

# Migration and Long-run Economic Development: Evidence from Settlements in the Pampas\*

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## Abstract

This paper analyzes the impact of migration on long-run economic development. In particular, I study the European migration to Argentina in the late nineteenth century. I use an instrumental variables approach to show that the historical population composition caused differences in current economic outcomes. The IV randomly assigns immigrants across counties by interacting two sources of exogenous variation: the availability of land for settlement and the arrival of Europeans over time. Areas with historically higher shares of European population currently have significantly higher per-capita GDP, higher education rates and a greater proportion of skilled workers. Moreover, I present results which suggest that industrialization and human capital were channels through which migration had long-run effects: counties with higher share of Europeans experienced more advanced levels of industrialization and higher literacy rates.

Keywords: Economic growth and development, Human capital, Literacy, Industrialization.

JEL Codes: N16, N66, O11, O15.

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# 1 Introduction

Understanding the fundamental causes of the large differences in income per-capita across countries has led economists to examine the effect of historical events on economic development. Of particular importance is the process of settlement and population that countries followed during and after the colonial period. Places with more European settlements in the past tend to outperform in the present in various measures of development (Easterly and Levine 2009), and even today there is a positive correlation between current per-capita GDP and places where Europeans live (see figure 1). Different theories have been proposed to understand how historical events persisted and shaped current economic conditions resulting in a growing literature.<sup>1</sup> One of the first ones to formalize the importance of history were Engerman and Sokoloff, in their research program (Engerman and Sokoloff 1997, 2002) they analyzed the effect of initial endowments on its distribution, inequality, political power and the resulting institutions that were in place. By comparing colonies in north and south America, they show that areas with a higher native population and/or potential for valuable exports generated unequal land holdings and concentrated political power on the elites. These differences created, in turn, rent-seeking institutions that were less conducive to economic growth in the long-run. A similar argument was proposed by Acemoglu et al. (2001, 2002), they follow this line of research by focusing on the importance of colonial institutions for economic development. Another view was pushed forward by Sachs, he emphasizes that levels of development (per-capita income, economic growth, and other economic and demographic dimensions) are strongly correlated with geographical and ecological variables. In his view geographic and climate endowments (such as latitude, disease ecology or distance from the coast) have a direct effect on development (Gallup, Sachs, and Mellinger 1998 and 2000, Gallup and Sachs 2001 and Sachs and Malaney 2002). Glaeser et al. (2004) highlighted a different aspect of population: knowledge and know-how, or human capital in a broader sense. They argued that human capital was brought by European settlers, and these past differences in human capital across societies/countries explain a greater part of current differences in economic growth,

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<sup>1</sup>See Nunn (2009) for a review of the literature.

a point also stressed by Easterly and Levine (2009).

In the process of settlement and population immigration played an important role, the short and medium run effects of immigration have been extensively analyzed, with seminal studies like Borjas (1994) and Card (1990). But how migration can affect a country's economic performance in the long-run remains an open question. Putterman and Weil (2010) recognized the importance of historic migration and how it altered population composition. They construct a matrix that links current population to population in source countries, and show how adjusting by the history of population's ancestors improves the prediction of current GDP by historic indicators of development across countries.

The complexity in understanding the impact of migration lies in its non random nature. Individuals that end up migrating first decide to do so, and second choose their destination. Therefore empirically assessing the effect of immigration and disentangling it from other confounding factors is a challenge for most studies. In this paper exploit the history of the settlement in the *Pampas*, in Argentina, to identify the causal effect of historical migration on long-run development. In Argentina the process of settlement was greatly influenced by the arrival of European immigrants, areas were exposed differently to European immigration that resulted in a great variation in the composition of population across counties. The characterization of European settlements in Argentina resembles that of the world: areas differ in the intensity of European population. In figure 2 I replicate figure 1 for this time for counties in Argentina. The positive correlation between the share of Europeans and per-capita GDP is also present in this figure, counties in Argentina look similar to countries in the world. The case of Argentina offers the possibility to understand the long-run effect of European immigration in a contained setting: focusing on a single country, with common macro-institutions and similar geographic endowments. The nature of the European immigration process in Argentina makes it relevant to the understanding of the long-run effects of the composition of population on development.

I will first establish the causal effect of migration in the late nineteenth century on current GDP, education and skilled labor. I show that there is a strong and positive effect of migration on these variables. Then I propose two channels through which the effect

persisted over time. To overcome the problem of endogenous sorting of migrants I use an exogenous measure of the share of immigration in a given region as an IV. The IV is constructed from a simple model of settlement and demographic growth. The IV exploits variation over time in the incorporation of land to the country interacted with variation in the net-immigration of Europeans. This empirical setting benefits from two important conditions: First, by focusing on a single country macro-political-institutions are common across regions. Second, the uniform geographical characteristics of the fertile plains allows me to compare a cross section of counties that are close to equal in all geographical endowments. Holding institutions and geography constant across counties allows me to focus on the composition of population, in particular given the heterogeneous population characteristics that arise from the process of migration. Moreover, once institutions and geographic endowments are accounted for in the analyzes, any effect coming from the population composition can only be attributed to the population characteristics.

The empirical analysis exploits a particular historical setting in the fertile plains of Argentina, the *Pampas*, an area originally occupied by native population, over which the Argentine government struggled to gain power. The availability of the fertile plains to those willing to settle varied over time depending on the civil and international conflicts and on the success of military campaign to conquer the plains.<sup>2</sup> European migration to Argentina was restrictive over the colonial period and only started years after independence, with peaks by the end of the nineteenth century and before the First World War. Between 1857 and 1914 close to 5.5 million Europeans migrated to Argentina.<sup>3</sup> The fertile plains, otherwise an area with geographically similar characteristics and common political institutions, were shocked in varying intensity by European immigrants. The shock to the population was not negligible, areas ranged in the intensity of treatment, the percent of European population after the shock, from 0% to 30%.

Using this constructed measure of the share of European population as an instrumental variable for the actual share of European population, I compare counties in the fertile plains

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<sup>2</sup>The process of settling the *Pampas* drastically contrasted to what happened in the US, while in Argentina settlers arrived after the government conquered the land, in the US colonizers preceded the military.

<sup>3</sup>The Argentine government started recording statistics for immigration in 1857 and in 1914 the government conducted a census.

and estimate that an increase of 11% (one standard-deviation) in the share of European population raises per-capita GDP by 60% in the long-run (0.77 standard deviations). Similar results hold for education: areas with higher share of European immigration in 1914 have a higher share of population with higher education in 2001. After establishing the long-run effects of immigration on development, I investigate two channels through which initial differences in the composition of population persisted over time: industrialization and human capital.

Census data shows that industrial establishments were owned predominantly by Europeans. Consistent with this fact I find that measures of industrial development such as the number of industrial establishment, the employment of high- and low- skilled industrial workers and the usage of energy for industry, were substantially higher in regions where the intensity of immigration was higher. This suggests that industrialization was a path through which differences in development arose and persisted over time. Regarding human capital, I show that areas where Europeans accounted for a higher share of the population had higher literacy rates in the past. The evidence suggests that immigrants not only contributed with their higher literacy, but generated a positive externality on the population, raising early levels of human capital.

The results I present in this paper show the importance of people themselves for economic development. The setting I exploit allows me to abstract from the classical institutional view, as well as from the geographic endowment hypothesis. These results demonstrate that people matter, and that they matter for reasons related to their knowledge: European immigrants are associated with greater industrialization and higher literacy for the population at large, and that the initial difference in the composition of the population has a long-lasting effect on development.

This paper is organized as follows, Section 2 reviews the conquest of the fertile plains and the European immigration to Argentina. I provide an historical account of the reasons that motivated military campaigns to the *Pampas* and timing of these campaigns. Further, I describe the process by which the plains were settled and how migration to Argentina resembles the migration pattern to the USA. Section 3 describes the data, its sources, the

unit of observation and how geo-referenced data was computed for this study. Section 4 develops the empirical strategy and shows the results. In the beginning of section 4 I show OLS estimates and in section 4.1 I proceed to develop the instrumental variable approach. In section 4.2 I implement my IV and show the causal effect of migrants on long-run development. Next in section 4.3 I show two channels of persistence: industrialization and human capital. In section 4.4 I perform a series of robustness checks: I consider variations to the parameters of the demographic model and the assumption on the initial stock of Argentinians and also competing hypothesis. Section 5 concludes.

## **2 The History of the Fertile Plains**

### **2.1 The Conquest of the Plains: the Desert**

It was not until end of the nineteenth century that the Argentinean government gained political power over the whole territory that nowadays is Argentina. During colonial times and after independence from the Spanish Empire in 1816 most of the fertile plains were settled by several indigenous tribes that did not recognize the Argentinean government. Relationships between Argentinians and indigenous tribes were characterized by mistrust and violence. By the time of independence the situation was such that Argentinians used to dispute land and wild livestock to the indigenous tribes, while indigenous people organized assaults into settlements and cities, stealing livestock, goods and kidnapping people. Indigenous raids attacking cities and military excursions into indigenous settlements, both ending in destruction and deaths, were common. The Argentinean government and main tribes often agreed on peace treaties, but the Argentinean government never recognized that area as an independent state, nor did it recognize indigenous people as legal owners of the land.

The threat of indigenous tribes over Argentinean settlements was not the only concern of the government regarding the national territory. For Argentina to consolidate as a nation it was necessary to delimit its frontiers, which turned necessary to occupy Patagonia, an area also claimed by neighboring country Chile (Lacoste 2002). But it was not until the end of the civil war in 1862 that a unified national government developed systematic

plans to conquer the rest of the territory, starting in 1870 until 1885.

Previous to 1870, military campaigns developed with many years of interruption and loss of domain, in particular during episodes of civil war and the war against Paraguay. Detailed information on the military campaigns and its effect on how the *frontier* between Argentines and the indigenous tribes changed over time has been documented by Walther (1964). Figures 3-4 depict maps showing the frontier between Argentina and the indigenous tribes in 1779, 1823, 1826, 1828, 1852, 1860, 1864 and 1876. Gains of territory by the Argentinean army and losses of domain over these years were a consequence of the limited resources the government had for the multiple military conflicts it faced (Luna 1993).

## 2.2 Settlement of the Fertile Plains

The end of the civil war and the re-unification and pacification of the country started a period of European migration to Argentina in the second half of the nineteenth century. Immigrants were granted the same legal rights as Argentines, without need to naturalize or acquire citizenship. The flow of immigrants to Argentina resembles the flow of immigrants to the USA, Canada and Australia.

Figure 5 shows the time series of immigration and net immigration of Europeans to Argentina. The series starts in 1857 when the national government started recording statistics on the arrival of immigrants to its ports. The flow of migration is far from constant, nor it is a monotonic function of time.

Immigrants settled in cities, urban areas and in the countryside, and were occupied both as skilled labor or unskilled labor. Activities were diverse, ranging from farmers to construction workers, merchants and craftsmen. As of 1895, 41 percent of the European immigrants (males, aged 15 or above) were living in urban areas, while 32 percent devoted their time to farming and 28 percent to non-farm skilled labor.

The ultimate conquest of the *Pampas* was possible between 1870 and 1895, once military resources were not longer used in civil or international wars. At the same time, the peace achieved in the country and the economic conditions in Europe motivated Europeans

to migrate to Argentina. Between independence and the reunification of the country, a period close to fifty years, civil war prevented many Europeans of migrating to Argentina<sup>45</sup>. Although the decision to conquer the plains was unrelated to the immigration patterns, the timing of the expansion of the frontier over the plains overlaps with the arrival of the first European immigrants to the country, as shown in Figure 6. Concerns might be raised on Europeans migrating to Argentina because of the growing availability of land. The data doesn't point to this conclusion, the correlation between the time series of immigration and the amount of land in the fertile plains under the political power of the government over time is close to 0.5, and a regression of immigration on the amount of land yields and R2 of 20%. Europeans were attracted by a peaceful place to live, prospects of a work and the legal protection of its rights. Temporary and permanent workers migrated mostly to the fertile plains, some of them coming back to Europe after the harvest in the southern hemisphere (right before the harvest in the northern hemisphere) and some of them settling down and bringing the rest of their families over time. Progress and well being among immigrants was not instant, but not hard to achieve.

### 3 Data and Summary Statistics

This study combines current data on economic development (per-capita GDP, higher education rate and share of skilled workers) with historical data on economic and social conditions (population density, productive uses of land, etc.). The unit of observation is at the county level. The sample covers the four provinces that hold the fertile plains: Buenos Aires, Santa Fe, Córdoba and Entre Ríos. The southwest section of the fertile plains lays in the state of La Pampa, which is not included in the sample. It was not until 1952 that La Pampa became a province, before that it was a *national territory*, i.e. a territory ruled by the national government, with appointed officials and no state constitution. Statistical information is not as exhaustive for national territories as it is for states. Moreover, the state of La Pampa changed all the county boundaries over the period of time considered in this study. Working with four states allows me to control for

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<sup>4</sup>In contrast to the US, which experienced large migration from northern Europe over this period.

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unobservable fixed variables at the state level. Though county boundaries have slightly changed over time, it is still possible to match older counties to new counties. New counties were mostly founded on previously unoccupied land, but there were cases where old counties split into two or more counties. When a new county can not be linked to an old county, the observation is dropped from the sample. There are 197 counties in the sample, where 31 are new counties not linked to an old county. From the remaining 166 counties, 25 are capital cities or large urban areas and 5 are counties without current information on economic outcomes. Excluding capital cities and the urbanized greater Buenos Aires, the final sample has 136 counties in four states.

Historical information comes from four sources: the 1895 and 1914 Argentinean censuses, the Argentine Office of Migration and Walther (1964). Both censuses contain detailed information at the county level on population characteristics and economic activities. I digitalized data on all variables used from the censuses: total population, foreign born population and population living in urban areas. Moreover, the 1914 census includes an agricultural and livestock census, which was used to construct a variable on the economic activities performed at the county level. Somoza and Lattes (1967) computerized representative samples of historical 1895 census microdata, from which individual level data on nationality, age, sex and occupation can be obtained.

The Argentine Office of Migration records since 1857 all non-Argentine incoming and outgoing population. Detailed data on the number of migrants and country of origin since 1857 until 1914 was digitalized for this study.

Data on the territory under the political power of the Argentine government comes from Walther (1964). Walther's detailed description of the military campaigns are summarized with a series of maps that show for different years the actual *frontier* between the territory under the Argentinean government and the native tribes' territory. Walther's work is based on military and historical documents. I complement these maps with Gallo (1983) and Tell (2008) who provide more detailed information for the states of Córdoba and Santa Fe.

The Argentinean Statistical Office (INDEC) computes GDP at the national and state

level, but not at the county level. In 1994 INDEC conducted the National Economic Census (CNE) censusing all business at the county level, except for the agricultural sector, recording the value of production, costs, investment, etc. Per-capita GDP is constructed by combining CNE's gross product data with yearly agricultural output estimates from the Ministry of Agriculture (see Appendix). For the states of Buenos Aires and Santa Fe state-statistical offices compute GDP at the county level. For these two states, the correlation between CNE's gross product with state's GDP at the county level is 95%, the correlation between CNE's gross product augmented by the agricultural output estimates and state's GDP is also 95%. The regression of state's GDP on the CNE's gross product augmented by agricultural output has an  $R^2$  of 90.34. I will use CNE's gross product augmented by agricultural output as a proxy for GDP at the county level.

Further, I will use data from the 1935 Industrial Census, which documents the number of industrial establishments, the value of the production, the number of workers and the usage of energy at the county level.

Data on higher education rates and share of skilled workers is from the 2001 Population Census and is publicly available from the Argentine Statistical Office. Finally, geo-referenced data on the quality of the soil comes from the National Institute for Agriculture and Livestock Technology (INTA) (Cruzate et al. 1990). INTA provides geo-referenced detailed data on the quality of the soil and elaborates an index that assigns a greater value to better soils. This index of land quality refers the geographical conditions of the soil (like ground composition and rain) and not to the technologies used for cultivation. I combine the geo-referenced data provided by INTA with the county boundaries and compute an area weighted average of the land-quality index. Geographical information on the average rain and temperature comes from Worldclim,<sup>6</sup> data on elevation from the National Oceanic and Atmospheric Administration (NOAA) and U.S. National Geophysical Data Center and data on ruggedness of the terrain from Nunn and Puga (2012). All the geographical variables are geo-referenced data which I combined with county boundaries to compute county averages. The availability of railroads in a given county is computed as the average railroad density in a radius of 5 km, data on railroads comes from *ATLAS*

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<sup>6</sup>See <http://www.worldclim.org/formats>.

*de Suelos de la República Argentina.*<sup>7</sup>

Table 1 shows the summary statistics for the variables used in this study. As a measure of the intensity of European immigration I construct the share of European population, defined as the fraction of European born population in 1914. The average (and median) share of European population is 23% (16%) and a standard deviation of 11%, with counties ranging from less than 1% to 47% of its population of European origin. GDP per capita averages slightly above 6.700 dollars, where the bottom 25% of the counties have less than 3.560 dollars and top 25% of the counties have a per-capita GDP above 9.000 dollars. On average 10.4% of the population 25 years of age and older have completed more than 12 years of education (completed secondary school and started or finished tertiary or university degrees). Of those individuals reporting an occupation in 2001, on average 18% work in high skilled jobs.

## 4 Estimation Strategy and Results

I will compare log per-capita GDP, higher education rates and the share of skilled workers today between counties with different population composition in the past. I start by running a regression of the dependent variable on the share of European population and other controls:

$$y_i = \alpha + \beta SE_i + X_i\gamma + \eta_p + \epsilon_i \quad (1)$$

Where  $y_i$  is the dependent variable in county  $i$ ,  $SE_i$  is the share of European population in county  $i$  in 1914,  $X_i$  are controls for county  $i$  characteristics in 1914, and  $\eta_s$  are state fixed effects. County characteristics include population density, share of the population living in urban areas (2000 or more inhabitants), share of productive land used for agriculture, land-quality and (log) distance to the city of Buenos Aires.<sup>8</sup> I also control for geographical characteristics (mean temperature, rainfall and ruggedness) and for the availability of railroads.

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<sup>7</sup>See Cruzate et al. (1990).

<sup>8</sup>The city of Buenos Aires is the capital city of the country, the main port of entry for traded goods and immigrants, and the most densely populated city. Proximity to this political and economic relevant city may have independent effects on development.

Table 2 documents OLS results of regressing log per-capita GDP in 1994 on the share of European population in 1914, equation (1). Column 1 only controls for state fixed effects, column 2 adds controls for the distance to the city of Buenos Aires, density of railroads, the share of productive land used for agriculture, population density and urbanization rate. Column 3 adds geographical controls (rain, temperature, elevation, ruggedness and land quality). The basic OLS regression shows that the share of Europeans in 1914 has a positive and significant coefficient. In column 3 distance to Buenos Aires has a coefficient statistically not different from zero and density of railroads has a positive coefficient. Land quality has a positive (though not different from zero) effect on development, and the share of productive land used for agriculture enters positively. Population density enters negatively, while urbanization has a positive coefficient but not statistically different from zero.

Following column 3, the preferred specification, a one standard deviation in the share of Europeans increases per-capita GDP by 0.55 standard deviation. As this result shows, European immigration positively correlate with economic development in the long-run, since close to eighty years after the arrival of European immigrants differences in economic performances can be found across counties depending on the pattern of settlement. The evidence presented in table 2 is based on correlations, and its interpretation has to be taken with caution. If European immigrants selected themselves into the counties depending on an omitted characteristic or an unobservable variable, the results would be biased. To deal with this potential problem I will use variation in the availability of land for settlement in the years of immigration as instrumental variables to account for the possible endogeneity in the selection of Europeans to the different counties.

#### **4.1 Instrumental Variable Approach**

European migration to the different counties in the fertile plains may not have been random. Immigrants may have had information in hand to choose one destination in favor of another, for example, previously settled immigrants may have sent letters or went back to the home country to attract the rest of the family to the newly settled area across the

ocean. Even differences in infrastructure, access to railroad or size of the cities in the plains may have played a role for immigrants when deciding where to settle. To account for the possible endogeneity in where European immigrants settled once they arrived to Argentina, I will construct an exogenous measure of the share of immigrants in each county and use it as an instrumental variable for the actual share of immigrants in a given county.

In order to construct an exogenous measure of the share of immigrants in a given county I will exploit two sources of variation: a) changes in the frontier between Argentina and the indigenous tribes. And b) changes in immigration to Argentina between 1857 and 1914. As will be discussed below, a simple demographic model will exploit the variation in both, available land for settlement and arrival of immigrants, to allocate immigrants (depending on the year of arrival) and Argentines to counties and construct an exogenous share of European population.

### **The History of the Instrument**

Using historical information on the military campaigns followed by the Argentine government, I am able to assign to each county a year in which (at least half of) the land was available to settlers.

From historical records (Walther 1964) I am able to trace the area under the political power of the Argentine government for this period. Walther (1964) documents for several years the end result of military excursions and the boundary that resulted of these expeditions between the Argentine government and the indigenous tribes, in a series of maps, Figures 3-4 being two examples of it. By 1884 the Argentine government controlled the rest of the fertile plains. I assume that no land is conquered or lost until the next military campaign, an assumption very close to the actual events. I overlap county boundaries to these maps and establish the date in which the boundary moved such that a county started to be on the Argentinean side.<sup>9</sup>

The second source of variation comes from the time series of immigration to Argentina. The migration pattern to Argentina resembles that of the USA, when comparing the two

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<sup>9</sup>The date a county *enters* Argentina has not to be confused with the date in which a county is officially founded, usually years after it was under the Argentinean power

time series the correlation of migration to Argentina and the USA is 0.795.<sup>10</sup>

An ideal experimental setting would consist of regions (counties) that are equal in all respects, and have a given number of Argentinean population. These regions are then randomly shocked with European population in different intensities. I could analyze economic and social development in these regions in the long run, and see whether there are differences to be explained by the share European population, the only variable that varies across regions. The actual empirical setting I am analyzing approximates very closely my ideal experiment: it consists of regions that are geographically uniform, had an initial stock of Argentinean population and were shocked by European population in different degrees. The key difference is that Europeans were not randomly distributed as they choose where to settle. The IV I am proposing consists of randomly distributing Europeans across counties, using variation in the timing of seizure of land from the indigenous tribes and the timing of arrival of Europeans, combined with a demographic model. In particular, for the shock of European population to be random in my analysis I need that Europeans decided to migrate to Argentina for reasons unrelated to the success or failure of the military campaigns in conquering new land, and that the decision by the government to conquer these vast tracks of land was independent of the arrival of European immigrants to the country. History shows that this appears to be the case, as discussed above, military and safety issues prompted the government to take power of this region, starting years before the first wave of European immigrants arrived; the military campaigns in the fertile plains ended by 1884, when slightly less than 900,000 immigrants had arrived to Argentina, in comparison to circa 3million net-immigrants immigrants that arrived by 1914. Finally, for the identifying assumption to be correct, the constructed share of European immigration has to affect the dependent variable (per capita GDP, higher education, etc.) only through the actual share of European immigration, while having no effect through other variables.

### **The Instrument**

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<sup>10</sup>Data on USA migration from Historical Statistics of the United States, Millennial Edition On Line, edited by Susan B. Carter, Scott Sigmund Gartner, Michael R. Haines, Alan L. Olmstead, Richard Sutch, and Gavin Wright, Cambridge University Press 2006. <http://hsus.cambridge.org/HSUSWeb/toc/tableToc.do?id=Ad1-2>

The instrument is constructed by assigning Argentinean and European population to each county and simulating the process of population growth, given the fertility and mortality rates, over the years 1857 to 1914.

For the construction of the IV, starting in 1857 Europeans will be distributed uniformly across counties. The quantity of immigrants each county is assigned varies by year of arrival, according to the time series. Argentineans, on the other hand, are initially present in counties under the political power of the Argentine government by 1857, but not in counties conquered after 1857. The population growth of Argentineans and Europeans is given by the fertility rate and the mortality rate.

Europeans arrive every year and move uniformly to any county that is under the political power of Argentina, and once they settled they never move again. Europeans die at rate  $\delta$  and reproduce at rate  $\rho$ , although children born to Europeans in Argentina are considered as Argentineans.<sup>11</sup>

The initial Argentinean population in 1857 comes from the 1869 census, adjusted by the population growth rate to the year 1857. Argentineans die at rate  $\delta$  and reproduce at rate  $\rho$ . There is a fraction  $\phi$  of Argentineans that each year decides to move to a new county. I assume they move equally to all the counties that belong to Argentina.

The mortality rate, the fertility rate and the fraction of Argentineans that move each year are computed from the 1869, 1895 and 1914 censuses. The mortality rate is computed to be equal to 2.2%.<sup>12</sup> The fertility rate is computed to be equal to 5.3%.<sup>13</sup> The moving rate for Argentineans,  $\phi$ , is computed to be equal to 1.95%.<sup>14</sup> The first stage and the analyses in the coming section are robust to changes in the parameters of the demographic

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<sup>11</sup>From 1857 until 1914.

<sup>12</sup>I compare the stock of Europeans in 1914 with the flow of Europeans from 1857 to 1914 and assuming that Europeans die at a constant rate  $\delta$  I solve for  $\delta$  such that  $\sum_{t=1857}^{1914} (1-\delta)^{1914-t} \cdot x_t = X_{1914}$ , where  $x_t$  is the number of Europeans that arrived at time  $t$ , and  $X_{1914}$  is the stock of Europeans in 1914.

<sup>13</sup>Given the Argentinean population from 1869 and 1914 censuses, and given that children of Europeans are considered Argentineans, I solve for  $\rho$  such that:

$$w_{1870} = (1 - \delta + \rho) \cdot w_{1869} + \rho x_{1869},$$

$$w_{1871} = (1 - \delta + \rho) \cdot w_{1870} + \rho x_{1870} = (1 - \delta + \rho)^2 \cdot w_{1869} + (1 - \delta + \rho) \cdot \rho x_{1870} + \rho x_{1869},$$

$\vdots$

$$w_{1914} = (1 - \delta + \rho)^{1914-1869} \cdot w_{1869} + \sum_{t=1869}^{1914-1} (1 - \delta + \rho)^{1914-1-t} \cdot \rho x_t,$$

where  $w_t$  is the number of Argentineans at time  $t$ .

<sup>14</sup>Using individual-level data from 1895 census I estimate the fraction of Argentineans living in a different province than the one in which they were born (since there is no county level information). Define  $\pi_{i,a}$  as

model, as well as changes in the assumption on the initial Argentinean population. All these possibilities will be considered in Section 4.4.

The number of Europeans in each county in 1914 is defined as:

$$CE_i = \sum_{t=1857}^{1914} \frac{1}{N_t} (1 - \delta)^{1914-t} e_t \cdot \mathbb{1}_i\{t \geq D_i\}. \quad (2)$$

The number of Argentineans in each county in 1914 is defined as:

$$CA_i = CA_{i1857} (1 - \delta + \rho - \phi)^{57} + \sum_{t=1857}^{1914} \frac{1}{N_t} (1 - \delta + \rho - \phi)^{1914-t} (\phi a_t + \rho e_t) \cdot \mathbb{1}_i\{t \geq D_i\}, \quad (3)$$

where  $CE_i$  and  $CA_i$  are the constructed number of Europeans and Argentineans in county  $i$  in 1914, respectively.  $e_t$  is the number of Europeans that arrived in year  $t$ , and  $a_t$  is the number of Argentineans that move to a different county in year  $t$ .  $CA_{i1857}$  is the initial number of Argentineans in a given county.  $\mathbb{1}_i\{\cdot\}$  is an indicator whether county  $i$  belongs to Argentina, and  $D$  is the year in which county  $i$  started to be under the political power of the Argentine government.  $N_t = \sum_i n_{it}$  is number of counties under the Argentinean political power at time  $t$  and  $n_{it}$  equals 1 if county  $i$  belongs to Argentina at time  $t$ , 0 otherwise.

The constructed share of Europeans population is defined as  $CSE_i = CE_i / (CE_i + CA_i)$ , and is used as IV for the actual share of European population. Variation in both  $CE_i$  and  $CA_i$  will induce variation in the constructed share.  $CE_i$  varies across counties  $i$  depending on the year in which county  $i$  started to be under the political power of the

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the fraction of people aged  $a$  born in county  $i$ , who still live in county  $i$ .

$$\pi_{i,a} = \frac{p_{i,a}^i}{\sum_j p_{j,a}^i},$$

where  $p_{i,a}^i$  is the number of people born in county  $i$  who live in county  $i$ , and  $p_{j,a}^i$  is the number of people born in county  $i$  who live in county  $j$ .

Then,

$$\pi_{i,a}^i = (1 - \phi_a)^a.$$

I will compute  $\phi_a$  for all ages and then compute the average  $\phi$  weighting by the fraction of people in each cohort.

$$\phi = \sum_{i=1}^I \sum_{a=1}^{99} \frac{p_{i,a}}{\sum_i \sum_a p_{i,a}} \cdot (1 - \pi_{i,a}^{1/a}),$$

where  $p_{i,a} / \sum_i \sum_a p_{i,a}$  is the fraction of  $a$  years old in the population.



Argentine government,  $D_i$ , and also on the number of immigrants,  $e_t$ , that arrived at time  $t$ . Variation in  $CA_i$  not only depends on  $D_i$ , the number of Argentines moving,  $\phi a_t$ , and the children of Europeans,  $\rho e_t$ , but also on the initial stock of Argentinean population,  $CA_{i1857}$ . Since  $CA_{i1857}$  is not a random variable and depends on observed and unobserved characteristics, I will show that results hold under a different assumption. In particular, in Section 4.4 I assume that instead of the actual population all counties will be assigned the same initial stock of Argentines:  $CA_{i1857} = CA_{1857}$  if  $CA_{i1857} > 0$ , and  $CA_{i1857} = 0$  otherwise. Also I will consider the case in which all counties are assigned the same initial stock of Argentines,  $W_{i1857} = W_{1857}$ .

As mentioned earlier, the conquest of the plains ended up generating 8 waves of land incorporation: 1779, 1823, 1826, 1860, 1864, 1869, 1876 and 1884; figure 6 shows the distribution of the counties over time, 66 counties already existed at the independence, while six were conquered in 1860, seven in 1864, eleven in 1869, eleven in 1876 and five in 1884.

## 4.2 The long-run effect of European immigration

I run the following specification for the first stage:

$$SE_i = \alpha + \psi CSE_i + X_i \gamma + \eta_p + \epsilon_i \quad (4)$$

Where  $CSE_i$  is the constructed share of European immigration.

Figure 7 shows the first-stage relation between the share of European population and the constructed share of European population. Figure 8 shows the first-stage correlation when control variables and fixed effects are included. Both figures show a strong positive correlation between the two variables.

Table 3 shows the first-stage regression, equation (4). In column 1 controls for  $X_i$  and no geographical controls are included, column 2 adds geographical controls, while in column 3 standard errors are clustered at the year of incorporation,  $D_i$ . The coefficient on the constructed share of immigration remains positive and significant across specifications, confirming the result presented in figures 7 and 8. An F-test of the coefficient  $\psi$  shows

a strong first-stage with a statistic greater than 30 for the full specification in column 3, and weak identification is ruled out by the Kleibergen-Paap test of 34.1.

Table 4-6 show results for three different dependent variables, where the constructed share of immigration is used as instrumental variable for the actual share of European population. I report results for three specifications discussed above: not including geographical controls (column 1), controlling for all variables (column 2) and clustering standard errors at the year of conquest level,  $D$ , (columns 3). In table 4 columns 1-3 the dependent variable is per-capita GDP in 1994. The coefficient on the share of Europeans in columns 1-3 shows a long-run effect of the share of European population on per-capita GDP, one standard deviation in the share of European population increases per-capita GDP by 0.77 standard deviations.<sup>15</sup> The point estimate of 5.49 is slightly higher than the OLS estimate of 3.91, suggesting a negative bias in the selection of Europeans to counties and/or measurement error. The effect of having relatively more European has an important effect in the long-run, an increase in the share of Europeans of 5% raises per-capita GDP by one third of a standard deviation. For a county like *Río Cuarto* with a share of Europeans of 20%, increasing the share to 25% would raise per-capita GDP from 6912 dollars to 9097. Certainly an economically significant effect.

Columns 1-3 of Table 5 examine census data on higher education in 2001. Results also show a positive and significant effect of European immigration on this variable. One standard deviation in the share of European immigration raises the share of population with higher education by 0.49 s.d., an effect significant at the 5% level. Table 6 columns 1-3 repeats the analyzes for the share of workers in high skilled occupations. Results show a positive effect: one standard deviation in the share of European immigration raises the share of workers in high skilled occupations by 0.51 standard deviations, a result significant at the 1% level. The results in tables 4-6 show an important causal effect of European immigration over the long-run: Europeans affected the degree of economic development as measured by GDP, higher education and skilled workers. The intensity of European migration appears to have created a divergence in the paths of economic development

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<sup>15</sup>One standard deviation in the share of Europeans equals 0.11 (11%), a 50% increase in the share of Europeans for an average county

across counties. I will be examine the channels through which development diverged and persisted over time in the next section.

### **4.3 The effect of European immigration: the channels of persistence**

Why did Europeans affect economic outcomes close to a century after their arrival? How did their initial effect on the economy propagate and persist over time? To answer these questions I will next investigate two channels through which the effect of European immigration created differences in the paths of economic development over time: Industrialization and Human Capital. Both channels are linked together and show two different aspects of the process of development.

#### **4.3.1 Industrialization**

Industrialization has been widely understood as an important factor in a country's development, countries that industrialized earlier rank higher in today's development, per-capita income and living standards. Since the Industrial Revolution higher standards of development have been closely tied to the degree of industrialization of the economy, where the terms *industrialized nation* or *developed nation* and *advanced economy* have been used interchangeably to describe it. In the case of Argentina, industrialization arose in some counties more than in others, and cities that developed more were also cities that experienced higher industrialization in the beginning of the twentieth century. Why industrialization arose in the first place is an open question, but from the industrial census in 1895, 1914 and 1935 we know that the process of industrialization was tightly linked to immigrants and their ability and willingness to set up and operate industrial establishments. In this sense industrialization operates as a vehicle that propagates development over time, and long-term differences across regions emerge between more and less industrialized counties.

Table 7 examines the nationality of the owners and workers of industrial establishments in Argentina in 1895, 1913 and 1935. In 1895 81% of these establishments were owned by foreigners, while 59% of the workers employed were immigrants. Close to twenty years later, in 1913, 65% of the industrial establishments were run by foreigners and workers of foreign origin made up 49% of the employment. Industry at that time was mostly

centered around the production of garment, food, wooden, metal and chemical products, and construction. Table 6 also shows that still in 1935, 58% of the industrial establishments were under the ownership of foreign citizens.

Below I investigate the relationship between the structure of the industrial sector in 1935 and the share of Europeans twenty years earlier.<sup>16</sup>The 1935 industrial census records information at the establishment level and at the county level. My outcome variables are the number of establishments per person, percent of skilled workers in the population, per-capita value of production<sup>17</sup> and energy in horse power per person.<sup>18</sup> In table 8 I examine the effect of the share of European immigration on these variables, using IV for the share of European population. The share of European population has a positive and significant effect on all industrial variables. Following columns 1-4, one standard deviation (SD) in the share of European population raises the value of industrial production by 0.66 SD, the share of skilled workers by 0.85 SD, the number of factories per person by 1.04 SD and the energy in horse power per person by 0.64 SD. For a county like *Río Cuarto*, having a share of Europeans of 25% instead of 20% would have raised the value of industrial production in 1935 by 41%.

Tables 7 and 8 show the importance of the European population in the process of industrialization, in 1895, 1914 and 1935 the fraction of industrial firms owned by Europeans was above 50%, industrial workers were mostly of European origin and counties that happened to have a greater share of their population of European origin experienced greater industrial output and assigned more resources to industry: workers and investment in energy production.

Consistent with the results presented in the previous section, counties where the share of European population is greater experienced more industrial output, had a higher share of skilled workers and greater investments in installed energy in 1935.

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<sup>16</sup>1935 is the first industrial census for which data at the county level is available

<sup>17</sup>In 1935 peso currency.

<sup>18</sup>For the per person variables I consider the 1914 population, since it is the closest population census.

### 4.3.2 Human Capital: Literacy rates in 1914

Human capital is an important factor in the process of economic growth (Galor and Weil 1999, 2000 and Galor 2005), as it is directly related to technological progress, increases productivity and contributed to the rapid growth of per-capita GDP. Contemporary differences in human capital have been shown to affect development at the macro- and micro-level, but evidence pointing to the effect of historic differences in human capital on development in the long-run is scarce. Glaeser et al. (2004) find evidence for human capital as a channel for growth and better political institutions and Easterly and Levine (2009) point out that human capital was an important intermediating channel through which colonial settlement affected development in the long-run. I will add to the literature providing evidence for migration generating differences in the initial levels of human capital and on current levels of human capital. European immigrants had a positive impact on literacy rates and the effect lasted for more than eighty years.

The level of human capital at the end of the nineteenth century, beginning of the twentieth century was drastically altered by the inflow of more educated immigrants. Literacy rates vary more within Europeans than between Europeans and Argentinians. Table 9 examines literacy rates in 1914 by nationality for immigrants in Argentina: while the Argentinean population is on average 63.2% literate, Germans are 88.2% literate and immigrants from Italy, Spain and France are 59.6%, 67.4% and 79.3% respectively. When weighted by population, on average Europeans are 64.2% literate and the population as a whole is 63.3% literate. Europeans migrating to the *Pampas* were on average more literate than locals, but the difference does not seem important at first sight. What was the effect, if any, of a population with higher human capital on development? Did Europeans also foster the acquisition of human capital by the population at a large?

In table 10 I examine the relationship between the literacy rate in 1914 at the county level and the share of European population, column 1 shows IV estimates. As column 1 shows once the endogenous distribution of immigrants is accounted for, the share of European immigration has a positive and significant effect on literacy rates, the coefficient of the IV regression is 0.07. This coefficient implies that one standard deviation in the

share of European population rises literacy rates by 0.15 SD. Continuing with our example on *Río Cuarto*, if the share of Europeans would have been 5% higher, the literacy rate would have been 0.35% higher, raising from 57.1% to 57.5%.

The question that tables 9 and 10 raise is what explains this difference in literacy rates across counties? Can this difference be explained by a composition effect, namely by substituting a less literate Argentinean by a more literate European? Or is the effect of immigration on literacy the consequence of an increase in the acquisition of human capital? As documented in table 9 on average Europeans are 1.1% more literate than Argentineans, implying that switching 1% European population for 1% Argentinean population will automatically raise literacy by 1.1%. The effect of 7% shown in table 10 column 1 is far greater than 1.1%. The composition effect can explain part but not the whole difference in literacy rates across counties. Beyond the composition effect, immigration has a positive externality on literacy rates on the rest of the population. There are several potential explanations for this: it may be that Europeans provide more education to their offspring, it may also be related to Europeans demanding more schools in the places where they settled and afterward schools provide education to all citizens, or the Argentinean government providing education to the newly arrived immigrant, or it may also be the case where economic progress generated a demand for more skilled labor, providing higher incentives to acquire human capital. In accordance to the results provided in the previous section, places where Europeans accounted for a higher share of the population had higher literacy rates in 1914, partly due to more literate immigrants and partly due to a positive externality on the rest of the population (their children and others). In the next section I will investigate if more education was provided in areas with a higher share of European immigrants.

### **European Immigration and Human Capital formation in 1914**

I analyze whether more education was provided in areas with higher shares of European immigrants. Were counties with a higher share of European population more literate because of school availability? Did the Argentinean government promote education in

areas with more Europeans to assimilate them to the native population? Are counties with higher literacy the results of public financed education, or the result of private financed education?

Since mid-eighteenth century schools were built through the country by the government, offering free public education to all individuals in school-age (6 to 14 years old). These schools were mostly in urban areas or highly densely populated areas. Private schools were also present and offered religious learning and/or were present in areas without public schools. Given that the government followed an active policy of educating the population, it is plausible that counties with a higher share of Europeans experienced more public financed education. However, the opposite is actually true, areas with a higher share of European immigrants are associated with a higher number of private schools per schooling age population and a lower number of public schools.

In table 10, columns 2 and 3 I regress the number of public schools and private schools per 1000 school-age population on the share of European immigrants, controlling for county characteristics. Census data on schools in 1914 lists schools' location's and the school-age population in each county, from which I construct the number of schools per 1000 school-age children, on average there are 5.3 public schools and 0.85 private schools in each county per 1000 school-age population, with a standard deviation of 2.32 and 0.71, respectively. In column 2, I regress the number of public schools per school-age population on the share of European population, the share of European population has a negative and significant effect on the number of public schools. One standard deviation in the share of European population reduces the number of public schools by 0.61 standard deviations, a magnitude equivalent to reducing close to one and a half schools. Column 3 shows IV estimates of regressing the number of private schools on the share of Europeans, results show a positive, although not significant, effect of immigrants on the quantity of schools, one standard deviation in the share of immigrants increases by 0.38 SD the number of private schools per school-age population.

These findings show that government educational policy was not targeted to areas where Europeans concentrated, quite the opposite, an increase by 0.11 in the share of

Europeans is associated with a reduction of 1.5 public schools. On the other hand, the share of Europeans has a positive but not significant effect on the number of private schools. The evidence points to literacy rates being higher in areas with more Europeans not because of educational policies pursued by the national government, but because of individual decisions of the citizens of these counties.

#### 4.4 Robustness Checks

The results are robust to a series of variations in the specification and construction of the IV: I consider changes on the assumptions of the demographic model, as well as alternative explanations for the divergence in economic growth. In table 11 I consider 6 variations to the parameters of the demographic model presented in section 4: column 1 shows results when initial stock of Argentinians is fixed among counties with  $W_{i,1857} > 0$ , and 0 otherwise, namely I assume  $W_{i,1857} = 6269$ , the average number per county of Argentinians in 1857. In column 2 all counties have an average initial number of Argentinians equal to 3600. I also consider arbitrarily high (double) values for the parameters of the model as follows: in column 3 the moving rate  $\phi$  equals 6%, in column 4 the fertility rate  $\rho$  equals 10%, in column 5 the mortality rate  $\delta$  equals 6% and in column 6  $\phi = 6%$ ,  $\rho = 10%$  and  $\delta = 6%$  simultaneously. Columns 1-6 in table 10 show that results remain consistent with my main results, changes in the assumptions of the model do not alter the effect on per-capita GDP and literacy rates (results for all the other variables considered in this study are also robust to these changes).

In table 12 I consider alternative explanations to the divergence in the paths of economic development: land inequality and access to a highly valuable export crop: wheat. Columns 1 and 2 show that adding these variables to the analyses do not alter the statistical relevance of the share of Europeans in explaining economic development. Finally in column 3 I repeat the main regressions of the paper weighting by the population of the county. Relative differences in the population size of a county may be relevant to assess the effect of the population composition on development. As column 3 shows, weighting for the population does not change the results.



In sum, the regressions shown in the previous sections are robust to the inclusion of other potential relevant variables, changes in the parameters of the model and weighting by population.

## 5 Conclusion

The period between mid eighteenth hundred and the First World War saw an unprecedented flow of European immigrants to Argentina, mostly to the rural and urban areas across the fertile plains. Areas where Europeans accounted for a greater share of the total population developed more than areas with fewer Europeans, as measured by GDP close to one hundred years later.

Why were areas with a higher share of European immigrants able to develop more than areas where Europeans represented a fewer share of the population? As I have discussed above, the *Pampas* provides an area of study where political institutions are common across counties and geographical conditions are uniform, therefore differences in development are found in the role played by immigration and human capital. When compared to Argentineans, Europeans were engaged in industrial production complementary to human capital, knowledge or skills. Europeans started most of the industrial activities and provided for most of the industrial (skilled and unskilled) workers.

Moreover, where Europeans accounted for a greater share of the population, the population had higher literacy rates. This higher literacy rates cannot be explained by differences in literacy of Europeans and Argentineans alone, Europeans had a positive effect on literacy rates beyond what can be attributed to a composition effect. Higher literacy rates cannot be explained by an effort of the national government to educate and assimilate immigrants, since public schools were less available in counties where Europeans accounted for a higher share of the population. Private schools were created either by Argentineans or immigrants, and although there is no statistical significant effect of Europeans on the availability of private schools, the data shows a positive correlation between private schools availability and the share of Europeans. Europeans generated a positive externality on the society as a whole, generating greater literacy rates.

These results point to the importance of people themselves in the process of economic development. This study of the fertile plains of Argentina, an area with equal political institutions and uniform geographical characteristics, shows that there is a long-term impact of initial differences in the composition of the population and human capital on economic development.

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Figure 1: Correlation between current log per-capita GDP and the share of European population in 2000.

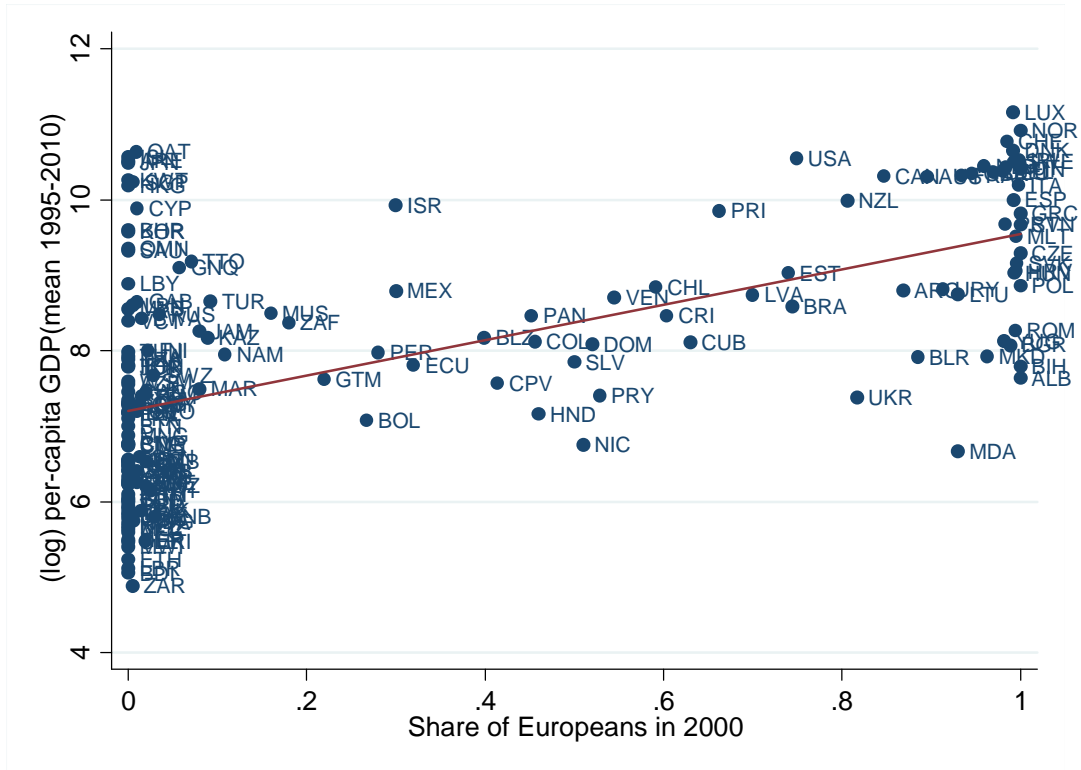


Figure 2: Correlation between log per-capita GDP in 1994 and the share of European population in 1914, in Argentina.

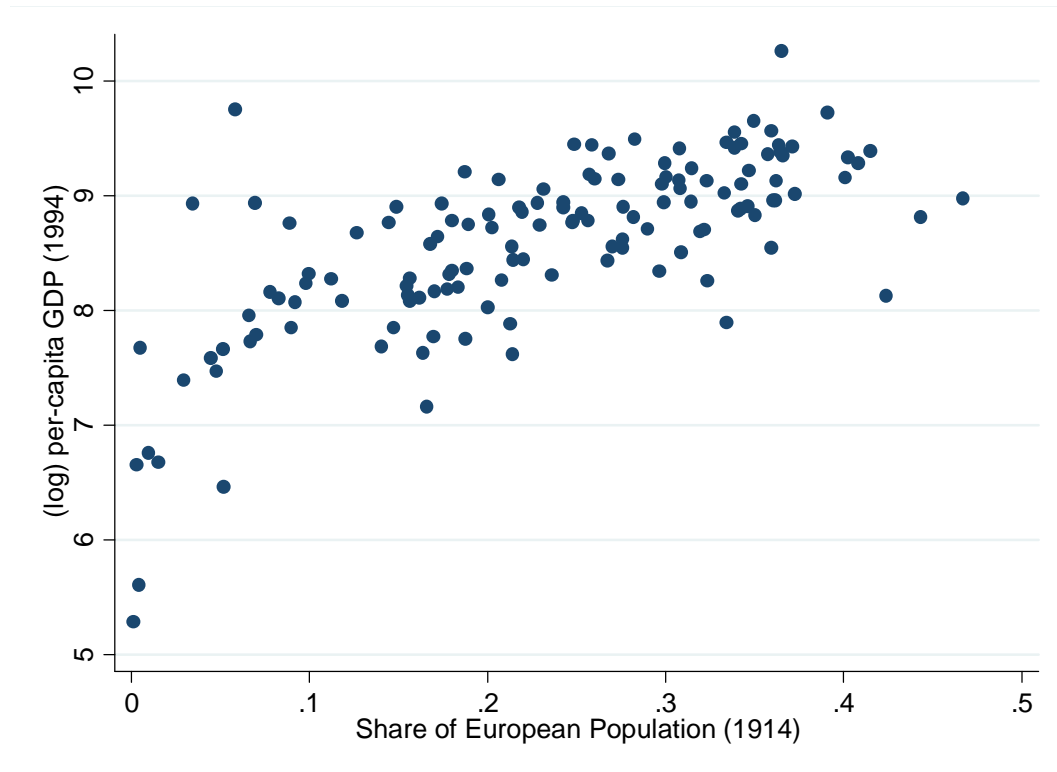




Figure 4

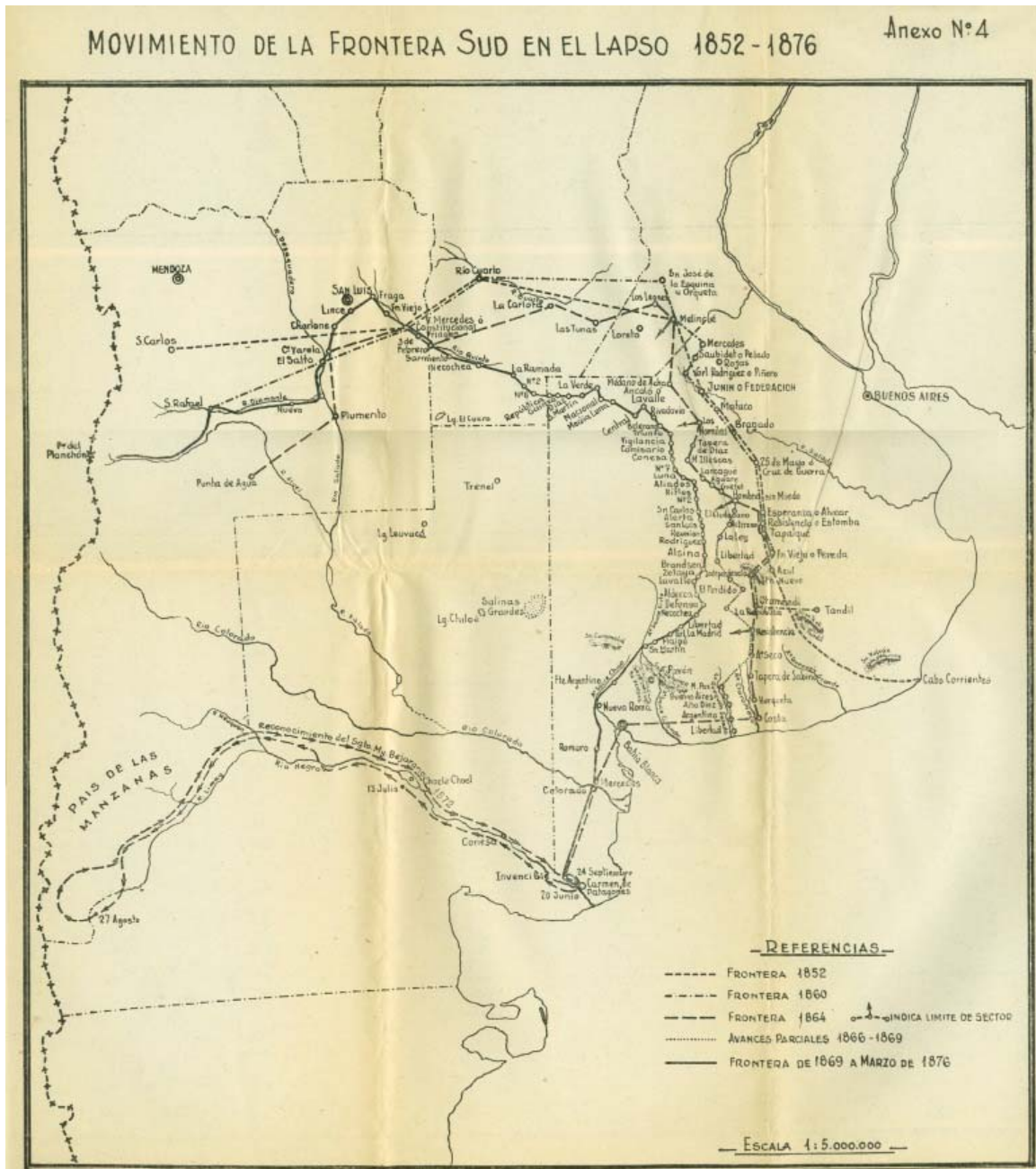




Figure 5: Immigration Time Series.

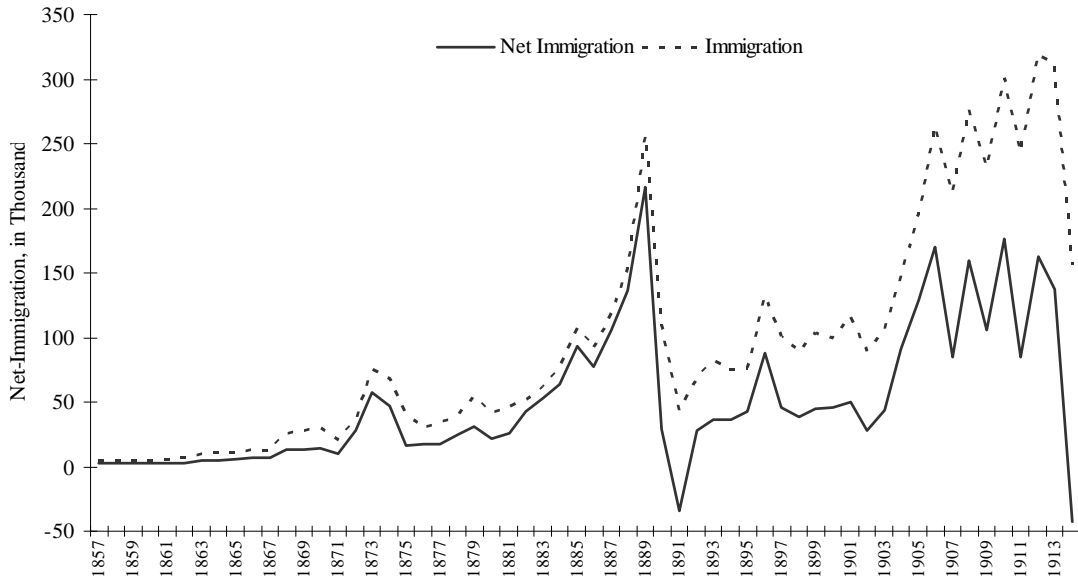


Figure 6: Cumulative Net-Immigration and Area for settlement.

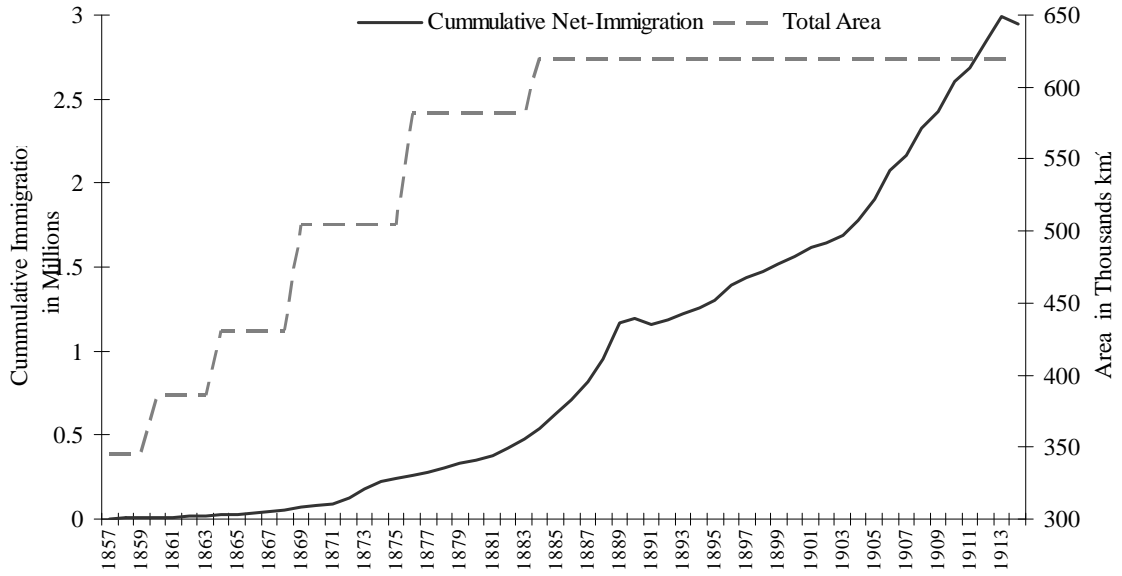


Figure 7: 1<sup>st</sup> Stage correlation between the share of European population and the constructed share of European immigration.

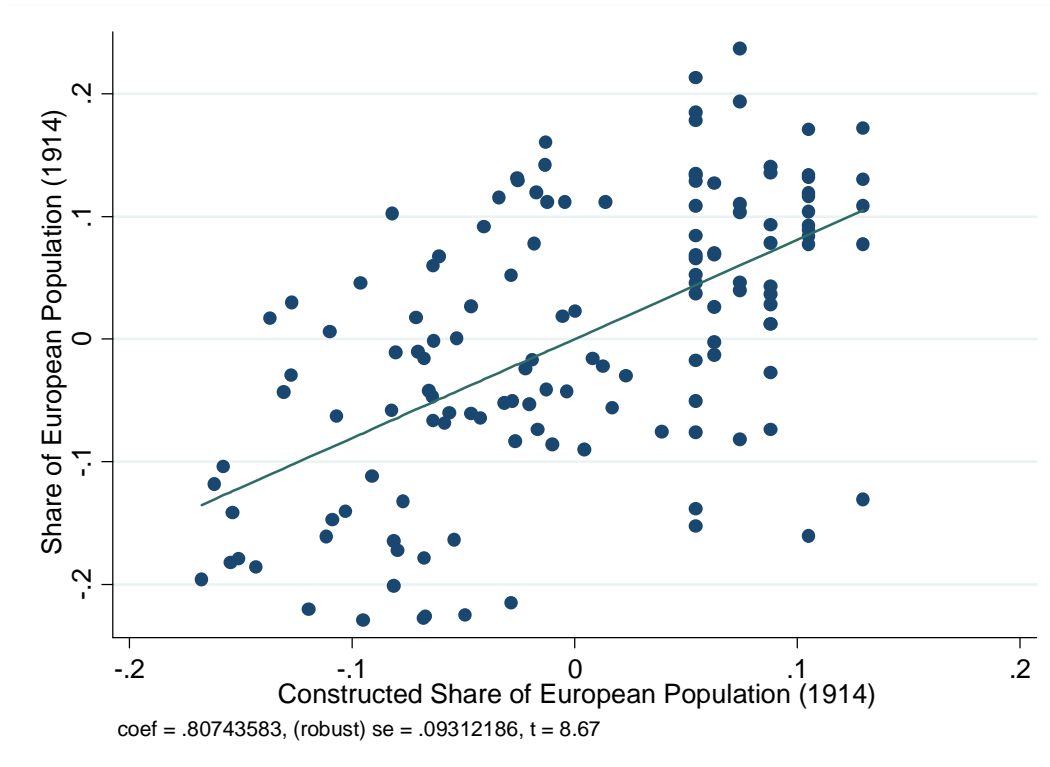


Figure 8: 1<sup>st</sup> Stage correlation between the share of European population and the constructed share of European immigration, control variables and fixed effects included.

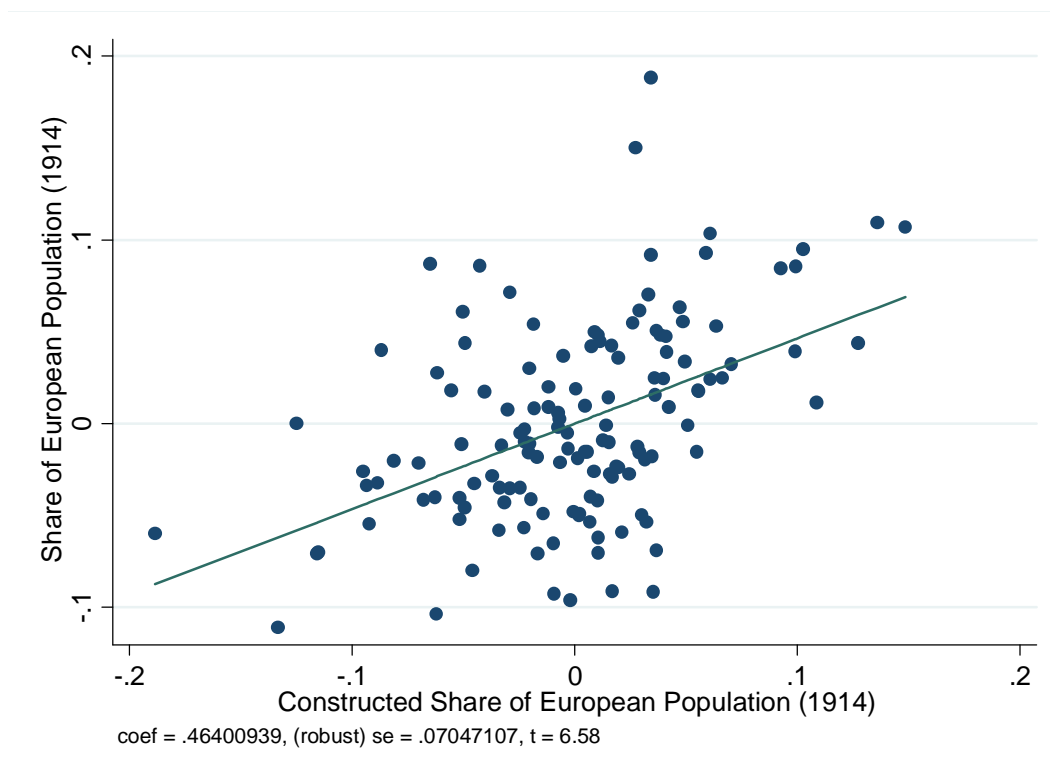


Table 1: Summary Statistics

Variable	Mean	Standard Deviation	50th Percentile
<b>Share of European population, 1914</b>	<b>0.23</b>	<b>0.11</b>	<b>0.16</b>
GDP per-capita, 1994	6754	4190	3560
log GDP per-capita, 1994	8.59	0.78	8.18
Share of pop. w/higher education, 2001	0.1	0.02	0.09
Share of skilled workers, 2001	0.18	0.04	0.15
log industrial output per-capita, 1935	4.4	1.14	3.87
Skilled workers per-1000 individuals, 1935	1.99	2.06	0.89
Number of factories per-1000 individuals, 1935	3.69	2.16	2.16
Energy in H.P. per-capita, 1935	0.1	0.14	0.05
Literacy rate, 1914	0.63	0.05	0.58
Number of private schools per-1000 school age pop.	0.85	0.71	0.35
Number of public schools per-1000 school age pop.	5.33	2.32	3.63
Number of secondary schools per-1000 individ. 2007	0.89	0.45	0.63
Percent of Land used for Agriculture	0.28	0.23	0.07
Population Density	6.67	5.53	2.78
Urban Rate	0.33	0.18	0.22
Number of observations: 136			

Table 2: OLS

Dependent Variable:	log per capita GDP, 1994		
	(1)	(2)	(3)
<b>European population / total population, 1914</b>	<b>5.668***</b> <b>(0.632)</b>	<b>4.403***</b> <b>(0.732)</b>	<b>3.914***</b> <b>(0.796)</b>
Distance to BA City		-0.010 (0.114)	0.079 (0.151)
Land Quality			0.004 (0.004)
Railroad Density		0.069*** (0.026)	0.052* (0.029)
Percent of Land used for Agriculture in 1914		0.715*** (0.248)	0.644** (0.293)
Population Density in 1914		-0.037*** (0.009)	-0.028** (0.011)
Urban Rate in 1914		0.684** (0.335)	0.557 (0.341)
Geographic Controls	no	no	yes
Province Fixed Effects	yes	yes	yes
Observations	136	136	136
R-squared	0.507	0.561	0.596

*Note:* Ordinary least squares regressions with robust standard errors in parentheses. Dependent variable in all columns is log per-capita GDP in 1994. In column 1 only province fixed effects are included. Column 2 includes all control variables except for the geographical controls. In column 3 all control variables are included. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 3: First Stage

Dependent Variable:	European population / total population		
	(1)	(2)	(3)
<b>Constructed European population / total population</b>	<b>0.450*** (0.084)</b>	<b>0.464*** (0.070)</b>	<b>0.464*** (0.069)</b>
Distance to BA City	0.040*** (0.010)	0.018 (0.012)	0.018 (0.012)
Land Quality		0.000 (0.000)	0.000 (0.000)
Railroad Density	0.001 (0.003)	0.002 (0.003)	0.002 (0.003)
Percent of Land used for Agriculture in 1914	0.221*** (0.027)	0.184*** (0.024)	0.184*** (0.025)
Population Density in 1914	0.003* (0.001)	0.003** (0.001)	0.003*** (0.001)
Urban Rate in 1914	0.122*** (0.033)	0.086** (0.040)	0.086*** (0.021)
Geographic Controls	no	yes	yes
Province Fixed Effects	yes	yes	yes
Cluster SE at year of conquest	no	no	yes
Observations	136	136	136
Adjusted R-squared	0.768	0.805	0.805

*Note:* Ordinary least squares regressions with robust standard errors in parentheses. Dependent variable in all columns is the Share of European Population in 1914. In column 1 includes all the control variables except for the geographical controls. In column 2 all control variables are included and in column 3 standard errors are clustered at the year of incorporation. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 4: IV Results

Dependent Variable:	log per capita GDP, 1994		
	(1)	(2)	(3)
<b>European population / total population</b>	<b>5.564***</b> <b>(1.451)</b>	<b>5.493***</b> <b>(1.514)</b>	<b>5.493***</b> <b>(0.688)</b>
Distance to BA City	-0.085 (0.149)	0.000 (0.162)	0.000 (0.050)
Land Quality		0.004 (0.004)	0.004 (0.002)
Railroad Density	0.067*** (0.025)	0.047* (0.028)	0.047** (0.014)
Percent of Land used for Agriculture in 1914	0.419 (0.395)	0.291 (0.360)	0.291 (0.309)
Population Density in 1914	-0.038*** (0.009)	-0.031*** (0.011)	-0.031*** (0.005)
Urban Rate in 1914	0.541 (0.344)	0.437 (0.330)	0.437 (0.374)
Geographic Controls	no	yes	yes
Province Fixed Effects	yes	yes	yes
Cluster SE at year of conquest	no	no	yes
Observations	136	136	136
Adjusted R-squared	0.553	0.583	0.432

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variable in all columns is log per-capita GDP in 1994. In column 1 includes all the control variables except for the geographical controls. In column 2 all control variables are included and in column 3 standard errors are clustered at the year of incorporation. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5: IV Results

Dependent Variable:	share of population with higher education, 2001		
	(1)	(2)	(3)
<b>European population / total population</b>	<b>0.074*</b> <b>(0.044)</b>	<b>0.089**</b> <b>(0.041)</b>	<b>0.089**</b> <b>(0.037)</b>
Distance to BA City	-0.004 (0.004)	-0.006* (0.003)	-0.006* (0.003)
Land Quality		-0.000** (0.000)	-0.000** (0.000)
Railroad Density	0.002** (0.001)	0.002*** (0.001)	0.002*** (0.001)
Percent of Land used for Agriculture in 1914	-0.020 (0.013)	-0.012 (0.011)	-0.012 (0.010)
Population Density in 1914	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)
Urban Rate in 1914	0.026** (0.011)	0.034*** (0.009)	0.034** (0.012)
Geographic Controls	no	yes	yes
Province Fixed Effects	yes	yes	yes
Cluster SE at year of conquest	no	no	yes
Observations	136	136	136
Adjusted R-squared	0.295	0.472	0.224

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variable in all columns is the share of population age 25 and above with higher education in 2001. In column 1 includes all the control variables except for the geographical controls. In column 2 all control variables are included and in column 3 standard errors are clustered at the year of incorporation. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 6: IV Results

Dependent Variable:	share of population with high skilled occupations,		
	(1)	(2)	(3)
<b>European population / total population</b>	<b>0.174*** (0.067)</b>	<b>0.184*** (0.066)</b>	<b>0.184 (0.105)</b>
Distance to BA City	0.006 (0.006)	0.002 (0.006)	0.002 (0.007)
Land Quality		-0.000 (0.000)	-0.000 (0.000)
Railroad Density	0.003*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Percent of Land used for Agriculture in 1914	0.035* (0.021)	0.036* (0.019)	0.036 (0.040)
Population Density in 1914	-0.002*** (0.001)	-0.002*** (0.001)	-0.002** (0.001)
Urban Rate in 1914	0.065*** (0.018)	0.064*** (0.015)	0.064*** (0.016)
Geographic Controls	no	yes	yes
Province Fixed Effects	yes	yes	yes
Cluster SE at year of conquest	no	no	yes
Observations	136	136	136
Adjusted R-squared	0.675	0.738	0.484

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variable in all columns is the share workers in high-skilled occupation in 2001. In column 1 includes all the control variables except for the geographical controls. In column 2 all control variables are included and in column 3 standard errors are clustered at the year of incorporation. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



Table 7: Ownership and Industrial Workers

	year	Share of Foreigners
Ownership	1895	0.81
	1913	0.65
	1935	0.58
Workers	1895	0.59
	1913	0.49

Table 8: IV Results

Dependent Variable:	log value of industrial production (1)	skilled workers per-1000 individuals (2)	factories per- 1000 individuals (3)	energy in h.p. per person (4)
<b>European population / total population</b>	<b>6.885*** (2.498)</b>	<b>16.025*** (6.091)</b>	<b>20.381*** (5.527)</b>	<b>0.817** (0.323)</b>
Distance to BA City	-0.235 (0.299)	-0.847 (0.714)	-0.725 (0.547)	0.034 (0.030)
Land Quality	-0.022*** (0.008)	-0.056*** (0.019)	-0.001 (0.015)	-0.003*** (0.001)
Railroad Density	0.000 (0.053)	-0.189* (0.112)	0.012 (0.076)	0.009 (0.007)
Percent of Land used for Agriculture in 1914	-0.870 (0.672)	-2.956** (1.326)	-4.402*** (1.548)	-0.187* (0.110)
Population Density in 1914	0.035* (0.020)	0.217*** (0.047)	0.019 (0.046)	0.007*** (0.003)
Urban Rate in 1914	0.215 (0.790)	-0.914 (1.238)	1.653 (1.057)	0.006 (0.070)
Geographic Controls	yes	yes	yes	yes
Province Fixed Effects	yes	yes	yes	yes
Observations	136	136	136	136
Adjusted R-squared	0.190	0.243	0.344	0.084

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variables in columns 1-4 are the value of industrial production, the number of skilled workers per 1000 individuals, the number of factories per 1000 individuals and the energy in h.p. per person. Each column includes all the control variables. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 9: Literacy Rates by Contry of Birth

<u>Nationality</u>	<u>Literacy rate</u>
Argentina	63.2%
Average European	64.2%
Average Population	63.3%
Austria	69.2%
France	79.3%
Germany	88.2%
Great Britain	90.9%
Italy	59.6%
Spain	67.4%
Switzerland	86.9%

Table 10: IV Results

Dependent Variable:	share of literate population	Public Schools x 1000 school-age population	Private Schools x 1000 school- age population	Secondary Schools x 1000 individuals,
	(1)	(2)	(3)	(4)
<b>European population / total population</b>	<b>0.070** (0.035)</b>	<b>-12.817*** (4.536)</b>	<b>2.430 (1.850)</b>	<b>1.484** (0.666)</b>
Distance to BA City	-0.011*** (0.003)	-1.522*** (0.436)	-0.119 (0.169)	0.041 (0.064)
Land Quality	-0.000* (0.000)	-0.004 (0.012)	-0.003 (0.004)	-0.004* (0.002)
Railroad Density	0.000 (0.001)	0.032 (0.087)	0.019 (0.033)	0.005 (0.011)
Percent of Land used for Agriculture in 1914	-0.021** (0.009)	-1.142 (1.268)	0.185 (0.494)	-0.218 (0.175)
Population Density in 1914	-0.001*** (0.000)	-0.015 (0.031)	-0.006 (0.014)	-0.030*** (0.006)
Urban Rate in 1914	0.001 (0.007)	-0.783 (1.232)	0.372 (0.364)	0.019 (0.196)
Geographic Controls	yes	yes	yes	yes
Province Fixed Effects	yes	yes	yes	yes
Observations	136	136	136	136
Adjusted R-squared	0.945	0.490	0.226	0.661

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variables in columns 1-3 are the share of literate population in 1914, the number of public schools per 1000 school-age population and the number of private schools per 1000 school-age population. Each column includes all the control variables. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 11: Robustness Checks

Dependent Variable:	log per capita GDP, 1994					
Assumptions:	If initial Arg.>0, Arg_0=6300	Arg_0=3600 for all counties	moving rate =6%	fertility rate =10%	mortality rate =6%	assumptions (3), (4) and (5)
	(1)	(2)	(3)	(4)	(5)	(6)
<b>European population / total population</b>	<b>7.249*** (1.826)</b>	<b>5.387** (2.501)</b>	<b>4.810*** (1.774)</b>	<b>7.025*** (1.663)</b>	<b>5.492*** (1.666)</b>	<b>5.300*** (1.571)</b>
Distance to BA City	-0.087 (0.172)	0.006 (0.192)	0.034 (0.173)	-0.076 (0.152)	0.000 (0.169)	0.010 (0.164)
Land Quality	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)
Railroad Density	0.040 (0.029)	0.047* (0.027)	0.049* (0.028)	0.041 (0.028)	0.047* (0.028)	0.047* (0.028)
Percent of Land used for Agriculture in 1914	-0.101 (0.430)	0.315 (0.585)	0.444 (0.392)	-0.051 (0.452)	0.291 (0.372)	0.335 (0.366)
Population Density in 1914	-0.034*** (0.012)	-0.031** (0.013)	-0.030*** (0.011)	-0.034*** (0.012)	-0.031*** (0.011)	-0.031*** (0.011)
Urban Rate in 1914	0.303 (0.381)	0.445 (0.359)	0.489 (0.326)	0.320 (0.367)	0.437 (0.331)	0.451 (0.329)
Geographic Controls	yes	yes	yes	yes	yes	yes
Province Fixed Effects	yes	yes	yes	yes	yes	yes
Observations	136	136	136	136	136	136
Adjusted R-squared	0.538	0.585	0.592	0.546	0.583	0.586

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variables in columns 1-6 are different assumptions for the construction of the IV. Each column includes all the control variables. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 12: Robustness Checks

Dependent Variable:	log per capita GDP, 1994		
Assumptions:	Wheat	Land-gini	Obs. Weighted by population
	(1)	(2)	(3)
<b>European population / total population</b>	<b>5.451***</b> <b>(1.533)</b>	<b>5.389***</b> <b>(1.444)</b>	<b>4.067***</b> <b>(1.389)</b>
Percent of Land used for Wheat	0.136 (0.516)		
Land-gini in 1914		-1.058* (0.590)	
Distance to BA City	-0.004 (0.164)	0.059 (0.158)	0.036 (0.141)
Land Quality	0.004 (0.004)	0.003 (0.004)	0.004 (0.003)
Railroad Density	0.045 (0.028)	0.042 (0.029)	0.037 (0.025)
Percent of Land used for Agriculture in 1914	0.257 (0.349)	-0.051 (0.452)	0.379 (0.275)
Population Density in 1914	-0.030*** (0.011)	-0.027** (0.012)	-0.026*** (0.010)
Urban Rate in 1914	0.428 (0.325)	0.490 (0.325)	0.407 (0.318)
Geographic Controls	yes	yes	yes
Province Fixed Effects	yes	yes	yes
Observations	136	136	136
Adjusted R-squared	0.580	0.592	0.582

*Note:* Instrumental Variable regressions with robust standard errors in parentheses. Dependent variables in columns 1-3 is log per-capita GDP in 1914. In column 1 the percent of land used for wheat production is included as a regressor. In column 2 the land gini is included as a regressor. In column 3 observations are weighted by the population. Each column includes all the control variables. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.