dossiers involving multiple applicants (a man, a spouse and potential children), there are 11,369 relatives (spouse or children) and 38,047 children for which the city of origin is not recorded. This pertains mostly to the 1920s, before our main period of interest.

Finally, out of the exploitable 258,655 individuals, we identified 8,504 duplicates corresponding to individuals appearing in different decrees at different times. The most frequent case was when an individual first obtained a residency permit and became naturalized a few years later. In such

[40] According to Voisin, 2000, "[at first], few foreigners apply for naturalization: in 1872, they represented only 1.9% of the foreigners residing in France, but after that date, the share kept growing, to reach 15.1% in 1891 and almost 22% in 1901" (p. 99, our translation).

[41] Having continuous data over 1883-1900 enables us to capture the first major boom in naturalizations (Meuriot, 1912).

a case, we keep only the first decree issued for this individual. The final database is composed of 250,151 individuals.

A.3 Categories of Naturalization Records

Out of the exploitable 258,655 individuals, 257,994 of them appear in decrees issued during one of the four periods of our analysis (1883-1890, 1891-1900, 1913-1920 and 1921-1930). As shown in Table B1, we classified the 257,994 relevant and exploitable records into homogeneous categories.[42] French naturalizations make up the largest category with a total of 110,754 individuals over 1883-1930, including 36,484 before 1900. A second important category corresponds to residency permits ("*décret d'admission à domicile*"), which was long a prerequisite to naturalization. Most of the decrees related to residency permits were issued before 1890, with 16,739 permits over 1883-1890 out of a total of 22,964. The 1889 law relaxed the conditions to obtain French citizenship and applicants for naturalization no longer needed this permit after this date.

A third important category consists of naturalizations and reintegrations into French citizenship of people from Alsace-Lorraine, which belonged to Germany between 1871 and the end of World War I. Out of the 29,666 total individuals concerned, 13,676 pertained to the 1880s, a decade after France lost the war against Prussia, and 6,935 in the 1920s, a few years after France recovered this territory. In addition, there are 57,206 individuals concerned by decrees of reintegration but that do not explicitly refer to Alsace-Loraine, albeit an important part involves this region.

A fourth significant category is composed of: 1) Naturalizations of women, often married with a foreigner who obtained French citizenship, and 2) Reintegrations of women, who were formerly French but lost their French citizenship when marrying a foreigner. Contrary to the above decrees of French naturalizations for which the applicant is a man, possibly with a spouse involved in the application, in this case the main applicant is explicitly a woman. This type of decree involves 6,814 women mainly from 1921 onward, most of them born in France.

A further category is composed of 9,532 rejections of French naturalization and of resident permit, mainly from 1891 onward. This category involves people born in Belgium, France, Italy and to a lesser extent in Germany. In the same vein, there are 203 individuals subject to a decree of revocation of naturalizations or of resident permits, involving mainly individuals born in France.

The database further includes categories of decrees that are not relevant for our empirical analysis and that we exclude. These mainly involve initially French individuals (or born in France) or individuals who acquired another citizenship than the French one. These records do not provide information on foreigners who migrated to France and could then diffuse the French fertility norms to their region of origin. For instance, the database includes almost 19,000 individuals subject to decrees of Algerian or other colonial naturalizations, corresponding to the naturalizations of

[42] This classification was a substantial amount of work: each decree describes the type of legal action being taken, with substantial variation in the description. We aggregated these types into 12 categories, assigning each decree to one of them.

people (possibly French) who acquired the citizenship of a country belonging to the French colonial empire, mainly composed of Algeria, Tunisia, Morocco, as well as other African and Asian countries. Regarding to the non-French naturalizations, there are also $1,076$ permits of naturalization abroad or authorizations to serve abroad, mainly for French individuals as well as some Germans and Swiss individuals.[43]

[43]The database also provides information on name changes and rejections of name changes, which mainly took place over the 1920s and applied to French individuals but also to foreigners such as Germans, Belgians and Italians. Finally, there were a very few decrees of hereditary annuity mainly for soldiers, involving mostly individuals born in France.

B Figures and Tables

Figure B1: Evolution of the Stock of Foreigners and of Naturalized Citizens in France

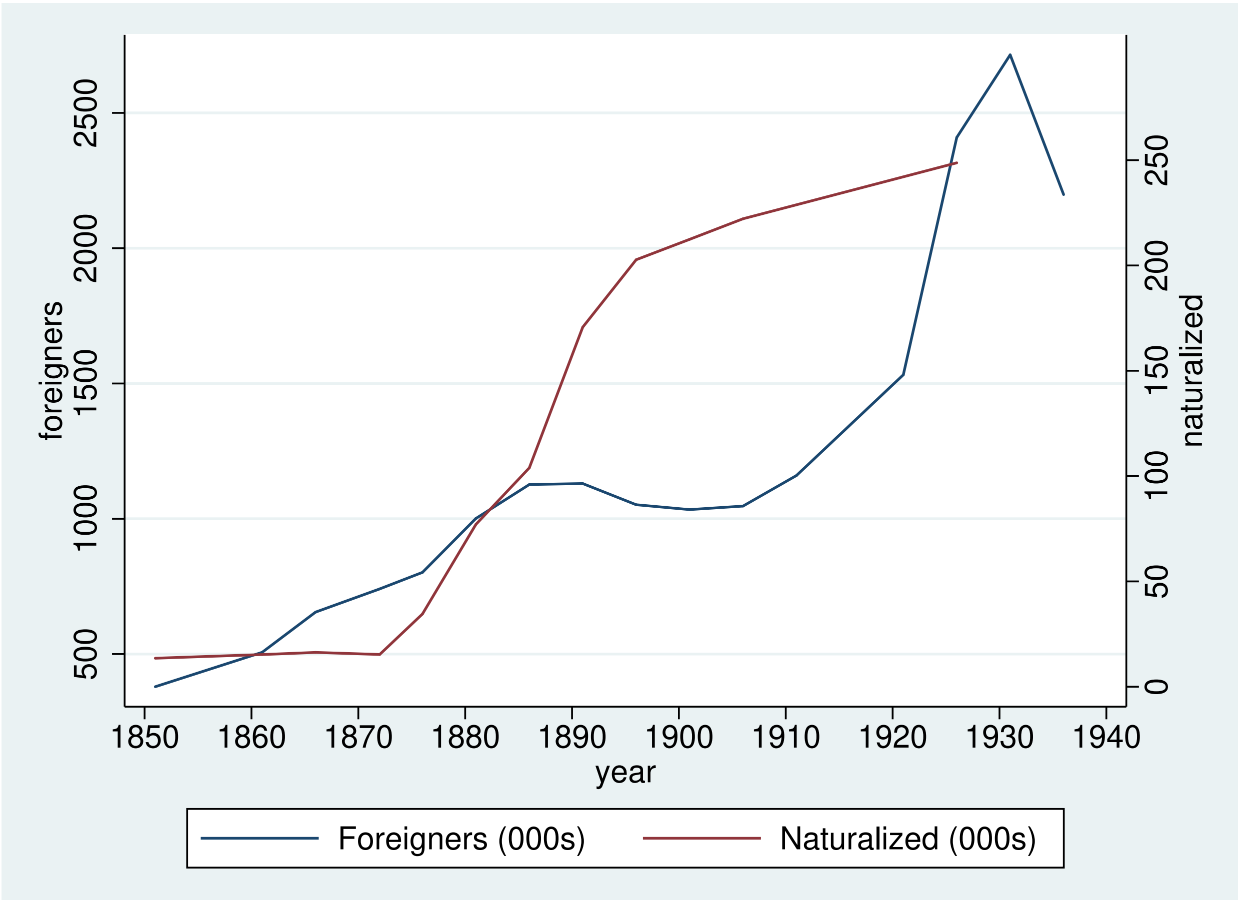
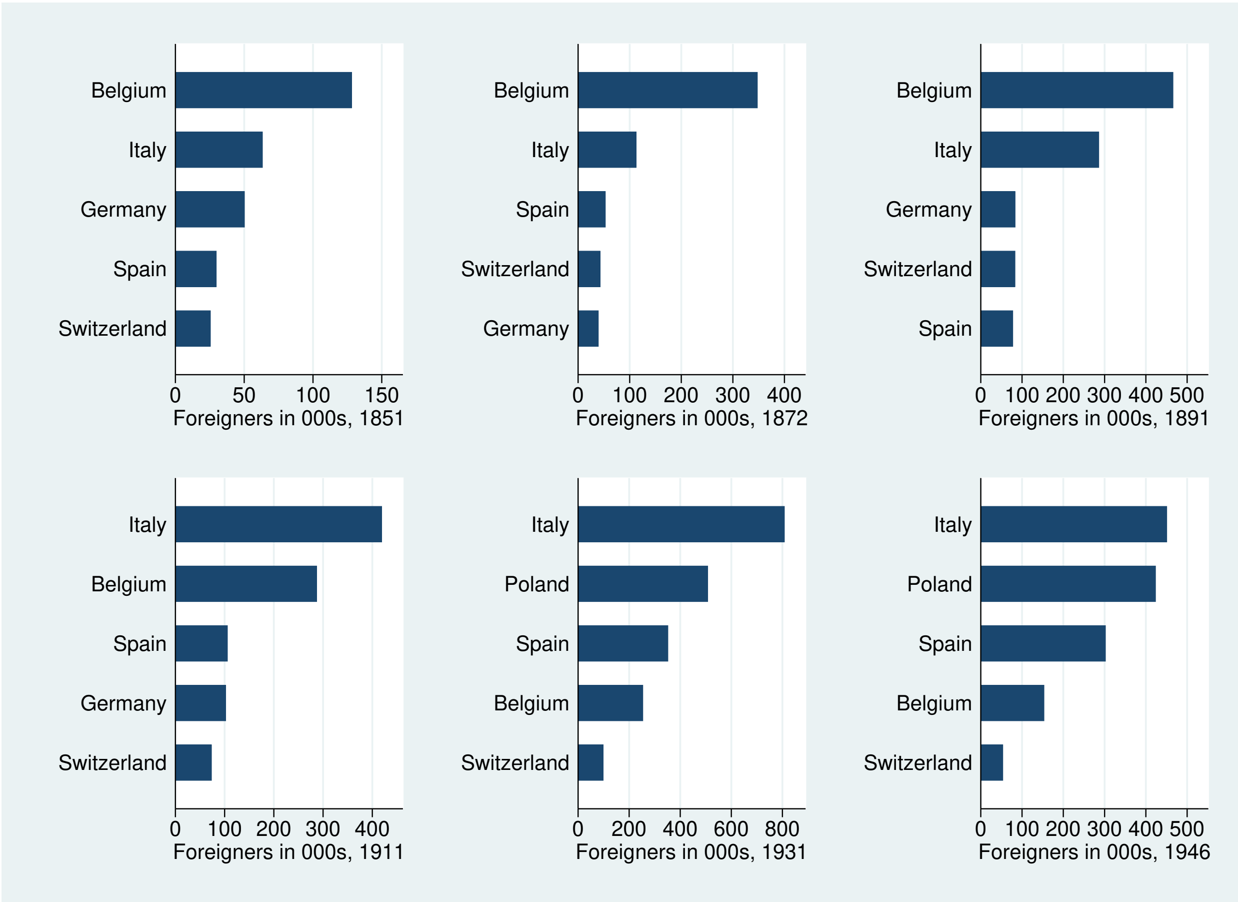
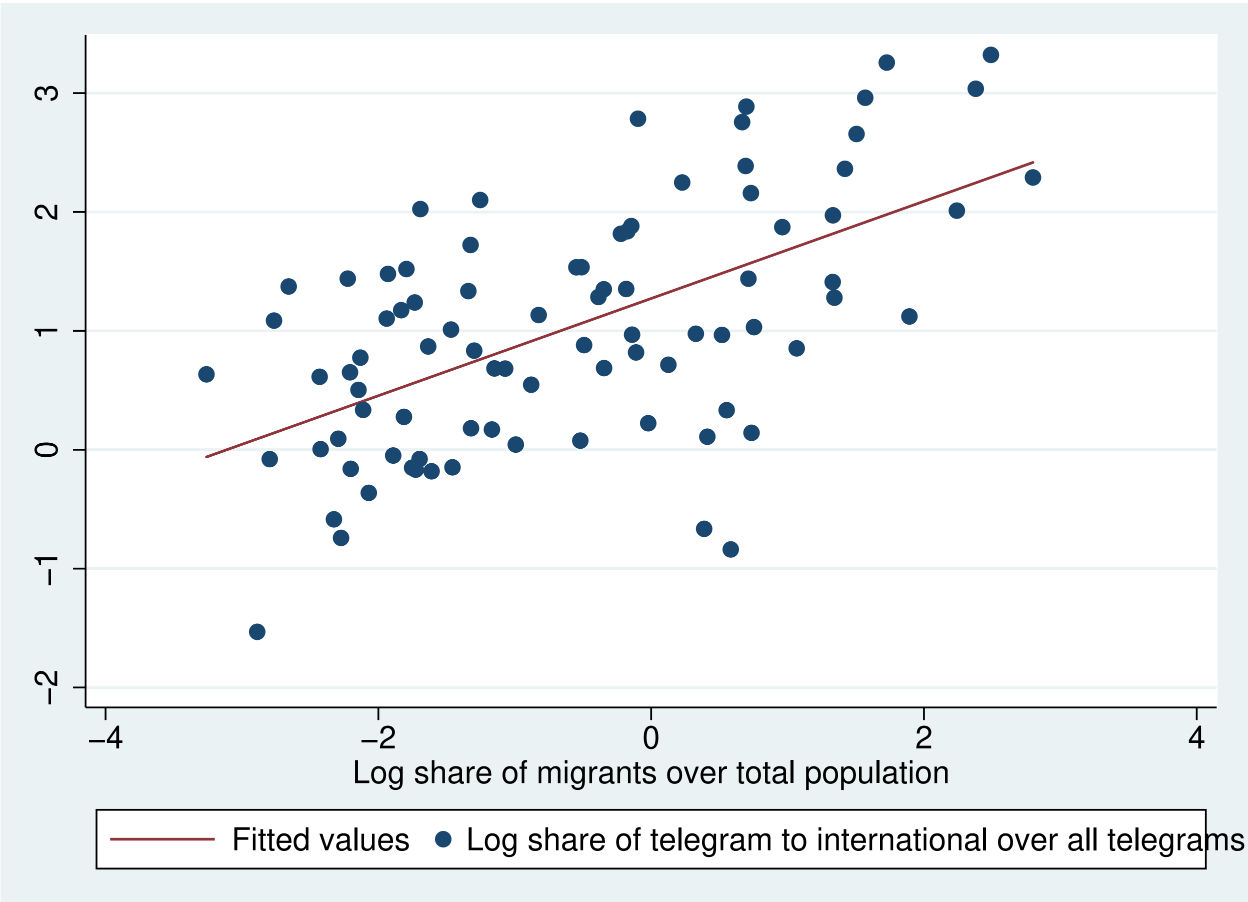


Figure B2: Foreigners in France by Country of Origin at Selected Dates



Source: Various issues of the French National Census.

Figure B3: Share of Foreigners in Population vs. Share of International Telegrams in all Telegrams at the French department level in 1876



Source: 1876 French National Census.

Figure B4: Cumulative Distribution of Fertility Transition Dates

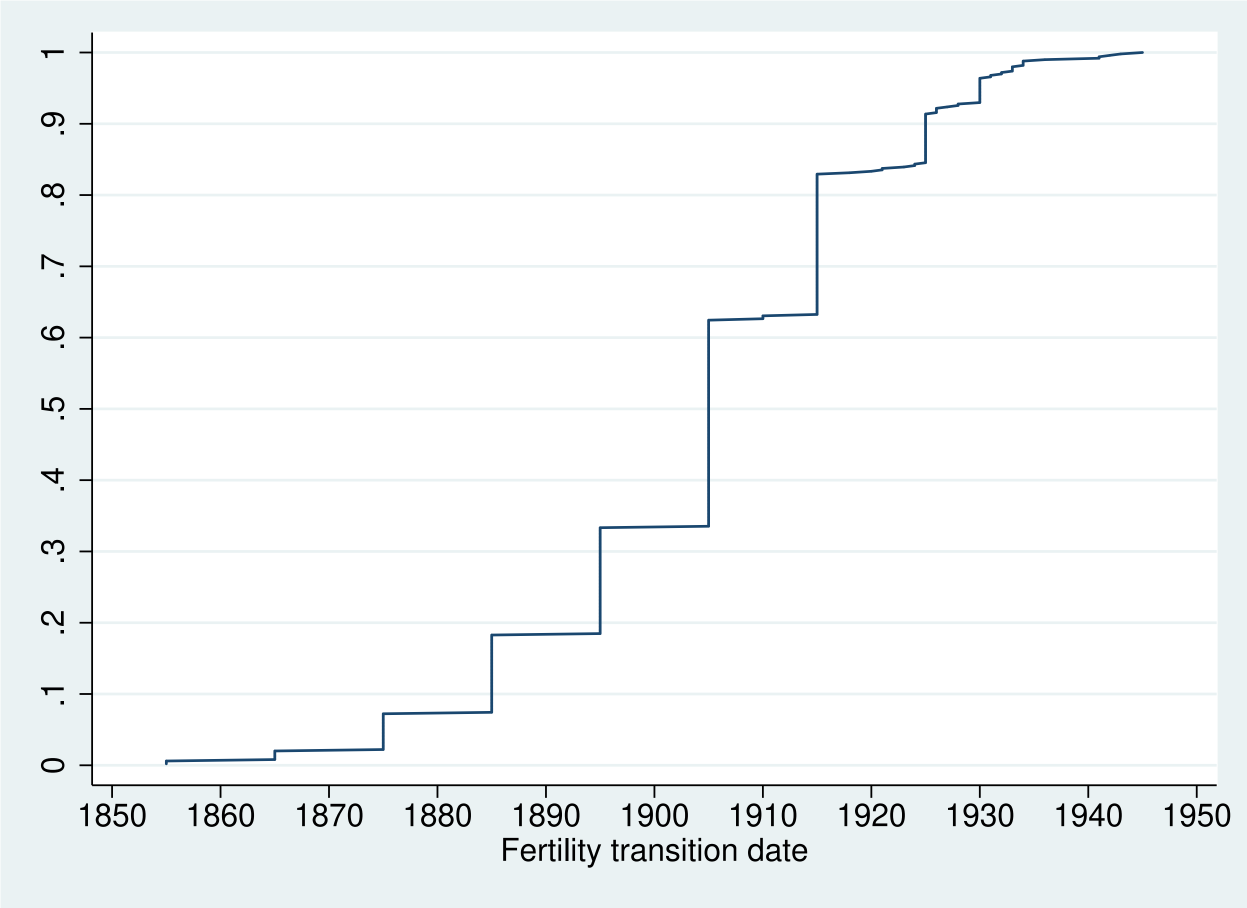
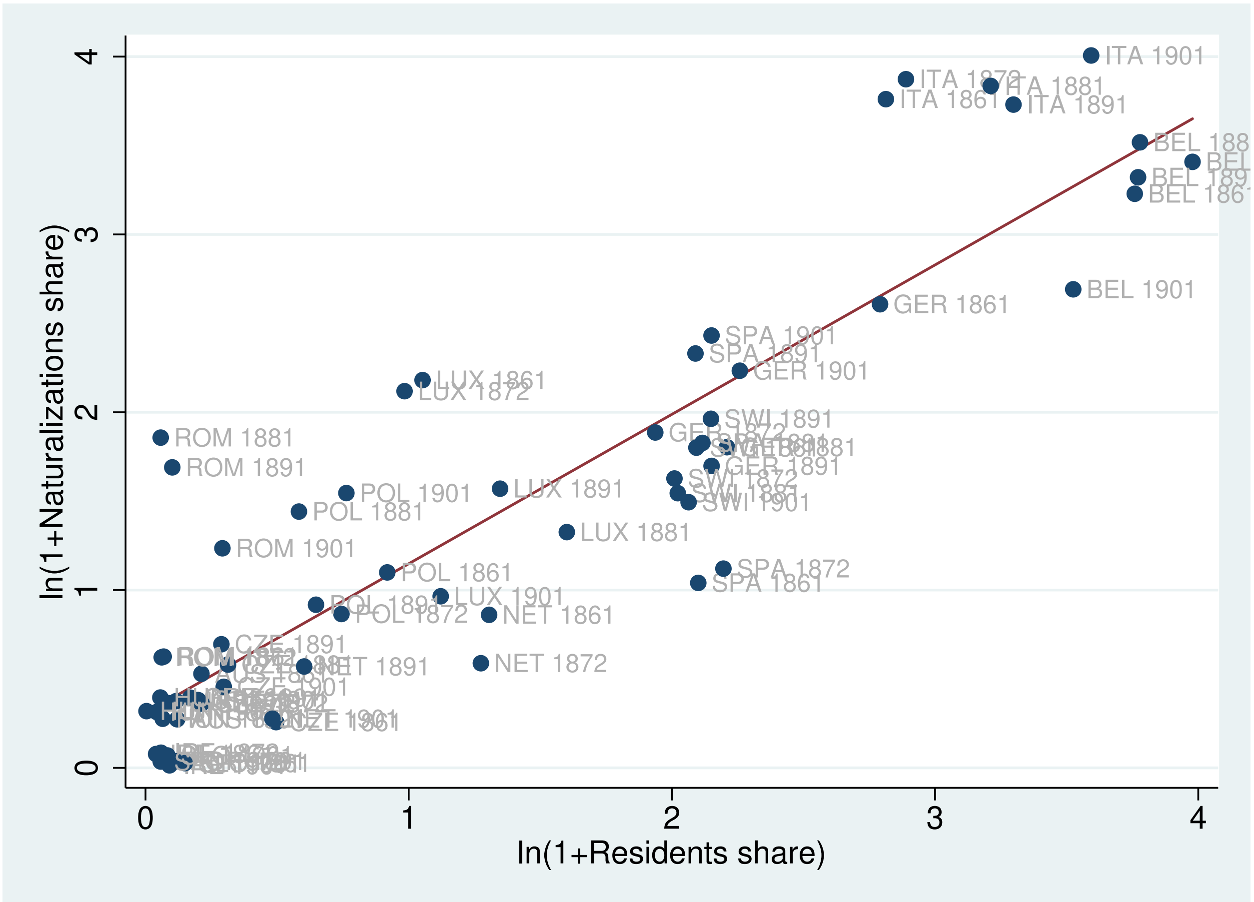
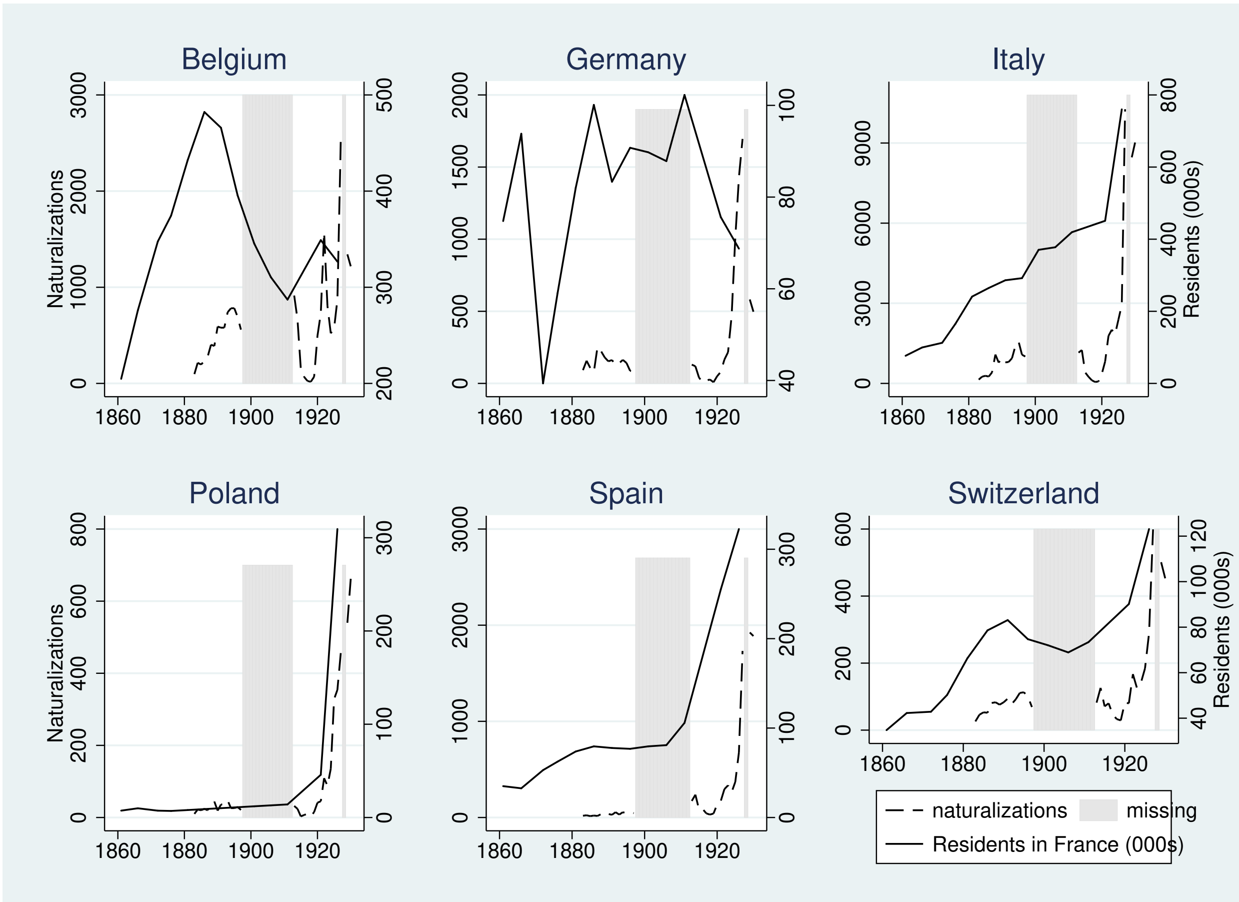


Figure B5: Share of Naturalized VS Residents in France by country of Origin



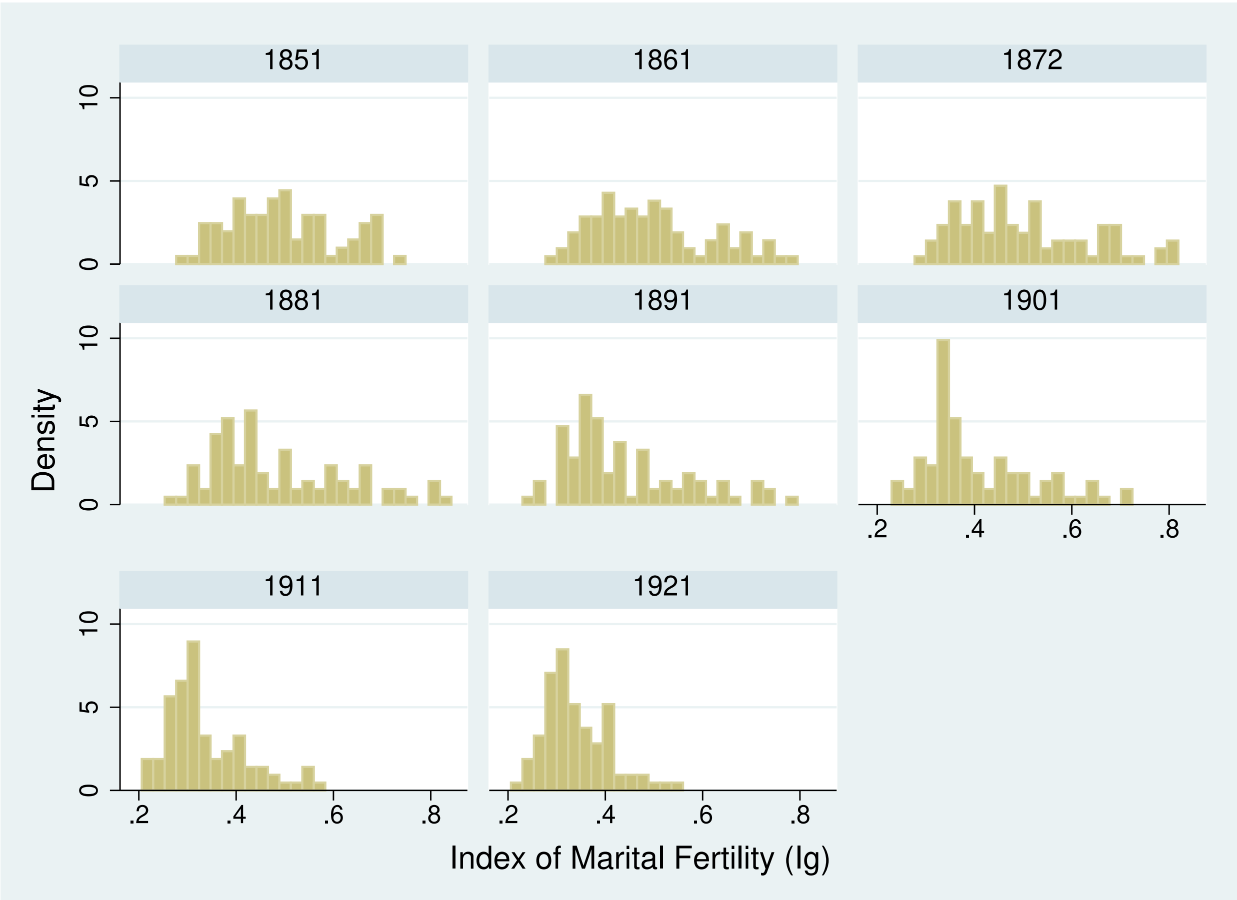
Note: The date in the label corresponds to the date of measurement of the residents in France. Naturalizations are measured two decades later. Source: Various issues of the French National Census and French National Archives.

Figure B6: Evolution of Naturalization and Residents in France for 6 Countries



Source: Various issues of the French National Census and French National Archives.

Figure B7: Distribution of Marital Fertility Rates across French Regions



Note: Distribution of the Marital fertility rate, Ig, of the French regions.

Figure B8: Destination Regions in France for a Selection of Belgian Regions

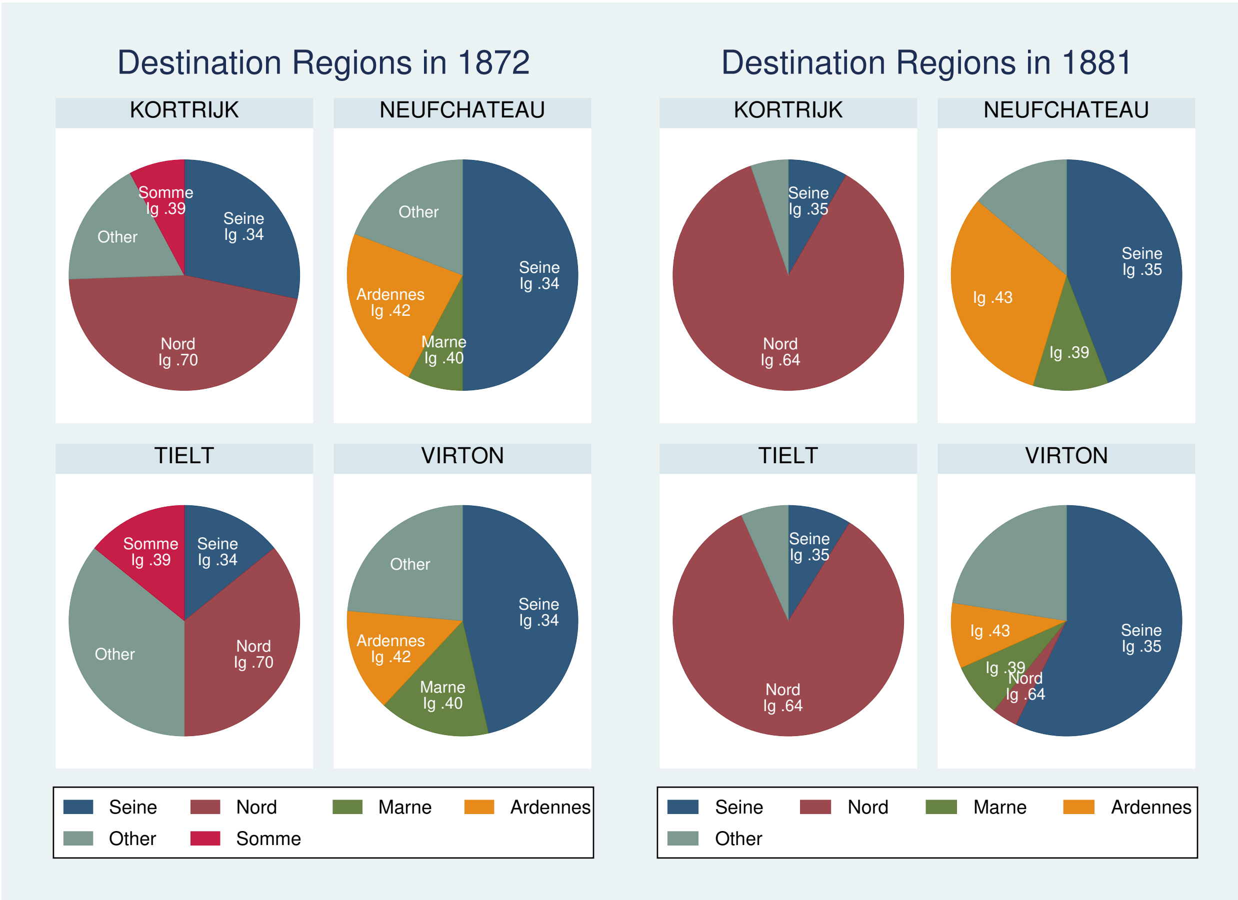


Figure B9: Destination Regions in France for a Selection of Italian Regions

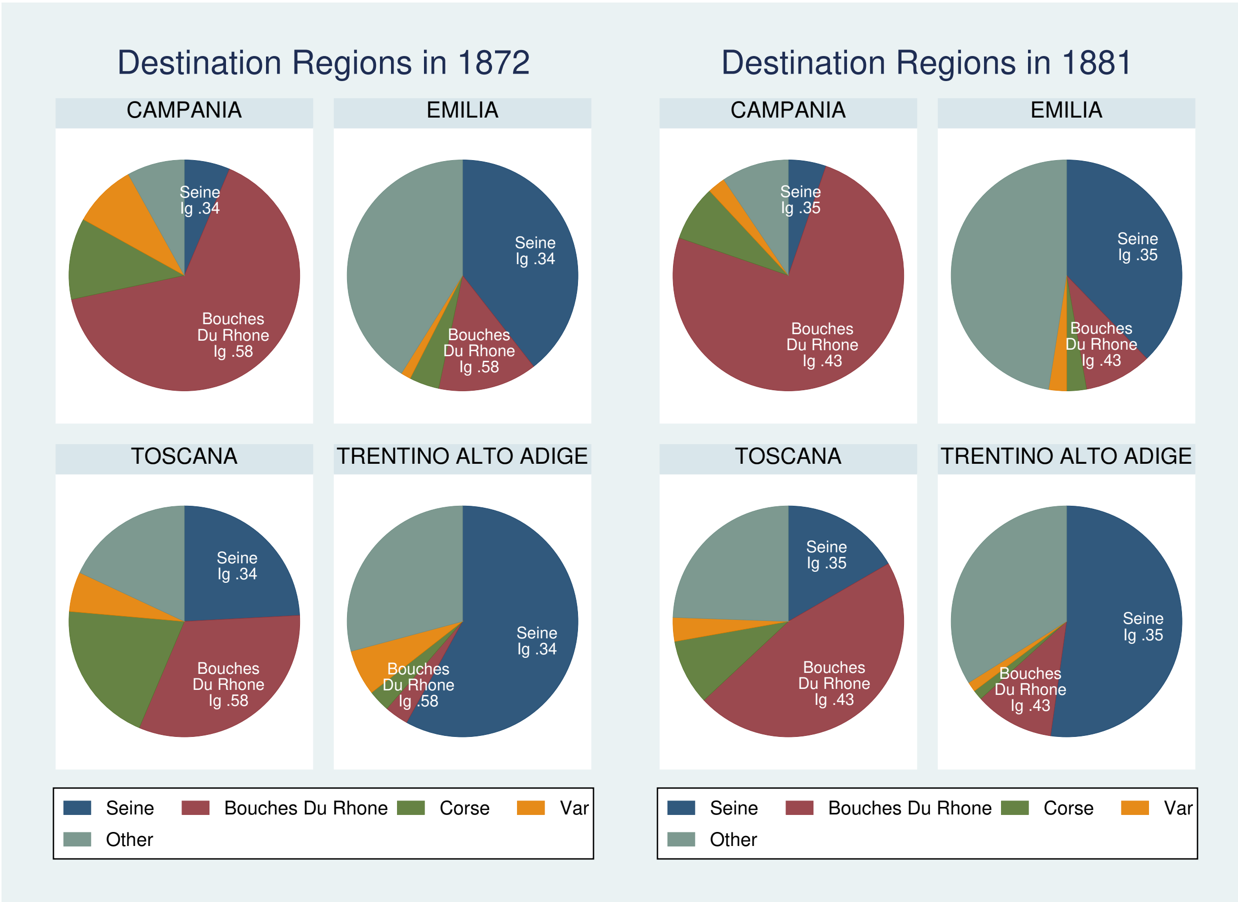


Figure B10: Distribution of Destination Fertility, *DestIg*

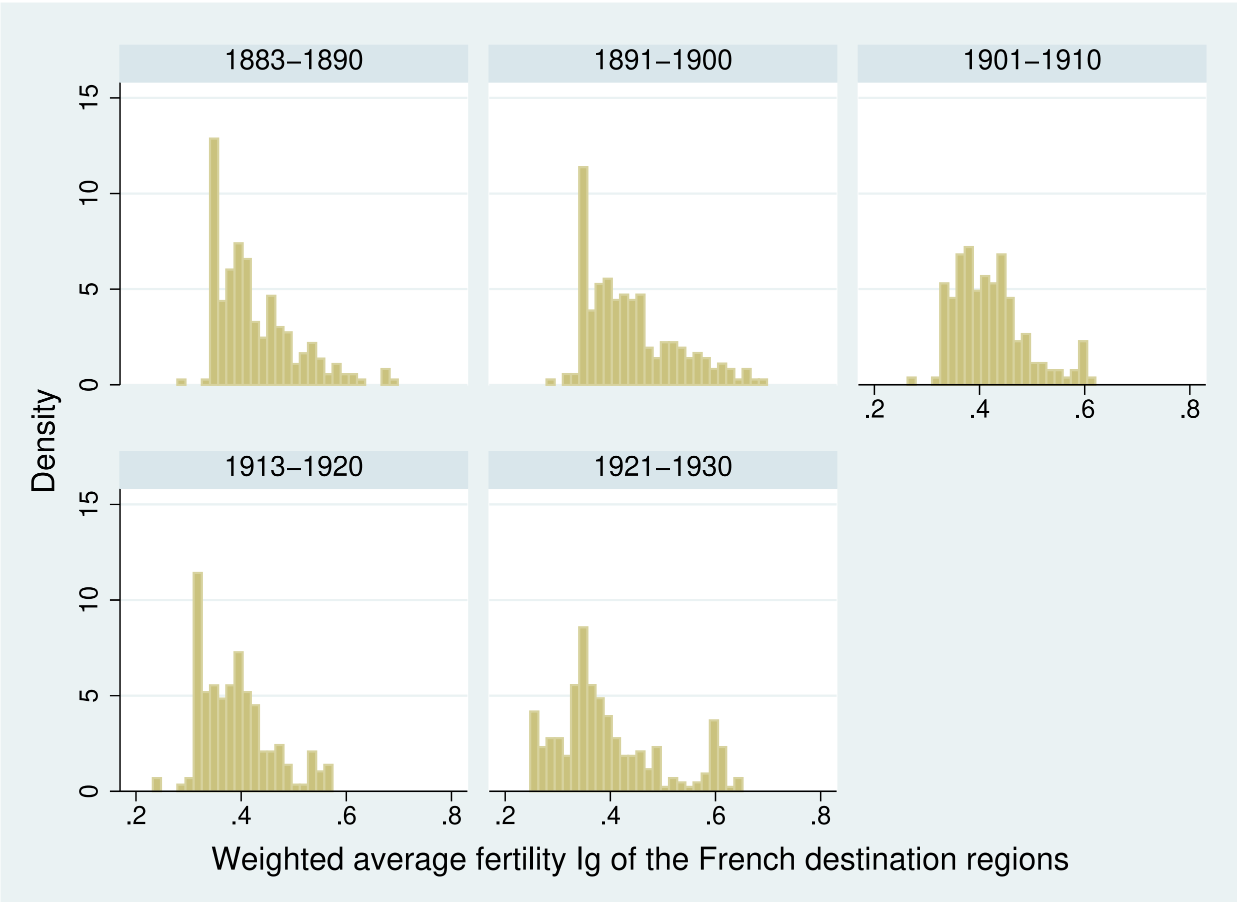
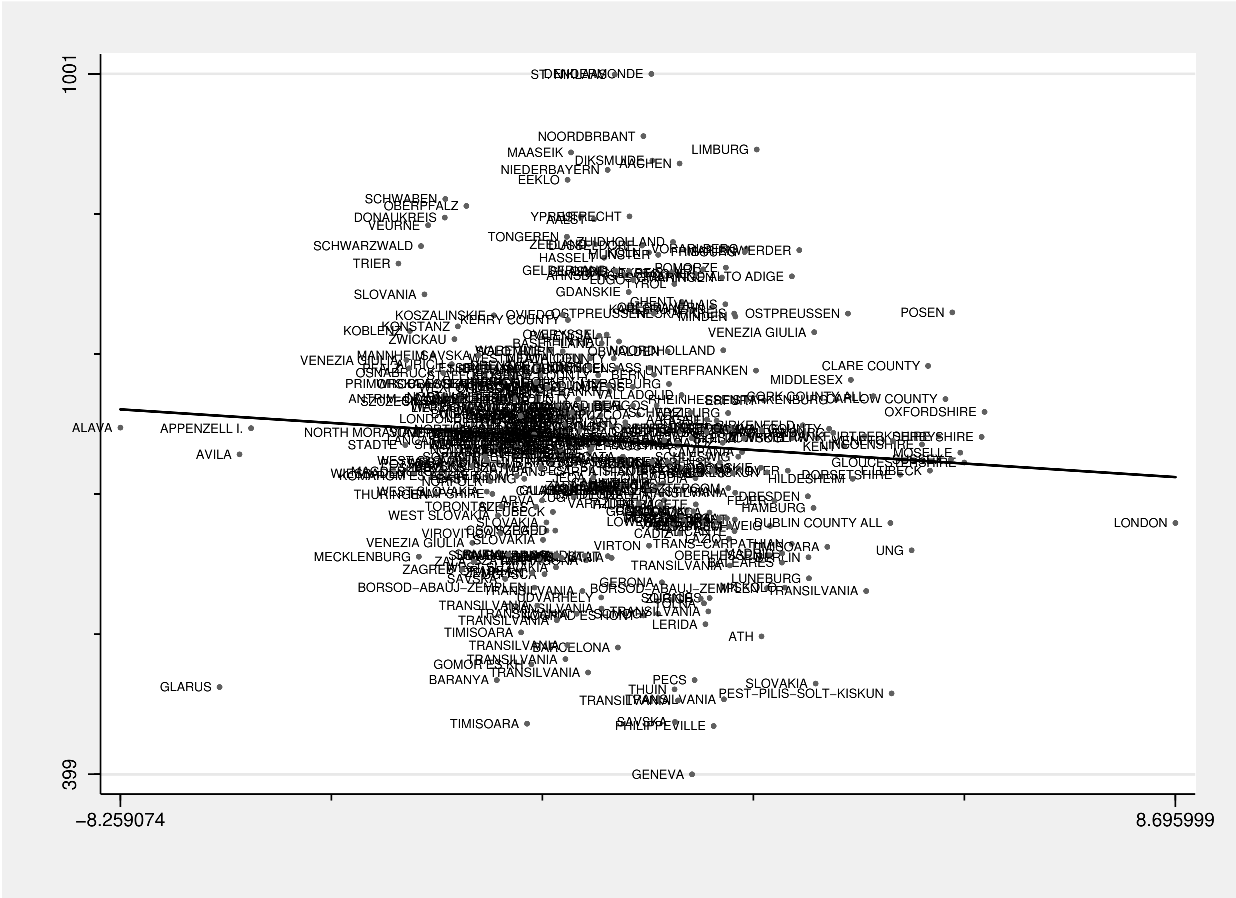
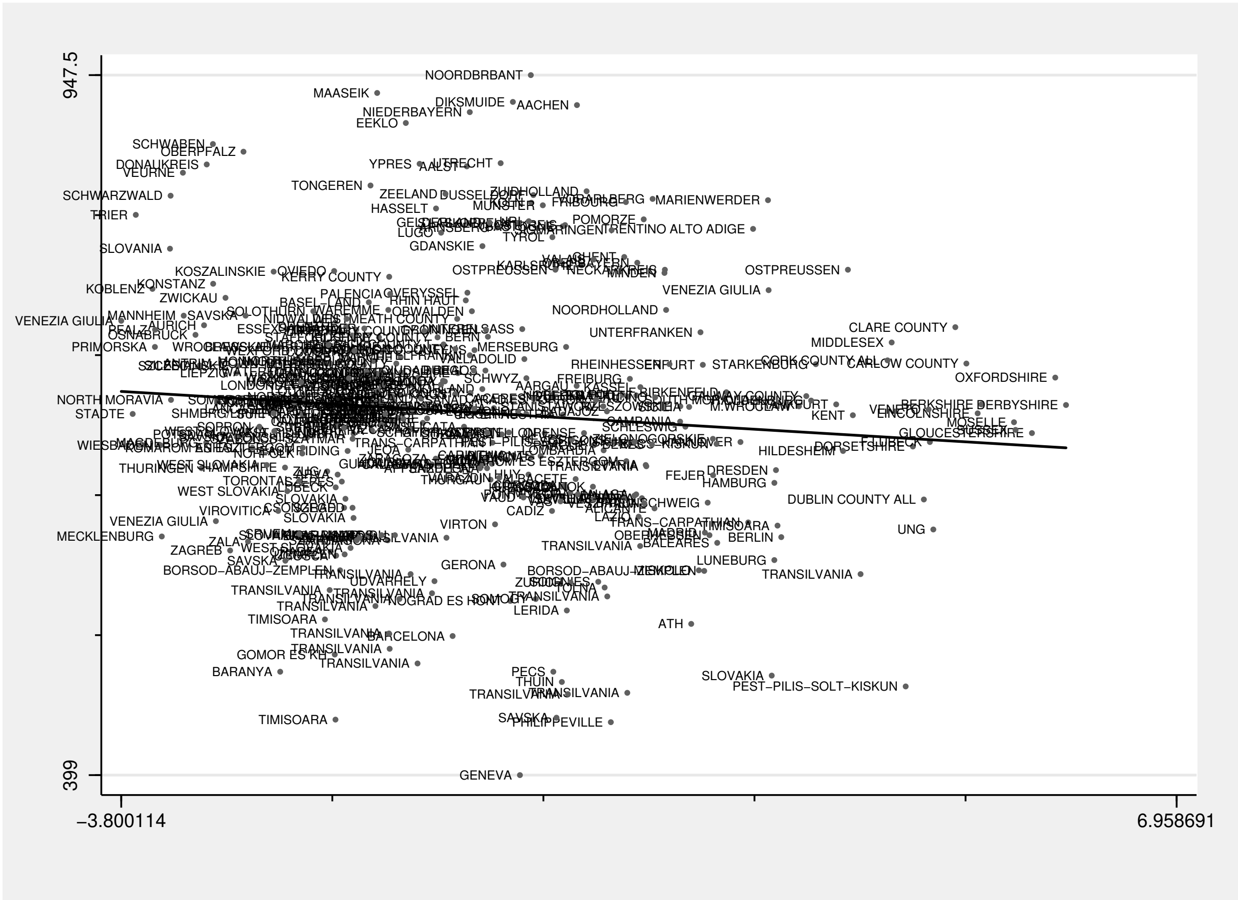


Figure B11: Fertility Rate and Exposure Including Controls



Note: Partialled out fertility rate (1871-1890) and partialled out exposure (1861-1880) using the specification of Table B14, column (1), including all controls.

Figure B12: Fertility Rate and Exposure, Including Controls and Dropping Outliers



Note: Partialled out fertility rate (1871-1890) and partialled out exposure (1861-1880) using the specification of Table B14, column (2), including all controls and dropping outliers.

Table B1: Naturalization Records by Category and Periods

	1883-1890		1891-1900		1913-20		1921-30	
Decree type	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Name changes	3	0	2	0	0	0	1,066	0.85
Residency permit	16,739	30	3,801	6.69	327	1.61	2,097	1.67
French naturalization	11,435	21	25,049	44.08	7,610	37.54	66,660	53.09
Reintegration	7,469	14	13,005	22.89	5,755	28.39	30,977	24.67
Naturalization/reintegration of women	0	0	0	0	81	0.4	6,733	5.36
Rejections of French naturalization and of resident permit	1	0	2,587	4.55	2,596	12.81	4,348	3.46
Revocation of naturalization or of resident permits	55	0	27	0.05	95	0.47	26	0.02
Hereditary annuity	0	0	0	0	44	0.22	44	0.04
Naturalization abroad	208	0	104	0.18	113	0.56	651	0.52
Algerian naturalizations	5,610	10	4,337	7.63	787	3.88	4,382	3.49
Colonial naturalization	148	0	1,664	2.93	54	0.27	1,638	1.3
Naturalization/reintegration of Alsatians	13,676	25	6,245	10.99	2,810	13.86	6,935	5.52
Total	**55,344**	**100**	**56,821**	**100**	**20,272**	**100**	**125,557**	**100**

Note: *Residency permit* corresponds to "*décret d'admission à domicile*" in French, and *Hereditary annuity* to "Investiture d'une Dotation". Shaded: Excluded from our analysis.

Table B2: Summary Statistics and Correlations for the Number of Naturalizations by Region of Origin (*nrcd*)

Panel A. Summary Statistics

Period	**Obs.**	**Mean**	**Std.dev**	**Min**	**Max**	**Individuals**
1883-1890	433	76.38	666.51	0	9,904	46,320
1891-1900	433	68.92	422.62	0	5,588	47,935
1913-1920	442	26.95	114.08	0	1,399	20,357
1921-1930	501	152.51	736.32	0	13,857	120,232

Note: The second column provides the number of region-level observations by period. The last column provides the total number of individual records by period used to construct the number of naturalizations by Region of Origin, *nrcd*.

Panel B. Simple Correlations of the Number of Naturalizations across Decades

	# Naturalizations		
# Naturalizations	1883-1890	1891-1900	1913-1920
1891-1900	0.95		
1913-1920	0.76	0.92	
1921-1930	0.41	0.65	0.84

Table B3: Summary Statistics on Age at Arrival in France and at Naturalization

	Mean	**Median**	**Std.dev**	**Min**	**Max**	**Obs**
Arrival age	19.16	19.50	10.41	1	43	98
Decree age	39.83	38	10.26	25	66	98
Duration	20.66	20	9.56	3	51	98

Source: Sample of 98 complete naturalization dossiers that we consulted in person at the French National Archives.

Table B4: Cross-Regional Regressions with Naturalizations

	Marital Fertility, *Ig*			
	1871-1890	1881-1900	1891-1910	1901-1920
	(1)	(2)	(3)	(4)
Naturalizations 1881-1900 (IHS)	-10.46***			
	(3.199)			
Naturalizations 1891-1910 (IHS)		-9.225***		
		(3.236)		
Naturalizations 1901-1920 (IHS)			-8.966**	
			(4.087)	
Naturalizations 1911-1930 (IHS)				-3.801
				(3.782)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	373	396	396	403
R^2	0.451	0.333	0.286	0.370
Standardized Beta %	-23.898	-21.214	-18.383	-8.745

Note: All regressions include country fixed effects defined as per 1866 borders. Included controls: population mid-19th (in ln), geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B5: Cross-Regional Regressions - Children and Adults Exposure

	Marital Fertility *Ig*			
	1871-1890	1881-1900	1891-1910	1901-1920
	(1)	(2)	(3)	(4)
Children Exposure 1861-1880 (IHS)	-2.009			
	(2.803)			
Adults Exposure 1861-1880 (IHS)	-18.72***			
	(4.198)			
Children Exposure 1871-1890 (IHS)		-4.705		
		(3.488)		
Adults Exposure 1871-1890 (IHS)		-7.850**		
		(3.711)		
Children Exposure 1881-1900 (IHS)			-4.878	
			(4.398)	
Adults Exposure 1881-1900 (IHS)			-7.018*	
			(3.876)	
Children Exposure 1891-1910 (IHS)				-3.589
				(5.811)
Adults Exposure 1891-1910 (IHS)				-5.142
				(5.992)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	231	235	232	242
R^2	0.443	0.364	0.337	0.329

Note: Exposure of Adults is calculated based on the share of main applicants (head of household) in the total number of individuals (main applicants plus children) listed on the naturalization records of region r in country c. Exposure of Children is calculated based on the share of children naturalized along with the main applicant in the total number of individuals (main applicants plus children) on the naturalization records of region r in country c. All regressions include country fixed effects defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B6: Cross-Regional Regressions - Exposure by Age Groups

	Marital Fertility *Ig*			
	1871-1890	1881-1900	1891-1910	1901-1920
	(1)	(2)	(3)	(4)
Exposure - age 20-45, 1861-1880 (IHS)	-9.503***			
	(3.042)			
Exposure - age 45+, 1861-1880 (IHS)	-7.355***			
	(2.130)			
Exposure - age 20-45, 1871-1890 (IHS)		-8.085***		
		(2.352)		
Exposure - age 45+, 1871-1890 (IHS)		-4.718**		
		(2.147)		
Exposure - age 20-45, 1881-1900 (IHS)			-7.544*	
			(3.984)	
Exposure - age 45+, 1881-1900 (IHS)			-1.474	
			(4.001)	
Exposure - age 20-45, 1891-1910 (IHS)				-2.441
				(4.276)
Exposure - age 45+, 1891-1910 (IHS)				-7.866*
				(4.373)
All controls	X	X	X	X
Country FE	X	X	X	X
Regions	231	235	232	242
R^2	0.437	0.367	0.336	0.333

Note: Exposure of individuals between 20 and 45 years old is calculated based on the share of naturalized adults between 20 and 45 in the total number of indivduals coming from region r in country c. Exposure of individuals over 45 years old is calculated based on the share of naturalized adults over 45 in the total number of naturalized individuals coming from region r in country c. All regressions include country fixed effects defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B7: Cross-Regional Regressions - Robustness to Todd's Family Structure

	Ig 1871-1890 (1)	*Ig* 1881-1900 (2)	*Ig* 1891-1910 (3)	*Ig* 1901-1920 (4)
Exposure to France 1861-1880 (IHS)	-9.451***			
	(1.943)			
Exposure to France 1871-1890 (IHS)		-7.791***		
		(2.104)		
Exposure to France 1881-1900 (IHS)			-8.442***	
			(2.711)	
Exposure to France 1891-1910 (IHS)				-5.120**
				(2.445)
Absolute Nuclear	50.07*	51.54*	52.65	42.93
	(26.90)	(29.37)	(39.12)	(33.55)
Egalitarian Nuclear	84.28***	93.89***	86.57**	86.52***
	(27.36)	(28.23)	(33.52)	(29.73)
Stem Family	69.10***	85.93***	105.4***	108.2***
	(18.13)	(20.18)	(29.51)	(24.66)
Incomplete Stem Family	87.75***	93.39***	124.7***	145.2***
	(22.00)	(22.91)	(29.83)	(31.87)
Communitarian	64.38*	80.09**	55.04	46.80
	(35.65)	(35.41)	(39.29)	(41.01)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	240	240	226	257
R^2	0.367	0.273	0.276	0.481
Standardized Beta %	-41.738	-34.784	-33.054	-18.721

Note: All regressions include country fixed effects defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. The omitted type of family structure is "intermediate". Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B8: Cross-Regional Regressions - Robustness to Time Span (30-year Periods)

	Ig 1861-1890	*Ig* 1871-1900		*Ig* 1881-1910		*Ig* 1891-1920
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure 1861-1890 (IHS)	-4.560**	-3.676**				
	(1.796)	(1.771)				
Exposure 1871-1900 (IHS)			-3.212*	-3.459*		
			(1.720)	(1.868)		
Exposure 1881-1910 (IHS)					-1.302	-1.336
					(1.814)	(1.940)
Controls	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Regions	373	396	427	427	451	452
R^2	0.451	0.381	0.366	0.308	0.288	0.345
Standardized Beta %	-18.291	-14.940	-13.746	-14.271	-5.443	-5.103

Note: Cross-regional regressions over 30-year periods. Exposure being available from 1861 to 1910, it is measured contemporaneously in columns (1), (3) and (5), and with a 10-year lag in columns (2), (4) and (6). All regressions include country fixed effects defined as per 1866 borders. Included controls: Geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B9: Cross-Regional Regressions - Robustness to the Lag Structure

	Ig 1871-1890 (1)	*Ig* 1881-1900 (2)	*Ig* 1891-1910 (3)	*Ig* 1901-1920 (4)
Exposure 1851-1870 (IHS)	No data			
Exposure 1861-1880 (IHS)		-4.316**		
		(1.905)		
Exposure 1871-1890 (IHS)			-4.201**	
			(2.091)	
Exposure 1881-1900 (IHS)				-5.046*
				(2.702)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	583	396	396	363
R^2	0.539	0.326	0.301	0.304
Standardized Beta %	-5.103	-16.594	-15.381	-17.258

Note: Cross-Regional Regressions over 20-year periods with no overlap between *Ig* and *Exposure*. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B10: Cross-Regional Regressions - Robustness to Naturalization Delay

	Marital Fertility *Ig*					
	1881-1900	1891-1910	1901-1920	1871-1890	1881-1900	1891-1910
Naturalization Assumption:		10-year lag			30-year lag	
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure 1861-1880 (IHS)				-5.035**		
				(1.958)		
Exposure 1871-1890 (IHS)	-3.900**				-3.742*	
	(1.826)				(1.976)	
Exposure 1881-1900 (IHS)		-3.633*				-1.564
		(2.093)				(2.034)
Exposure 1891-1910 (IHS)			-4.183*			
			(2.325)			
All controls	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Regions	396	396	394	373	396	451
R^2	0.325	0.299	0.380	0.443	0.307	0.290
Standardized Beta %	-15.249	-13.413	-14.571	-19.471	-14.723	-6.124

Note: Exposure to France is calculated under alternative assumptions of a 10-year lag between arrival in France and naturalization in columns 1-3 and of a 30-year lag in columns 4-6. Because of the limited availability of the naturalization data, it is not possible to construct Exposure over 1861-1880 under the assumption of a 10-year lag between arrival and naturalization, and over 1891-1910 under the assumption of a 30-year lag. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B11: Cross-Regional Regressions - Robustness to a Low Foreigners' Death Rate and Return Rate (α+β=0.2)

	Ig 1871-1890 (1)	*Ig* 1881-1900 (2)	*Ig* 1891-1910 (3)	*Ig* 1901-1920 (4)
Exposure to France 1861-1880 (IHS)	-5.676***			
	(2.013)			
Exposure to France 1871-1890 (IHS)		-3.696**		
		(1.847)		
Exposure to France 1881-1900 (IHS)			-3.149	
			(2.267)	
Exposure to France 1891-1910 (IHS)				-0.516
				(2.134)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	372	395	395	402
R^2	0.427	0.313	0.269	0.352
Standardized Beta %	-21.211	-13.960	-11.769	-1.807

Note: Compared to our baseline cross-regional regressions in which the construction of *exposure* is based on the assumption that the sum of the death rate (α) and the return rate (β) of foreigners is equal to 0.668, we now make the lower-bond assumption that this sum is equal to 0.2. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B12: Cross-Regional Regressions - Robustness to a High Foreigners' Death Rate and Return Rate (α+β=0.8)

	Ig 1871-1890 (1)	*Ig* 1881-1900 (2)	*Ig* 1891-1910 (3)	*Ig* 1901-1920 (4)
Exposure to France 1861-1880 (IHS)	-4.592**			
	(1.799)			
Exposure to France 1871-1890 (IHS)		-3.714**		
		(1.792)		
Exposure to France 1881-1900 (IHS)			-3.078	
			(2.035)	
Exposure to France 1891-1910 (IHS)				-1.105
				(2.011)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	372	395	395	402
R^2	0.425	0.313	0.270	0.352
Standardized Beta %	-18.305	-14.949	-11.499	-3.904

Note: Compared to our baseline cross-regional regressions in which the construction of *exposure* is based on the assumption that the sum of the death rate (α) and the return rate (β) of foreigners is equal to 0.668, we now make the upper-bond assumption that this sum is equal to 0.8. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B13: Cross-Regional Regressions - Placebo with Subsequent Exposure

	Ig 1851-1860 (1)	*Ig* 1851-1870 (2)	*Ig* 1861-1880 (3)	*Ig* 1871-1890 (4)
Exposure to France 1861-1880 (IHS)	-0.465			
	(2.374)			
Exposure to France 1871-1890 (IHS)		-1.275		
		(2.171)		
Exposure to France 1881-1900 (IHS)			-3.267	
			(2.141)	
Exposure to France 1891-1910 (IHS)				-1.900
				(1.714)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	81	152	285	402
R^2	0.467	0.328	0.508	0.415

Note: All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B14: Cross-Regional Regressions of Fertility 1871-1890 - Robustness to Outliers

	Marital Fertility *Ig*, 1871-1890			
	Full sample	exclud. outliers	exclud. Alsace-Loraine	exclud. 0 exposure
	(1)	(2)	(3)	(4)
Exposure 1861-1880 (IHS)	-5.135***	-6.742***	-5.052**	-20.01***
	(1.918)	(1.869)	(1.952)	(4.163)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	373	364	370	231
R^2	0.444	0.455	0.443	0.441
Standardized Beta %	-19.776	-26.677	-19.227	-49.626

Note: Column 2 excludes outliers: London, Glarus, Alava, Venezia Giulia, St. Niklaas, Appenzell I., Avila, Dendermonde and Posen. Column 3 excludes 3 regions in Alsace-Loraine: Lothringen/Moselle, Oberelsass/Rhin-Haut And Unterelsass/Rhin-Bas. Column 4 excludes regions with no exposure over 1861-1880. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B15: Cross-Regional Regressions of Fertility 1881-1900 - Robustness to Outliers

	Marital Fertility *Ig*, 1881-1900			
	Full sample	exclud. outliers	exclud. Alsace-Loraine	exclud. 0 exposure
	(1)	(2)	(3)	(4)
Exposure 1871-1890 (IHS)	-3.810**	-5.066**	-3.821**	-10.36***
	(1.823)	(2.033)	(1.843)	(3.409)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	396	386	393	242
R^2	0.313	0.315	0.313	0.334
Standardized Beta %	-15.166	-20.245	-15.004	-27.606

Note: Column 2 excludes outliers: London, Glarus, Alava, Venezia Giulia, Appenzell I., Limburg, Palencia and Drenthe. Column 3 excludes 3 regions in Alsace-Loraine: Lothringen/Moselle, Oberelsass/ Rhin-Haut And Unterelsass/Rhin-Bas. Column 4 excludes regions with no exposure in 1861-1880. All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B16: Cross-Regional Regressions for Fertility 1871-1890 - Contiguous vs. Non-Contiguous Regions

	Marital Fertility *Ig*, 1881-1900		
	Full sample	Contiguous regions	Non-contiguous regions
	(1)	(2)	(3)
Exposure to France 1861-1880 (IHS)	-5.274***	-25.08**	-4.448**
	(1.914)	(10.87)	(1.992)
All controls	X	X	X
Country FE	X	X	X
Regions	373	27	346
R^2	0.444	0.566	0.452
Standardized Beta %	-20.298	-54.901	-16.325

Note: Contiguous regions to France in column (2); Non-contiguous regions to France in column (3). All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B17: Cross-Regional Regressions for the Fertility Transition Date

	Transition Date			
	(1)	(2)	(3)	(4)
Exposure to France 1861-1880 (IHS)	-0.457*			
	(0.246)			
Exposure to France 1871-1890 (IHS)		-0.558**		
		(0.241)		
Exposure to France 1881-1900 (IHS)			-0.577**	
			(0.238)	
Exposure to France 1891-1910 (IHS)				-0.302
				(0.213)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	407	407	414	472
R^2	0.479	0.482	0.425	0.467
Standardized Beta %	-10.615	-13.240	-14.072	-7.639

Note: All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B18: Cross-Regional Regressions for the Fertility Transition Date with Additional Controls

	Transition Date			
	(1)	(2)	(3)	(4)
Exposure to France 1861-1880 (IHS)	-0.741**			
	(0.312)			
Exposure to France 1871-1890 (IHS)		-0.766**		
		(0.306)		
Exposure to France 1881-1900 (IHS)			-0.683**	
			(0.309)	
Exposure to France 1891-1910 (IHS)				-0.400
				(0.295)
Literacy rate 1880	-0.0977	-0.0998	-0.105	-0.103
	(0.0738)	(0.0731)	(0.0737)	(0.0746)
Distance to Closest Coal Centroid	0.000757	0.000751	0.000958	0.000880
	(0.00984)	(0.00979)	(0.00988)	(0.00992)
Population density at mid-19th	0.000613	0.000695	0.000667	0.000485
	(0.000664)	(0.000692)	(0.000663)	(0.000598)
Urbanization rate 1850	-10.93**	-11.06**	-10.89**	-10.98**
	(4.434)	(4.446)	(4.453)	(4.416)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	213	213	213	213
R^2	0.487	0.490	0.486	0.480
Standardized Beta %	-17.434	-18.725	-17.041	-10.573

Note: All regressions include country fixed effects are defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B19: Cross-Regional Regressions of Fertility Transition Date with Destination Fertility

	Transition Date			
	(1)	(2)	(3)	(4)
Exposure to France 1861-1880 (IHS)	-1.581**			
	(0.619)			
Destination fertility 1861-1880	0.0369***			
	(0.0128)			
Exposure to France 1871-1890 (IHS)		-0.840		
		(0.748)		
Destination fertility 1871-1890		0.0428***		
		(0.0139)		
Exposure to France 1881-1900 (IHS)			-1.695*	
			(0.996)	
Destination fertility 1881-1900			0.0618**	
			(0.0238)	
Exposure to France 1891-1910 (IHS)				-0.413
				(0.590)
Destination fertility 1891-1910				0.0130
				(0.0122)
Controls	X	X	X	X
Country FE	X	X	X	X
Regions	240	208	167	253
R^2	0.508	0.483	0.528	0.467

Note: Destination Fertility = Weighted average fertility rate of the destination regions in France of migrants from region r in country c in decade d. All regressions include country fixed effects defined as per 1866 borders. Included controls: geodesic distance, absolute difference in longitudes to Paris, absolute difference in latitudes to Paris, dummy = 1 if region is barred by a mountain range from France, dummy = 1 if region is contiguous with France, dummy = 1 if region shares at least one sea or ocean with France, dummy = 1 if region is landlocked, dummy = 1 if region is on an island. All specifications include an intercept term. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B20: Individual-level Regressions, Sample with at Least One Child

	Individual fertility	
	Full sample	Min 1 child
	(1)	(2)
Destination *Ig*	0.430***	1.358**
	(0.118)	(0.565)
Origin *Ig*	0.138***	0.601**
	(0.0512)	(0.238)
Married	0.374***	0.205***
	(0.0121)	(0.0387)
Age	4.754***	16.65***
	(0.109)	(1.057)
Age^2	-5.047***	-18.08***
	(0.120)	(1.173)
Decree FE	X	X
Period FE	X	X
Origin FE	X	X
Dest. FE	X	X
N	71,805	8,647
R^2	0.093	0.182

Note: Destination region Ig = fertility rate of the individual's destination region in France; Origin Ig = fertility rate of the individual's region of origin. All regressions include individual controls: dummy for married individuals, age (divided by 100), squared age, as well as decree fixed effect, period (decade) fixed-effects, origin regions fixed-effects and destination regions fixed-effects. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

C Population-level Analysis

In this Appendix, we replicate our main analysis at the level of European populations, as opposed to subnational regions. We use a sample of up to 31 populations, as defined in Coale and Watkins (1986). These populations mainly correspond to countries or, in rare cases, to sub-national entities.[44] To measure exposure, we begin with the number of residents in France by country of origin c in census year t, provided in every decade after 1851 by the national census.[45] This gives us RES_{pt}, the number of residents in France from population p in year t corresponding to the first year of the decade d.

We then calculate a_{pd}, a variable that captures the number of migrant *arrivals* in France from population p over decade d, in the same way as in equation (19). Finally, we construct the treatment variable at the population-level, $EXPO_{p\nu}$, the population's exposure to France through migration to France in period ν. $EXPO$ cumulates the decadal flows of a_{pd} over either two or three decades, entered in regressions using the inverse hyperbolic sine transformation.

Analogous to the regional specification in equation (23), in a cross-section of populations for each period under consideration, we hypothesize that marital fertility in the populations of origin is related to these populations' exposure to France, in line with Proposition 1. We use the following specification:

$$Ig_{pt} = \alpha_1 EXPO_{p\nu}^{IHS} + \alpha_2 POP_{p\nu} + X_p' \alpha_3 + \epsilon_{pt} \tag{26}$$

where Ig_{pt} is the average marital fertility rate of population p over a 30-year period (t ranges from 1881-1910 to 1901-1930), $EXPO_{p\nu}^{IHS}$ the inverse hyperbolic sine of the population's exposure to France measured as the sum of gross arrivals in France from population p over period ν (where ν ranges from 1851-1880 to 1891-1920, i.e. it is lagged either 3, 2, 1 decade or contemporaneous compared to the dependent variable). Considering 30-year periods for t and ν maximizes the number of observations as Ig and $EXPO$ are not systematically observed every decade for every population.

The regression includes additional controls: First, $POP_{p\nu}$ is the average number of inhabitants of population p over period ν (in logs). Second, X_p' is a vector of time-invariant geographical controls, including geodesic distance from France, absolute difference in longitudes from France, absolute difference in latitudes from France, a dummy for a mountain range separating the country from France, a dummy for contiguity to France, a dummy for a common sea or ocean with France,the average elevation of the countries between the country in question and France, a dummy if the country is landlocked and a dummy for islands.[46]

[44]The 31 populations are Austria, Belarus, Bulgaria, Czech Republic, Denmark, England, Finland, Flemish Belgium, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Sardinia, Scotland, Slovakia, Spain, Sweden, Switzerland, Ukraine, Wales, Walloon Belgium, Yugoslavia.

[45]In the case of Belgium, we rely on Stengers (2004) to allocate the number of residents in France to Walloon Belgium and Flemish Belgium, as these correspond to distinct populations in Coale and Watkins (1986).

[46]These variables are obtained from Spolaore and Wacziarg (2022).

Table C1: Cross-population Marital Fertility Ig Regressions, 30-year periods

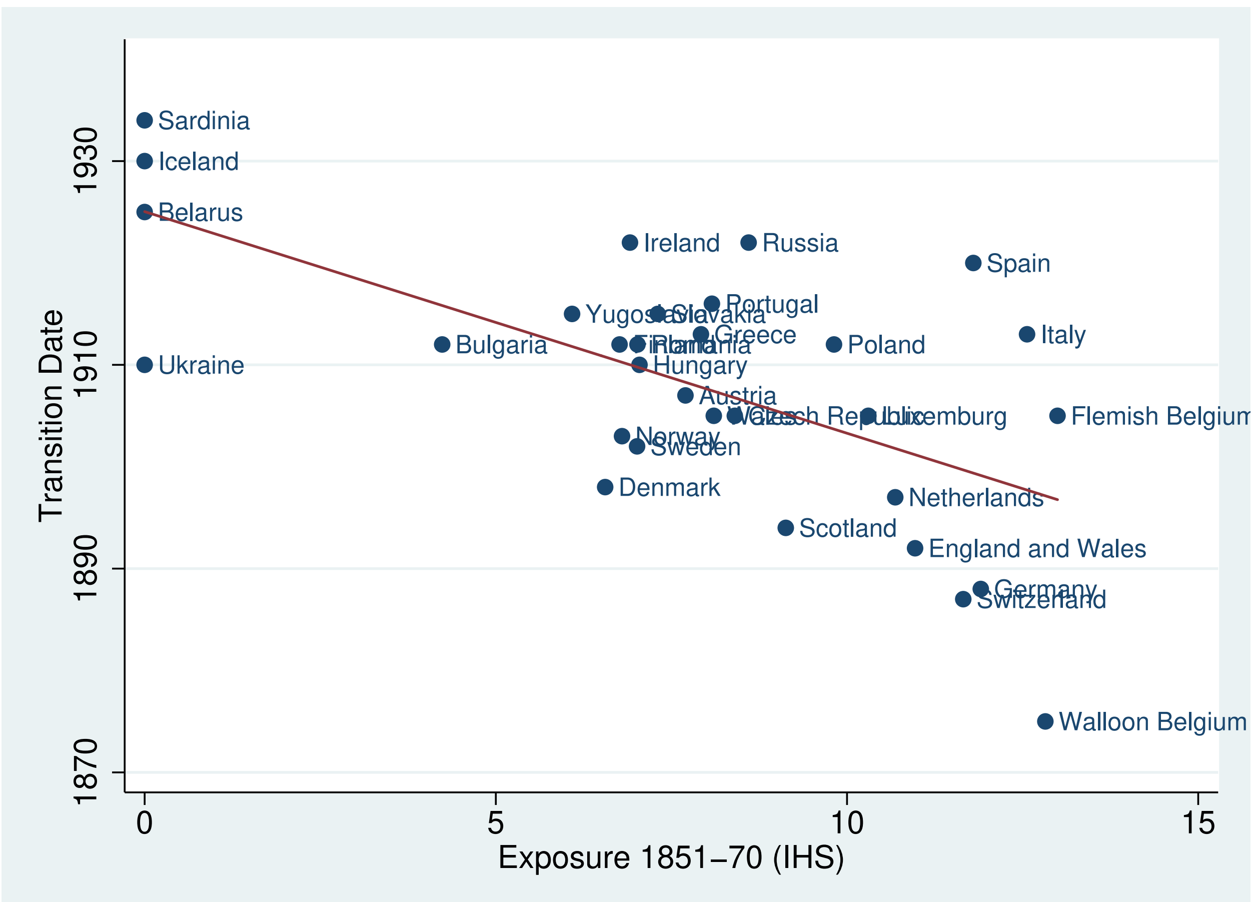
	Ig 1881-1910				Ig 1891-1920				Ig 1901-1930		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Exposure 1851-1880 (IHS)	-4.744										
	(5.836)										
Exposure 1861-1890 (IHS)		-4.951			-10.97**						
		(5.736)			(4.735)						
Exposure 1871-1900 (IHS)			-7.707			-13.58***			-17.65*		
			(5.203)			(4.174)			(9.862)		
Exposure 1881-1910 (IHS)				-8.851*			-13.69***			-16.51	
				(4.480)			(3.664)			(10.51)	
Exposure 1891-1920 (IHS)								-8.915			-18.63*
								(6.586)			(9.310)
All controls	X	X	X	X	X	X	X	X	X	X	X
Countries	29	29	29	29	29	29	29	29	29	29	29
R^2	0.309	0.316	0.347	0.367	0.526	0.539	0.535	0.426	0.590	0.571	0.566
Standardized Beta %	-31.377	-33.046	-47.631	-53.768	-63.240	-72.536	-71.883	-37.063	-61.174	-56.252	-50.264

Note: Exposure to France is entered in IHS (Inverse Hyperbolic Sine Transformation). All controls: Average population (over the same period as exposure), geodesic distance, absolute difference in latitudes from France, absolute difference in longitudes from France, dummy for contiguity with France, dummy for island, dummy if shares at least one sea or ocean with France, average elevation between countries to France, dummy if landlocked. We omit the following periods for Ig: 1851-1880, 1861-1890, 1871-1900 because Ig is observed for a too few countries over these periods. Robust standard errors are in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

The results, reported in Table C1, show that the (negative) standardized effect of $EXPO$ is largest when Ig is measured over 1891-1920, a period during which most populations of our sample experienced their fertility transition. Moreover, lagged measures of exposure strongly correlate with the marital fertility rate over this period but contemporaneous exposure does not.

We also used, as an alternative dependent variable, the date of the fertility transition, defined by Coale and Watkins (1986) as the first date at which a 10% reduction in marital fertility is achieved. This allows us to maximize the number of observations, as the variable is defined for every population. Figure C1 first plots the exposure to France over the earliest 20-year period (1851-1870) against the fertility transition date, revealing a negative relationship.

Figure C1: Fertility Transition Date and Exposure to France (1851-1870)



Then, we re-estimate equation (26) but with the date of transition as the dependent variable, as follows:

$$MTD_p = \beta_1 EXPO^{IHS}_{p\nu} + \beta_2 POP_{p\nu} + X'_p \beta_3 + \epsilon_{pt} \tag{27}$$

where MTD_p refers to the marital transition date of population p, $EXPO^{IHS}_{p\nu}$ the inverse hyperbolic sine of the population's exposure to France measured over a 20-year or 30-year period ν, $POP_{p\nu}$ and X'_p correspond to the same controls as in equation (26).

Table C2: Cross-population Transition Date Regressions, 20-year periods

	Transition Date					
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure 1851-1870 (IHS)	-2.453**					
	(1.038)					
Exposure 1861-1880 (IHS)		-2.210*				
		(1.065)				
Exposure 1871-1890 (IHS)			-2.119*			
			(1.073)			
Exposure 1881-1900 (IHS)				-1.928		
				(1.426)		
Exposure 1891-1910 (IHS)					-1.483	
					(1.338)	
Exposure 1901-1920 (IHS)						-1.951
						(1.325)
All controls	X	X	X	X	X	X
Countries	31	31	31	31	31	31
R^2	0.460	0.442	0.439	0.376	0.347	0.365
Standardized Beta %	-71.279	-66.329	-64.180	-53.069	-41.690	-42.469

Note: Exposure to France entered in IHS (Inverse Hyperbolic Sine Transformation). All controls: Average population (over the same period as exposure), geodesic distance, absolute difference in latitudes from France, absolute difference in longitudes from France, dummy for contiguity with France, dummy for island, dummy if shares at least one sea or ocean with France, average elevation between countries to France, dummy if landlocked. 31 countries/populations: Austria, Belarus, Bulgaria, Czech Republic, Denmark, England, Finland, Flemish Belgium, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Sardinia, Scotland, Slovakia, Spain, Sweden, Switzerland, Ukraine, Wales, Walloon Belgium, Yugoslavia. Robust standard errors are in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

The regressions results are presented in Tables C2 and C3 using respectively 20-year and 30-year periods for exposure. Both tables show that the effect of exposure is largest for the earliest period starting in 1851, and then progressively decreases over time, consistent with our diffusion model. The early start date for detecting the effect is consistent with the fact the marital transition date captures only the first major decline in fertility, which occurs quite early for some populations such as Walloon Belgium in 1875.

Table C3: Cross-population Transition Date Regressions, 30-year periods

	Transition Date				
	(1)	(2)	(3)	(4)	(5)
Exposure to France 1851-1880 (IHS)	-2.213**				
	(1.037)				
Exposure to France 1861-1890 (IHS)		-2.089*			
		(1.036)			
Exposure to France 1871-1900 (IHS)			-1.942		
			(1.384)		
Exposure to France 1881-1910 (IHS)				-1.499	
				(1.333)	
Exposure to France 1891-1920 (IHS)					-2.084
					(1.368)
All controls	X	X	X	X	X
Countries	31	31	31	31	31
R^2	0.447	0.440	0.382	0.346	0.375
Standardized Beta %	-67.718	-64.492	-55.530	-42.140	-46.514

Note: Exposure to France entered in IHS (Inverse Hyperbolic Sine Transformation). All controls: Average population (over the same period as exposure), geodesic distance, absolute difference in latitudes from France, absolute difference in longitudes from France, dummy for contiguity with France, dummy for island, dummy if shares at least one sea or ocean with France, average elevation between countries to France, dummy if landlocked. Robust standard errors are in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

In Table C4, we run a specification similar to equation (27), including RES_{pt}, the number of residents in France from population p in year t, along with the number of residents in England and Wales from population p in the same year. In this specification, we directly use RES instead of the $EXPO$ variable as we do not have sufficient information to construct the exposure to England and Wales, as defined above. The idea behind this test is to run a horse race between exposure to France and exposure to England, the birthplace of the Industrial Revolution. If the fertility transition mainly comes from economic modernization, we would expect the main axis of diffusion to stem from England and not from exposure to France. Table C4 shows that exposure to France wins the horse race. This suggests that the transition arose from a process of cultural remittance of the fertility norm from the first country to undergo the transition.

Similarly, in Table C5, we run a horse race between the exposure through migration to France, and possible exposure from migration of the French, from France to the other European countries/population. Along with RES, the specification includes the number of French citizens residing abroad, in countries or populations p. The results support the hypothesis of remittances of the French norms through migration to France and not of diffusion of the French norms through the migration of the French abroad. It is important to note that migration flows from France from the rest of Europe were quantitatively small, compared to flows from the rest of Europe to France.

Table C4: Horse Race with Residents in England and Wales

	Transition Date			
	(1)	(2)	(3)	(4)
Residents in France 1851-80	-2.470**			
	(1.122)			
Residents in England 1851-80	-0.325			
	(0.507)			
Residents in France 1861-90		-2.246*		
		(1.126)		
Residents in England 1861-90		-0.348		
		(0.796)		
Residents in France 1871-00			-1.808	
			(1.347)	
Residents in England 1871-00			-0.620	
			(0.926)	
Residents in France 1881-10				-1.380
				(1.775)
Residents in England 1881-10				-0.832
				(0.983)
All controls	X	X	X	X
Countries	31	31	31	31
R^2	0.471	0.454	0.453	0.413
Standardized Beta %	-69.272	-64.689	-52.732	-37.676

Note: Residents in France = Average number of residents in France from country c over each 30-year period, entered in IHS (Inverse Hyperbolic Sine Transformation). Residents in England = Average number of residents in England and Wales from country c over each 30-year period, entered in IHS. We consider 30-year periods to maximize the number of observations, as residents in England are not available for every census year. All controls: Average population (over the same period as exposure), geodesic distance, absolute difference in latitudes from France, absolute difference in longitudes from France, dummy for contiguity with France, dummy for island, dummy if shares at least one sea or ocean with France, average elevation between countries to France, dummy if landlocked. Robust standard errors are in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

We conclude that the analysis of the determinants of marital fertility and of the fertility transition date, in a sample of 31 European populations, delivers results consistent with those of the analysis in the main text, involving a more geographically disaggregated sample of European sub-national regions. In particular, more migrants to France during the height of the European fertility diffusion in Europe was associated both with lower fertility and an earlier onset of the fertility transition. A similar pattern is not observed when migrants to England and Wales are considered, consistent with the idea that migrants remitted French fertility norms to their regions of origin

Table C5: Horse Race with French Emigration

	Transition Date			
	(1)	(2)	(3)	(4)
Residents in France 1851-80	-2.600**			
	(1.086)			
French residents 1851-80	no data			
Residents in France 1861-90		-2.453**		
		(1.111)		
French residents 1861-90		0.225		
		(0.461)		
Residents in France 1871-00			-2.237*	
			(1.085)	
French residents 1871-00			-0.0145	
			(0.557)	
Residents in France 1881-10				-0.735
				(1.864)
French residents 1881-10				-1.703
				(1.908)
All controls	X	X	X	X
Countries	31	31	31	31
R^2	0.464	0.453	0.442	0.420
Standardized Beta %	-72.939	-70.640	-65.225	-20.064

Note: Residents in France = Average number of residents in France from country c over each 30-year period, entered in IHS (Inverse Hyperbolic Sine Transformation). French Residents = Average number of French people residing in country c over each 30-year period, entered in IHS. We consider 30-year periods to maximize the number of observations, as residents in England are not available for every census year. All controls: Average population (over the same period as exposure), geodesic distance, absolute difference in latitudes from France, absolute difference in longitudes from France, dummy for contiguity with France, dummy for island, dummy if shares at least one sea or ocean with France, Average elevation between countries to France, dummy if landlocked. Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

because France had experienced an earlier fertility transition and had consequently much lower fertility than England in the second half of the nineteenth century.