The Geography of Social Change*

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Abstract

The US fertility transition is a puzzle in terms of both magnitude and timing. We show that fertility declined faster in counties characterized by a higher outward migration, especially towards the Western frontier. Improved economic opportunities in the West, as higher wages and land availability, provided incentives to migrate. Results are robusts to several measures of fertility and internal migration. Our theory is based on the diffusion of new family values governing intergenerational responsibilities and behavior with respect to saving and fertility. Migration and the lack of remittance technology lowered expected transfers from children, and incentivized precautionary savings of parents.

JEL classification: C33, J11, J13, N32, O15, R23

Keywords: Fertility rate, fertility transition, counties, outward migration.

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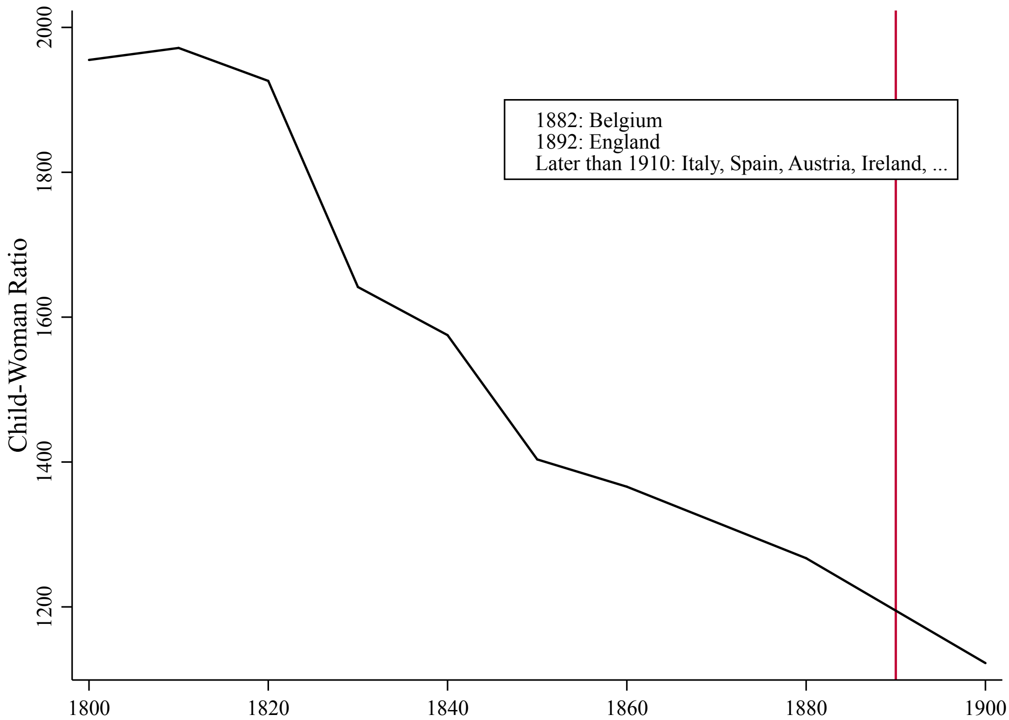
1. INTRODUCTION

The U.S. experienced a sustained fertility decline in the 19th century: As shown in Figure 1, the child-woman ratio dropped from about 1900 in 1800 to 1100 in 1900.[1] Even though a demographic transition from high to low levels of fertility and mortality is common to every modern and economically developed country, the American pattern had distinctive features. First, fertility transition was underway from the beginning of the 19th century while all other Western developed countries, with the exception of France (Murphy, 2015 and Daudin et al., 2019), began their sustained decline in birth rates only in the late 19th or early 20th century. The vertical line in Figure 1 denotes the beginning of fertility transition in Belgium and England. In most of the other countries, fertility declined later than the end of the 1800s.



Sources: Authors' computations using data from Ruggles et al. (2015) and Haines et al. (2010). Child-Woman Ratio is the the number of children of age 0-9 per 1,000 women of age 15-44.

Figure 1 – Child-Woman Ratio and Fertility Decline in Europe

In this paper, we study the convergence in fertility rates in the U.S. during the 19th century. By the end of the century, the differences in the child-woman ratio across counties had disappeared, and its variance has halved. We ask whether the characteristics of the *Westward* migrants, and the distance of migration have contributed to the drop of fertility.[2] Our

[1]From the CDC, 1999a, we know that In 1800 the typical American woman had about 7 live births during her reproductive years, and about 3.5 by the end of 1900.

[2]The *Westward expansion* denotes the 19th-century movement of settlers into the American West, which began with the Louisiana Purchase and was fueled by the Gold Rush, and the Oregon Trail.

theory relies on the change of family social norms: patriarchal family, based on intergenerational transfers, dissolved as young Eastern sons migrated towards the West attracted by new economic opportunities, i.e., land to improve, natural resources to exploit, and higher wages in general. As described by Ferrie (1997), migrants exploited natural resources at locations distant from the narrow band of initial settlement on the Atlantic coast. Farmers moved to more productive land in the Ohio River Valley in the late 18th century and on to the Great Plains by the middle of the 19th century. Mineral and timber resources were used to good advantage by migrants to the West and the Northwest. By the end of the 19th century, the rates of population growth in each region have converged, and the geographic distribution of population became stationary. The lack of remittance technology lowered expected transfers from children, and incentivized precautionary savings of parents especially when the distance from the home county is high.[3]

Data are from several sources. To quantify the number of internal migrants at the county level, we use an innovative dataset: the IPUMS Linked Representative Samples (Ruggles et al., 2015) which link records from the 1880 complete-count database to representative samples of the 1850, 1860, 1870 U.S. censuses of the population. For each individual we have information about her *county* of residence at the time of the Census (i.e. 1850, 1860, or 1870), her destination *county* of residence in the linked sample of 1880, and other demographic characteristics. We believe that this measure of outward migration is more accurate than those proposed by Carter et al. (2001) and Rosenbloom and Sundstrom (2003) which use *state* level data to *infer* the number of migrants from either the change population composition over Census decennials (Carter et al., 2001), or from the difference between state of birth and state of residence declared at the time of the Census interview (Rosenbloom and Sundstrom, 2003). For fertility, county, demographic, and economic characteristics, we follow Haines and Hacker (2011), and use the ICPSR data set “Historical, Demographic, Economic and Social Data: The United States, 1790-2002” (Haines et al., 2010). In particular, fertility is approximated by the child-woman ratio, i.e., the ratio between the number of white children of age 0 to 9, and the number of white women of age 15 to 44 or 49, depending on sample availability. Our main assumption is that fertility decline occured at the same time as the Westward migration.

In the baseline regression, we find that a one percent increase in the percentage of migrants contributes about 3 percentage points to the fertility decline in the home county from 1850 to 1880. Most importantly, the size of the correlation increases with the distance of migration. That is, a one percent increase in the percentage of migrants moving to a different state contributes 5 percentage points to the fertility decline in the home county, and 7 percentage points when migrants moved to the *frontier*, i.e. towards counties located in states that do not belong to the original settlements. We control throughout the analysis for state-level fixed effects, which absorb any heterogeneity in migration patterns across U.S. states.

[3]Lewis (1983) documents that savings rate rose from 16 to 22 percent between 1830 and 1900.

Any remaining variation in fertility must therefore reflect variation in norms that sustain the change of family size. We extend the analysis to the fertility decline from 1800 to 1880, and find significantly higher correlation coefficients as the decline had already started at the beginning of the century.

We take advantage of the geographic and time variations in the child-woman ratio and fraction of migrants to study how their relationship is conditioned by land policy set by the US government and real wages in Western settlements. The historical institutional backgroud can be used to address endogeneity concerns. Specifically, between 1847 and 1855, the Congress granted acres of land to veterans of the Civil War and their heirs through the Homestead Acts. This generates as-good-as-random assignment of migrants. Our source of exogenous variation is the average number of acres granted. The idea is that families whose members were involved in the Civil War received federal land for private ownership and provided incentives to migrate in the states where acres were located. In our context, it is unlikely that acres situated in states different than the state of residence of the beneficiary family had a direct effect on later fertility in the home county. We estimate the IV model for a sample of states where families should not be affected by migration because they are located in the Western U.S. states. Our estimates are close to zero for these counties which were in the West coast. This suggests that our empirical model captures the effect of settlements and not other confounding factors.

We perform several robustness checks. We are well aware of the fact that the child-woman ratio (CWR henceforth) does not account for age structure or marriage patterns, both of which changed significantly during this period. A shift in age structure in the absence of a fertility reduction would increase or decrease the CWR. By failing to take into account the changing population age structure, the CWR may understate the change in behavior. To prove the robustness of our results, we use two alternative measures of fertility. First, we compute the number of children ever born as in Jones and Tertilt (2006), available at the state level. Second, we consider only children of age five to nine years old to take into account the high child mortality rate of that period of time. In both cases, results are confirmed and reported in Section 3.3. We also exclude counties that belong to the bottom and top 5% of the distributions of CWR and percentage of migrants, to verify that results are not led by outliers in the dependent or independent variable. All these robustness checks reduce unobserved heterogeneity between counties but leave our results unchanged.

Related evidence. The changing of family structure and the movement to the West took place at the same time as the development of the U.S. banking system. The Bank of North America, the first bank in the modern sense, was established in 1781 in Philadelphia. The following decades witnessed an increase in the number of Banks from about 28 in 1800 to 824 in 1850 (Carter et al., 2006, Table Cj142-148). We provide evidence of the correlation between the number of banks and the amount of deposits, and the decline of CWR. That is, we observe a higher number of banks or a higher amount of deposits in states where the decline in CWR has been the highest. While these results are consistent with our theory of substitution between children and savings for old age support, we do not have enough evidence to rule out reverse causation.

The correlation between fertility decline and migration is not an exclusive U.S. statistics. To get a rough idea of the correlation, we scatterplot the number of immigrants from several European countries to the U.S. from 1820 to 1920 and identify the date at which marital fertility declined by 10 percent, as reported in Knodel and van de Walle (1979). At a first sight, we cannot rule out the link between the year associated to the highest immigration flow and the fertility decline. Few exceptions are present, as France and Ireland. To get a measure of the correlation, we use micro data from Mitchell (2003) and compute both the percentage of migrants from Europe by decade, and the change in the child-woman ratio (as in our analysis for the U.S.). We find that the correlation is significantly positive, but smaller than the ones estimated for the U.S.

Literature Review. Conventional theories have placed great reliance on child costs and benefits associated with structural changes accompanying modern economic development, such as urbanization, industrialization, the rise in literacy and education, and the increase in female labor force participation. But, in the U.S., fertility transition started before many of these structural changes became important. We now review some of the most relevant theories of fertility decline that compete with our novel theory of distant westward migration. In this section we will go through a review of the existing theories of fertility decline.

First, we know from demographers that fertility transition starts after or at the same time as the reduction in mortality. But, the Notestein's argument does not fit the timing of the historical declines in fertility and mortality. As shown by Haines (2001), there is no sustained fall in the infant mortality rate until the 1890s.

Sources: Authors' computations using data from Haines (2001).

Figure 2 – Infant Mortality and Life Expectations

Second, Yasuba (1962) and Easterlin (1976)'s theories suggest that the availability of easily accessible land might provide an explanation for the robust East-West fertility gradient in fertility decline. Yasuba (1962) proposed that East-West differences in population density could account for the geographical pattern of fertility. Acquisition of new land in the settled areas became increasingly difficult and costlier and the average distance from the settled to the new areas where land was plentiful became farther. Consequently, fertility in the older communities may have been reduced directly in response to the decreased demand for children or indirectly as a result of the rise in the age at marriage and the fall in the incidence of marriage. Easterlin (1976) recasted Yasuba (1962)'s argument: he suggested that parents had an altruistic motive to preserve and augment the family's wealth and to pass those assets on to their children when they died. Over time fertility would decline because, in any given community, land would become increasingly scarce, more expensive, and more difficult to acquire.

This theory has several weaknesses. First, improvements in transportation and communication, the continuing release of the public domain at land auctions, and rising agricultural incomes should have made it easier to purchase a farm. Second, the land-scarcity model has difficulty explaining why fertility was so high at the beginning of the 19th century and why the onset of the fertility decline occurred at the time it did. Fertility began to fall at precisely the time American land policy changed, opening up vast expanses of public domain to settlement. Beginning with the Congressional Act of 16 September 1776 and the Land Ordinance of 1785, a wide variety of Congressional acts governed the distribution of federal land in the thirty public land states. Various acts opened up new territories, established the practice of offering land as compensation for military service, and extended preemption rights to squatters (e.g., the Indian Removal Act in 1830, the Preemption Act in 1841, and the Homestead Acts in 1862). These acts each resulted in the first transfer of land from the federal government to individuals. Relatively speaking, the threat of land scarcity must have appeared much greater in 1800 than at any time during the period between 1815 and 1840.

An alternative theory that tried to overcome the previous flaws is the one by Sundstrom and David (1988) based on state level data. They suggested that the high demand for children in the early years was motivated by parents' desire to provide for their own old-age security.[4] By having a large number of children and by offering these children a portion of the farm family's wealth as a potential inheritance in exchange for their continuing support, parents could ensure for themselves a flow of goods and services even after their own ability to support themselves was diminished by old age. According to their argument, the old-age security motive for having many children would have weakened substantially when opportunities outside of agriculture began to improve some time in the early-nineteenth century. The importance of inheriting farmland would be diminished. Testing their model using state-level data for 1840, they concluded that nonagricultural labor market opportunities had a large, negative effect on rural white fertility.

We make two contributions with respect to Sundstrom and David (1988). First, we are able to exploit the geographic variation of migration at the county level and obtain a more precise estimate of its effect on CWR from 1850 to 1880. This analysis would not be as robust with state level data, especially at a time when the number of politically organized states were limited to 26.[5] Moreover, we show that distance of migration plays a role, weakening the theory of Sundstrom and David (1988), which does not allow to differentiate between nearby or far nonagricultural opportunities. It is not enough to move out of its own family, but the distance has to be such that, given the geographical constraints of that time, interactions and remittances become very costly. Hence, we do not rule out the importance of industrial development, but we claim that it did not necessarily impacted fertility of nearby rural areas.

The paper proceeds as follows. In Section 2, we review the historical features of the CWR and westward migration. Section 3 presents the empirical strategy, results, and robustness checks. In section 4 we speculate on the development of the banking system, and the fertility transition in Europe. Section 5 concludes.

[4]Note that before the Social Security Act of 1935, the United States had no social insurance system. See Caucutt et al. (2013) for an analysis of the association between urbanization, industrialization and the rise of social insurance.

[5]See Figure 5 in Appendix A.

2. HISTORICAL BACKGROUND

2.1. The Geography of the Child Woman Ratio

CWRs at the county level are computed using data from Haines et al. (2010) and Ruggles et al. (2015). Statistics are summarized in Table 8 and in Table 1. For each decennial of the historical Census, we extract the number of white women in their reproductive age (15 to 44 or 15 to 49 depending on availability) and number of white children born alive up to age 9.

Year	1800	1810	1820	1830	1840	1850	1860	1880	1900
United States	**1.955**	**1.972**	**1.926**	**1.641**	**1.575**	**1.403**	**1.366**	**1.267**	**1.122**
St.Dev.	0.401	0.364	0.355	0.337	0.306	0.281	0.261	0.250	0.244
No. Counties	443	604	789	1,021	1,308	1,656	2,091	2,505	2,952
New England	1.703	1.621	1.419	1.114	1.066	0.921	0.886	0.768	0.733
Middle Atlantic	1.984	1.977	1.814	1.444	1.303	1.157	1.112	0.956	0.823
East North Central	2.282	2.305	2.173	1.857	1.633	1.447	1.342	1.127	0.961
West North Central	n.a.	2.269	2.227	2.030	1.798	1.622	1.476	1.339	1.162
South Atlantic	1.850	1.830	1.791	1.487	1.482	1.333	1.299	1.268	1.156
East South Central	2.443	2.305	2.184	1.846	1.765	1.488	1.391	1.322	1.192
West South Central	n.a.	2.075	2.030	1.802	1.792	1.569	1.556	1.498	1.302
Mountain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.584	1.317	1.160
Pacific	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.556	1.314	1.002

Table 1 – Child Woman Ratio, white population

In order to make the temporal change more visible, we plot the maps of the CWRs by county in 1800, 1820, 1840, 1860, and 1880 in Table 8.[6] On average, the CWR decreased from 1.955 in 1800 to 1.267 children per 1,000 women in 1880. Dispersion varied also from 1800 to 1880: the standard deviation dropped from 0.401 to 0.250 in 80 years. In 1800, the county with the lowest CWR (0.859) is in Virginia (Norfolk City), while the highest CWR county (Muhlenberg) is in Kentucky with 4,370 children per 1,000 women. By 1880, the CWR was homogenous across the territory.

The maps clearly show that CWRs decreased remarkably from 1800 to 1880, and the decline was not homogenous across the country. This evidence combined to Table 1 tells us that the east-west differences are apparent throughout and it is clear that New England was the area where CWRs was the lowest at the beginnning of the century. There is a less apparent suggestion of a north-south gradient, with the South having had higher CWRs. Urban places had lower CWRs than did rural areas, but the decline took place in both rural and urban areas between 1800 and 1840. Rural CWR remained above urban CWR, but absolute differences diminished as both types of residents limited their family size. Variation across

[6]The historical boundary files have been downloaded from the IPUMS and the NHGIS websites.

space narrowed from 1800 onwards. In 1810, the South had fertility ratios over 30 percent higher than in New England (the lowest fertility region). This differential had increased to about 60 percent in 1860, and the relative difference was nearly the same at the end of the century. The Midwest moved from being a region of quite large families to, by 1900, one with fertility close to the leaders in the transition, i.e. New England and Middle Atlantic regions.

2.2. *Westward Migration*

McClelland and Zechauser (1982) provide estimates of net interregional migration from 1800 to 1860, by decade, a rare and precious measure to be found in the literature. A summary of their data is in Figure 3 which shows the estimated interregional migration of white men. The largest net loser of population throughout this period was the Mid-Atlantic region (New York, New Jersey, and Pennsylvania), east of the Appalachians.

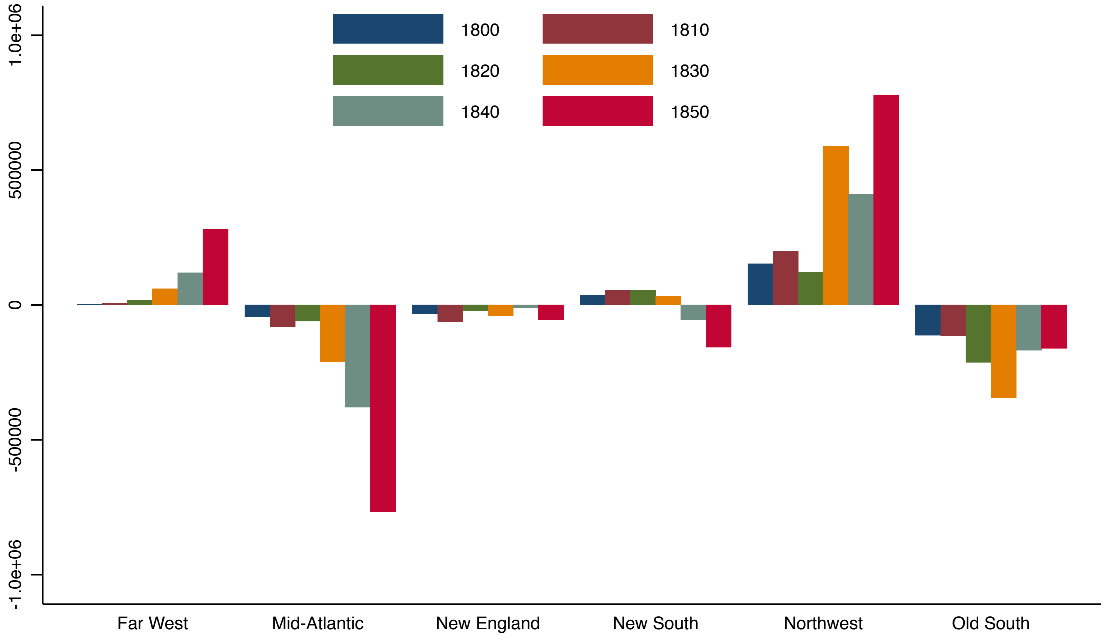
McClelland and Zechauser (1982) reports that the total exodus from this region for the entire period exceeded the total net loss of the Old South by more than 75 percent. This region was the the most important supplier of population to the west. The out-migration accelerated between 1800 and 1820, and then doubled from 1830 to 1860. The total loss amounted to approximately two thirds of the total net in-migration into the Northwest region in the same sixty years. The region that gained the most population was the Northwest, west of the Appalachians and north of Tennessee. The net influx between 1800 and 1860 was almost four million. New England and Old South were net losers of population but total net loss for the latter was almost four times that of the former. From 1800 to 1840, the region experienced a net influx of population. But population migrated from the South after 1840, as the nation became progressively divided.

Our measure of migration is computed using the IPUMS linked representative samples.[7] We pull together three linked samples: 1850-1880, 1860-1880, and 1870-1880. The samples are created by linking all men of 15 years and older who were in the U.S. in both census years.[8] Unfortunately, this measure of migration has some deficiencies: it fails to indicate the timing of an individual's move between birth and the census and fails to count moves in between censuses. In spite of that, it is the best measure at the county level available nowsadays.

Table 2 contains the descriptive statistics of migrants. In the first sample, about 10 percent of individuals migrated out of their county. This number decreased to about 8 percent in the last sample. Hence, the largest part of migrants moved to a different state. The percentage of individuals migrating to the frontier decreased over time from about 80 to 55 percent. We also compute the average distance of migration in miles between county centroids, and see that it decreases over time for inter-state (and frontier) movers, but it increases for

[7]The data are available from the website https://usa.ipums.org/usa/linked_data_samples.shtml.

[8]The samples of all women present in both census years are also available, but they do not include women who got married and changed their last name in between census. In section 3.3, we show that results hold true when considering btoh men and women.



Source: McClelland and Zechauser (1982).

Figure 3 – Net Interregional Migration of White Men 1800-1860

intra-state movers. The percentage of migrants born out of the U.S. remains low in three waves, not surpassing the 9.4 percent. This can be due to the economic recession experienced by the U.S. following the Civil War, that contributed to a slowdown in immigration.

About 30 percent of the migrants were already married at the time of the move, from 13 to 18 of them were farmers or laborers, living in rural areas. In contrast with the findings of Stewart (2006), migrants in our samples have an occupational score index which is not different from that of stayers before moving, and it is higher in the county of destination.[9]

3. Empirical Approach

3.1. Main Results

In this section we present extensive evidence of the positive correlation between the decline in CWR and the percentage of migrants at the county level. Our analysis is especially concerned with ruling out various background characteristics as the main drivers of our correlation. In particular, in order for the implications of our theoretical analysis to be correct (i.e. higher wages implying migration and hence a lower number of children), the positive correlation should not be driven by, say, a decrease in the sex-ratio (decreasing the probability of marriage, and hence the number of children). If this were the main driver, then there would be no dynamic implication to a shock that caused couples to have less children

[9]The occupational score index is a constructed variable (by IPUMS) that assigns occupational income scores to each occupation.

Sample:	1850-1880	1860-1880	1870-1880
Age	20.09	21.08	23.85
Literate (%)	94.50	95.34	93.33
Foreign Birthplace (%)	4.78	7.28	9.43
Moved county (%)	10.10	8.99	7.86
Distance in miles	52.81	56.04	57.05
Moved state (%)	89.90	91.01	92.14
Distance in miles	381.97	260.25	185.00
Frontier (%)	80.39	73.57	55.66
Distance in miles	473.11	315.31	216.81
Married in t_0 and in t_1 (%)	32.90	38.25	41.75
Percent rural, t_0	89.64	86.74	82.78
Percent rural, t_1	80.09	77.94	77.85
Farmers and laborers, t_0 (%)	12.71	13.48	17.53
Farmers and laborers, t_1 (%)	32.79	31.32	25.79
Occupational score of migrants, t_0	19.04	18.92	18.52
Occupational score of non-migrants, t_0	19.06	19.07	18.30
Occupational score of migrants, t_1	21.77	21.19	19.86
Occupational score of non-migrants, t_1	19.94	19.65	17.70
Northeast region, t_0 (%)	40.41	31.77	25.34
Northeast region, t_1 (%)	26.97	25.23	19.36
North Central region, t_0 (%)	30.07	36.84	42.61
North Central region, t_1 (%)	43.96	45.63	51.48
South region, t_0 (%)	28.98	29.55	28.87
South region, t_1 (%)	24.63	24.47	23.65
West region, t_0 (%)	0.55	1.83	3.18
West region, t_1 (%)	4.44	4.66	5.50
Number of migrants	24,491	126,930	224,500

Table 2 – Characterizing Migrant Men

than they did previously. Moreover, it is important to prove that migrating is not sufficient to impact fertility decisions, but it is relevant to move far enough to end participation in the original family's production activity. Hence, distance and origin of migration play a role.

We start our analysis by estimating the following model by OLS:

$$\Delta \log CWR_{ij} = \beta_0 + \beta_1 MIG_{ij} + \overline{\mathbf{X}}'_{ij}\beta_2 + \delta_j + \epsilon_j, \tag{3.1}$$

where the dependent variable is the percentage change of CWR from 1800 to 1850 or 1880 in the home county i, state j, in similar fashion of Goldstein and Klüsener (2014). The independent variable of interest is MIG_{ij}, i.e. the average fraction of migrants moving from the "home" county i in state j in 1850, 1860, and 1870, to the "destination" county in 1880. $\overline{\mathbf{X}}_{ij}$ is a matrix of individual and (home and destination) county-level variables, considered at their mean level over the period 1850-1880. The structure of our historical data enables us to introduce state fixed effects (δ_j) in order to account for common time-shocks state characteristics. Since the dependent variable is computed as a rate of change, each county appears in the dataset only once, hence we cannot control for county and year fixed effects. In addition, we have to include independent variables computed as averages across time and counties. ϵ_j is the error term. β_1 should be interpreted as the percentage change in the geometric mean of CWR change. It should be that $\beta_1 > 0$ because being a migrants has an increasing effect on the fertility decline of the home county. To assess the extent of migration distance, we estimate the following model by OLS:

$$\Delta \log CWR_{ij} = \beta_0 + \sum_{z=1}^{3} \beta_z MIGD_{ijz} + \overline{\mathbf{X}}'_{ij}\beta_4 + \delta_j + \epsilon_j. \tag{3.2}$$

$MIGD_{ijz}$ indicates migration status with $MIGD_{ij1}$ being the average fraction of individuals who did not migrate; $MIGD_{ij2}$ the average fraction of migrants who left county i, state j, but remained in state j; and, $MIGD_{ij3}$ the average fraction of migrants who moved to another state. Our hypothesis is that only migrants who moved far from their home state should have contributed to the decline of CWR. Hence, we expect $\beta_3 > 0$ and β_2 non significant.

We also consider a third measure, i.e. the *frontier*, which includes all destination states different than Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, West Virginia, Pennsylvania, Virginia, North Carolina, and South Carolina. The empirical model becomes

$$\Delta \log CWR_{ij} = \beta_0 + \sum_{z=1}^{3} \beta_z MIGFRONT_{ijz} + \overline{\mathbf{X}}'_{ij}\beta_4 + \delta_j + \epsilon_j, \tag{3.3}$$

where $MIGFRONT_{ij1}$ is the average fraction of stayers; $MIGFRONT_{ij2}$ is the average fraction of non-frontier migrants; and, $MIGFRONT_{ij3}$ is the average fraction of *frontier* migrants. Once again, we expect $\beta_2 > 0$, but β_3 could be positive or not significant, as we combined migrants of any distance.

We control for several characteristics that may have influenced individuals' decisions to migrate such as sex-ratio, access to train transportation, availability of land, value of farms, and presence of manufacturing industries, in both home and destination counties. These variables are from Haines et al. (2010), and are described in Appendix B. We also control for demographics characteristics of the records in the IPUMS Linked Representative Samples that may have influenced their migrating behavior, such as their age, schooling level, and marital status. Results are in Table 3.

We estimate equations (3.1)-(3.3) using ordinary least squares, and results are in columns (1) to (6) when the dependent variable is the log change in CWR from 1800 to 1850, and in columns (7) to (12) when the dependent variable is the log change in CWR from 1800 to 1880. Note that for ease of interpretation, the decline of CWR is expressed as $-\log \Delta CWR$. In terms of percentage change, migrants contribute from about 3.2 to 8.1 percent to the geometric mean of the CWR decline from 1850 to 1880. The contribution increases up to 31.6 percent when we consider the decline from 1800 to 1880. Controlling for all the aforementioned background variables increases the percentage from 3.9 (column 2) to 7.1 (column 6), and from 10.9 (colums 8) to 36.9 (column 12).

In columns (3)-(4) and (9)-(10), we report the results of the estimation of equation (3.2), where we distinguish between county and state movers. We see that there is no effect if migrants changed county but do not cross the state border. On the contrary, state movers increase the mean of the CWR decline up to 23.3 percent (column 10). Hence, in our estimations distance plays a role that has not been considered by Sundstrom and David (1988). Columns (5)-(6) and (11)-(12) show the results of the estimation of equation (3.3). Westward migration increases the average decline of CWR by more than 3 percent from 1850 to 1880, and up to 36.9 percent from 1800 to 1880. This results underlines that the direction of the move (from the East to the West) is even more important that the distance alone. The R-squared is higher in the second panel of the table and increases when control variables are added to the regressions.

Full regression results are available in Tables C.1 and C.2, Appendix C. The coefficients of the covariates (when significant) are robust across specifications. As predicted by the fertility literature, we observe that being literate decreases CWR. Similarly, a high male to female ratio in the county of residence has a positive effect on the decline of CWR. Railroad access does not affect migration and hence the CWR (differently from the results of Daudin et al., 2019). The coefficient on the percentage of improved lands ("land availability") in home counties has a negative effect on the decline of CWR. This is in contrast with the Easterlin's (1976) "target bequest" hypothesis. According to this view, the typical American farmer was strongly motivated to establish his offspring with a start in life "at least as good as that which his father gave to him" (1976, p. 65). Easterlin's (1976) idea is partly supported by the positive coefficient on the value of farms. On the contrary, Sundstrom and David (1988)'s theory on the availability and attractivness of opportunities outside the agricultural sector which depressed parents' demand for children as old-age security assets, is not confirmed by our data since the coefficient on the percentage of workers in manufacturing in both home and destination counties is not statistically significant.

3.2. Instrumental Variables

To corroborate our theory and test the prediction of our theoretical model, we propose an instrumental variable analysis. First, as unobserved characteristics of the counties other

Dependent Variable: ***Decline of CWR from 1800 to 1880***	(7)	(8)	(9)	(10)	(11)	(12)
MIG	0.063*	0.109**				
	(0.038)	(0.043)				
$MIGD_2$			0.016	0.040		
			(0.050)	(0.059)		
$MIGD_3$			0.137*	0.233**		
			(0.078)	(0.071)		
$MIGFRONT_2$					-0.006	0.029
					(0.048)	(0.058)
$MIGFRONT_3$					0.316**	0.369**
					(0.093)	(0.108)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	112	111	112	111	112	111
Observations	395	385	395	385	395	385
R-squared	0.565	0.600	0.568	0.606	0.577	0.611
Dependent Variable: ***Decline of CWR from 1850 to 1880***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.032*	0.039**				
	(0.018)	(0.020)				
$MIGD_2$			0.001	0.016		
			(0.024)	(0.025)		
$MIGD_3$			0.050**	0.055**		
			(0.021)	(0.022)		
$MIGFRONT_2$					-0.029	0.004
					(0.026)	(0.024)
$MIGFRONT_3$					0.081***	0.071**
					(0.021)	(0.024)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	173	169	173	169	173	169
Observations	1,544	1,469	1,544	1,469	1,544	1,469
R-squared	0.440	0.512	0.441	0.513	0.448	0.515

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table 3 – Evidence on Migration and Decline of CWR

than the flow of westward migrants may have contributed to the decrease in CWR, the IV analysis allows us to estimate the coefficient of interest consistently, and free of bias caused by the omitted variable issue. Second, we seek to quantify the importance of improving economic opportunities in the West of the country as main drivers of changing family size choices. We consider the role of two economic channels: (i) acres of land warranted to veterans and their families; and, (ii) destination county wages.

Land Warrants. Between 1847 and 1855 the Congress passed four land warrant acts which granted 60 million acres of land to veterans and their heirs. Approximately one in nine U.S. families received a land warrant for earlier military service. From the ICPSR Military Bounty Land Warrants in the United States (1847-1900) dataset (Oberly, 1991), we compute the average number of acres awarded in the state of residence of veterans when applying for the land warrant. The average number of awarded acres is about 115. The lowest average of acres has been granted to residents in Virginia and Georgia. The highest recipients of land lived in Rhode Island, Kansas, Idaho, Montana, and Oregon.

The drawback of this variable is its availability at the state level, while our endogenous variable (percentage of outward migrants) is available at the county level. Hence, we cannot directly use it in the estimation as the coefficients of our variable of interest would not be comparable. To solve this issue we generate a new county level variable, and we interact the number of awarded acres in state i ($LandWarrant_i$) with the estimate of the distance of migration in miles of an individual departing from county j in state i ($Milemig_{ij}$).[10] That is:

$$Instrument_{ij} = Milemig_{ij} \times LandWarrants_i \tag{3.4}$$

This new variable can be interpreted as the average amount of acres awarded per 1,000 miles of migration distance. Results are in Table 4.

The F-statistic for the instrumental variable in the first-stage regression is 79.94 (and 109.96), a strong relationship that should mitigate biases associated with weak instruments and with deviations from the assumed exclusion restriction (Bound and Baker, 1995; Staiger and Stock, 1997; Stock and Yogo, 2002; Conley and Rossi, 2012). It is interesting that the IV regression results are substantially higher for state movers than comparable OLS results. Assuming that the instrument is valid, this suggests that the percentage of migrants was correlated with unobserved negative shocks or trends, which bias downward the OLS estimates of migration effects.

Destination Wages. The economic history literature provides evidence of the fact that the Midwest had higher real wages than the Northeast (Margo, 2000). Salisbury (2014) shows that unskilled internal migrants were motivated by the possibility of upward occupational mobility, even though she mainly focused on short distance migrants. Borjas et al. (1992) argue that skilled individuals sort themselves into states with high earnings variance, as the

[10] The distance is available from Ruggles et al. (2015). They achieved these estimates by measuring distances between NHGIS county centroids (center points) in GIS software. Distances are not computed for those who moved to or from Alaska or Hawaii, or were categorized as "overseas military" in at least one year.

Dependent Variable:	Second-Stage Equation *Decline of CWR from 1800 to 1880* (1)	First-Stage Equation MIGSTATE (2)	Second-Stage Equation *Decline of CWR from 1800 to 1880* (3)	First-Stage Equation MIGFRONT (4)
MIGSTATE	0.200** (0.100)			
MIGFRONT			0.156** (0.072)	
Distance of Migration × Acres Granted by Congress		0.016*** (0.003)		0.020*** (0.002)
Demographic controls	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of clusters (home county)	107	107	107	107
Observations	362	362	362	362
Centered R-squared	0.450		0.482	
F-statistic	33.55	79.94	70.23	109.96

$***p<0.01$, $**p<0.05$, $*p<0.1$. IV regressions. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table 4 – IV Strategy - Land Warrants

return to skill is highest in these places. Grogger and Hanson (2011) find that international migrants tend to be positively selected, so immigrants on average are more skilled than stayers. Lindert (1976) (pages 2-3) summarizes this overall pattern as follows:

> *Throughout the antebellum period, starting around 1820, wide earnings gaps opened up, skill premia were on the rise, and wealth concentration accelerated. In short, skilled labor, professional groups, and urban wealth holders prospered much faster than farm hands and the urban unskilled. A dramatic change in northeastern America's income distribution was largely complete by 1860 or 1880. After the Civil War, earnings and total income inequality fluctuated around historically high levels with one last secular inequality surge, at least in urban America, appearing from the 1890s to World War I.*

In our dataset, the state with the lowest average wage is New Mexico, while the highest wage is found in Oregon. There are two drawbacks of using these data. First, wages are available at the state level only. Second, wages are not available for 1880. The first issue is mechanically solved by the way we construct our data. We average destination wages by home county, hence generating heterogeneity at the county level. The solution of the second problem relies on the assumption that wages in destination states did not change from 1850 to 1880 and from 1860 to 1880.

Results are in Table 5. In the first stage of the two-least square regression (columns (1) and (4)), we estimate the correlation between moving to another state (column (1)) or to the frontier (column (4)) and the average wages of farmhand and laborers with board in destination states. In both cases, the coefficients of destination wages are of similar magnitude, positive and significant. Hence, higher wages attract migrants to different states or to

Dependent Variable:	Second-Stage Equation *Decline of CWR from 1800 to 1880* (1)	First-Stage Equation MigrState (2)	Second-Stage Equation *Decline of CWR from 1800 to 1880* (3)	First-Stage Equation MigrFront (4)
MigrState	0.251** (0.081)			
MigrFront			0.213** (0.062)	
Avg. wages (destination)		0.238*** (0.046)		0.280*** (0.043)
Demographic controls	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of clusters (home county)	107	107	107	107
Observations	359	359	359	359
Centered R-squared	0.339		0.389	
F-statistic	26.33	51.75	41.89	77.73

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. IV regressions. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing, average wages in the home county. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table 5 – IV Strategy - Destination Wages

the frontier. In the second stage, the positive correlation between the decline of CWR and migration is established. The F-statistics for this instrumental variable in the first-stage regression is weaker than the one obtained for land warrants. Hence, the estimated effects on the CWR decline are less precisely estimated than in the land warrant exercise, but they are consistent with favorable effects.

In Tables C.3 and C.4, we run the same IV regressions above but we distinguish between Eastern and Western counties. In columns (3) and (4) of both Tables, the coefficients of the independent variables of interest are not statistically significant, suggesting that our model captures the effect of settlements and not other confounding factors.

3.3. Robustness Checks

We consider several scenarios in which the basic estimates of migration effects might be confounded by omitted variables.

Outliers. Table D.1 displays different approaches that allow us to ensure that our estimates of interest are not driven by outlying counties. The upper panel of Table D.1 conveys results of estimations where we exclude counties for which the overall model performs poorly and produces residuals that exceed 2- and 3- standard deviations.

In the lower panel of Table D.1, we exclude counties that belong to the bottom and top 5% of the distributions of CWR and percentage of migrants. This allows us to sequentially remove potential outliers in terms of the dependent and the independent variables. We combine both approaches by excluding counties that meet any of these two criteria in columns (5) and (6). Our estimates of interest are not substantially affected.

Children 5 to 9 years old. In this subsection, we compute the CWR including only children from 5 to 9 years of age. Data on children mortality in the 1800s are not available, but we know from CDC (1999b) that in 1900, 30 percent of all deaths in the United States occurred in children less than 5 years of age compared to just 1.4 percent in 1999. Hence, we estimate equations 3.1 to 3.3 where the dependent variable is the ratio between the number of white children five to nine years old and the number of white women fifteen to fortynine years old. The number of children of age five to nine is available in 1830 at the earliest, and not in the 1800. Table D.2 shows results for the change of CWR between 1830-1880, and 1850-1880.

Children Ever Born. We compute the number of children ever born (CEB hereafter) using several 1% public samples of the U.S. Census data (Ruggles et al., 2015). We follow the same methodology employed by Jones and Tertilt (2006). We compute average fertility by cohorts of women. We define a cohort to be five years of birth years. The decline of CEB is given by the difference (of the logarithm) between CEB of the 1893 and 1818 cohort. The drawback of this analysis is that the CEB is computed at the state level, and not at the county level, as the number of observations per county available for the oldest cohorts in 1818 is extremely small. Results are in Table D.3.

Migrants. We append the linked samples of migrant women to the one of migrant men used in the main analysis. The drawback of this dataset is that it only contains women that preserved their last name from one wave to the other. It is this characteriscs that allowed IPUMS to link individuals in two census years. Hence, women who got married and changed their last name in between census, are not present in the second census year. We estimate equations 3.1 to 3.3 for the new sample and confirm the previous results. Coefficients are in Table D.4. Note that neither the number of observations nor the size of the coefficients differ importantly from those estimated in the previous sections. We run the IV regressions and all the robustness checks: numbers are line with main findings and available under request.

4. RELATED EVIDENCE

Banks. An indirect implication of our theory is the development of the banking system. The spread of banks and financial alternatives was relevant, since financial institutions provided an alternative to saving in the form of real property or children. For example, in 1800 there were 28 state banks (and the First Bank of the United States), located almost entirely in larger cities. By 1860, there were 1,562 state banks, much more widely spread across the country (Carter et al., 2006). We could ask whether high CWR decline boosted the opening of banks or banking accounts. The reason is that the departure of children from their rural family settlements may have lead parents to switch to alternative financial forms of old-age support. If the emergence of savings for old age was relatively important in boosting banks and other financial institutions, then financial development should be viewed as an indicator of the extent of the transition. If banks and financial institutions arose primarily for other reasons, then the lack of financial development could be viewed as a constraint on the evolution of life-cycle economic processes. The role of banks has been underlined by Steckel (1992). He investigated the "financial-institutions hypothesis" by examining measures of the extent of financial development for their possible influence on fertility behavior. His empirical analysis does suffer of endogeneity and a solution is not proposed.

We propose a different model to determine the correlation between financial development and decline of CWR, and estimate the following equation:

$$Banks_i = \beta_0 + \beta_1 \Delta \log CWR_i + \mathbf{X}_i' \beta_2 + \epsilon_i \tag{4.1}$$

where the dependent variable $Banks_i$ measures either the total amount of bank deposits (in dollar) or the total number of banks and branches of state i on average between 1850 and 1860. In 1850, banks were geographically concentrated on the East part of the country. Banks and deposits were the highest in the state of New York, followed by Pennsylvania, Massachusetts, and Louisiana. Ten years after, the number of branches and the amount of deposits have more than doubled in almost all of the states. The results of the OLS estimation of model (4.1) are in Table 6.

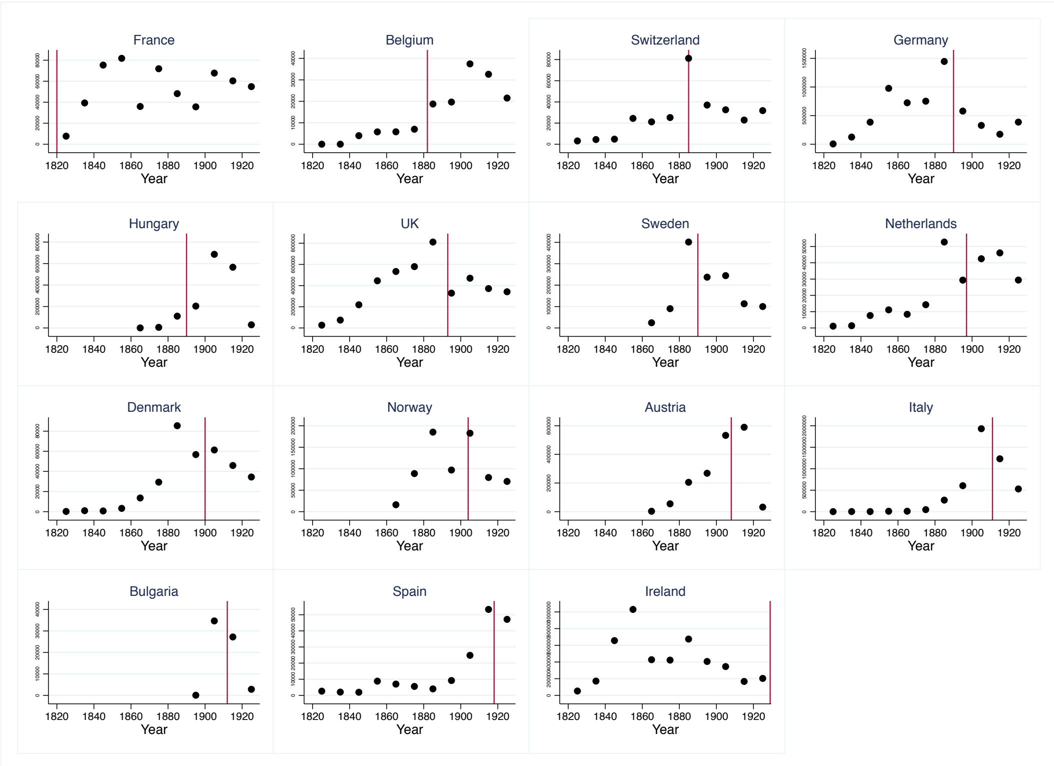
Dependent Variable:	Bank Deposits (in millions USD)	Banks (in thousands)
Decline of CWR from 1850 to 1880	14.759**	0.039**
	(4.709)	(0.013)
County controls	Yes	Yes
Observations	385	385
R-squared	0.569	0.565

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a state. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *County controls*: railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Banking data are available for the following states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, Delaware, New Jersey, New York, Pennsylvania, Indiana, Michigan, Ohio, Missouri, Virginia, Alabama, Georgia, Louisiana, North Carolina, South Carolina, Kentucky, Maryland, and Tennessee. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table 6 – Banks and Decline of CEB

If the decline of CWR increases by one percent, bank deposits increase by about 0.15 millions of U.S. dollars, and the number of (thousand) banks increases by 0.0004. Control variables include a subset of economic characteristics considered in the previous empirical analysis. Their coefficients suggest that railroad access, hence geographic accessibility, and the value of farms, contributed positively to both banks deposits and number of banks. The percentage of workers in manufacturing establishments and the acres of land available do not seem to impact the development of the banking system.

European Evidence. Our analysis can be extended to the European fertility transition. A summary of the existing theories about European fertility decline can be found in Guinnane (2011), who also shows detailed data on birth crude rate and cohort fertility in the period 1800-1970 for five major countries: France, England and Wales, Germany, the United States, and Italy. He also shows that fertility declining started in the eighteenth or nineteenth century, and this decline accelerated in the second half of the nineteenth century.



Sources: Dots are immigrants from https://www.dhs.gov/xlibrary/assets/statistics/yearbook/2008/ois_yb_2008.pdf, Table 2 "Persons obtaining legal permanent resident status by region and selected country of last residence: fiscal years 1820 to 2008"; vertical red lines are placed in correspondence of the "Date of decline in marital fertility by 10 percent" from Knodel and van de Walle (1979), Table 1.

Figure 4 – Migration and Fertility Transition in Europe

In Figure 4 we use data from the U.S. Office of Immigration Statistics and show the trend of immigrants from several European countries to the U.S. from 1820 to 1920. The vertical line is placed in correspondence of the date at which marital fertility declined by 10 percent, as reported in Knodel and van de Walle (1979). In general, we remark a strong correlation between the date of the highest immigration flow and the fertility decline. Few exceptions are present: France, where the decline of fertility started earlier than 1820; in Ireland, on the contrary, fertility transition is estimated to happen later than 1920, while immigration peaked around 1850.

We also rely on data from Mitchell (2003) to compute the percentage of migrants from Europe by decade (Table A8, page 129), and the change in the child (age 5 to 9 years old)-woman (age 15 to 49 years old) ratio (Table A2, pages 12-44). Descriptive statistics are in Table E.1, Appendix E.

In Table 7, we show the results of an OLS regression where the dependent variable is the decline of CWR from the earliest to the latest of the years available for each country, and the independent variable is the percentage of migrants (with respect to total population) from a specific country. The correlation is positive, meaning that the higher the fraction of migrants, the higher the decline of the CWR, and the impact is of about 1.65 percentage points.[11]

Dependent Variable: **_Decline of CWR_**	
Percentage of Migrants from Europe	0.0165***
	(0.004)
Observations	135
R-squared	0.062

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. The unit of observation is a pair country-year. Robust standard errors in parentheses. All regressions include a constant term.

Table 7 – Decline of CWR and Migration in Europe

5. CONCLUSION

We study the importance of internal migration on the CWR decline in the nineteen century in the U.S. We show that better economic opportunities in the form of higher wages and land availability, attracted individuals to the West. We suggest that, in a model where family members bargain over total farm production, the departure of sons reduces future father's revenue and increase the opportunity cost of bearing more children.

The negative correlation between migration and fertility is supported by county level data, showing that counties with high outward migration are also counties with high CWR decline. The result holds if we use a different measure of fertility at the state level, called children ever born. We go further in the study of the correlation between migration and fertility, and show that distance matters. That is, only migration to a different state or to the West frontier had an effect on fertility decline. Reverse causation is addressed by instrumenting migration with average number of acres granted from the government to veterans and their families, and average destination state wages.

We show that banks and banking deposits are higher in states characterized by a higher fertility decline. This correlation suggests that fertility decline may have provide incentives to the development of financial system, as social security was still inexistent in the nineteen

[11] As the number of observations for each country is limited (from 8 to 17 at most), it is not possible to include country fixed effects in the estimation.

century. Finally, we provide evidence of the relationship between European immigration towards the U.S. and the dates marking the beginning of fertility transition.

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A. MAPS

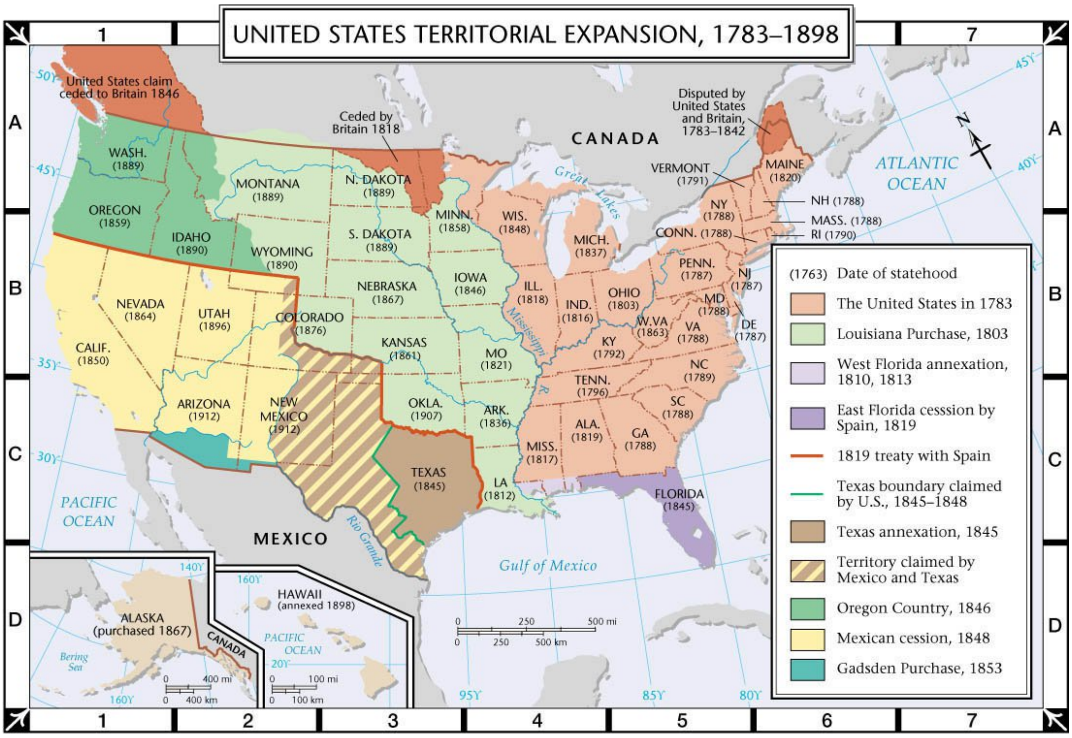

Figure 5 – Territorial Expansion of the United States

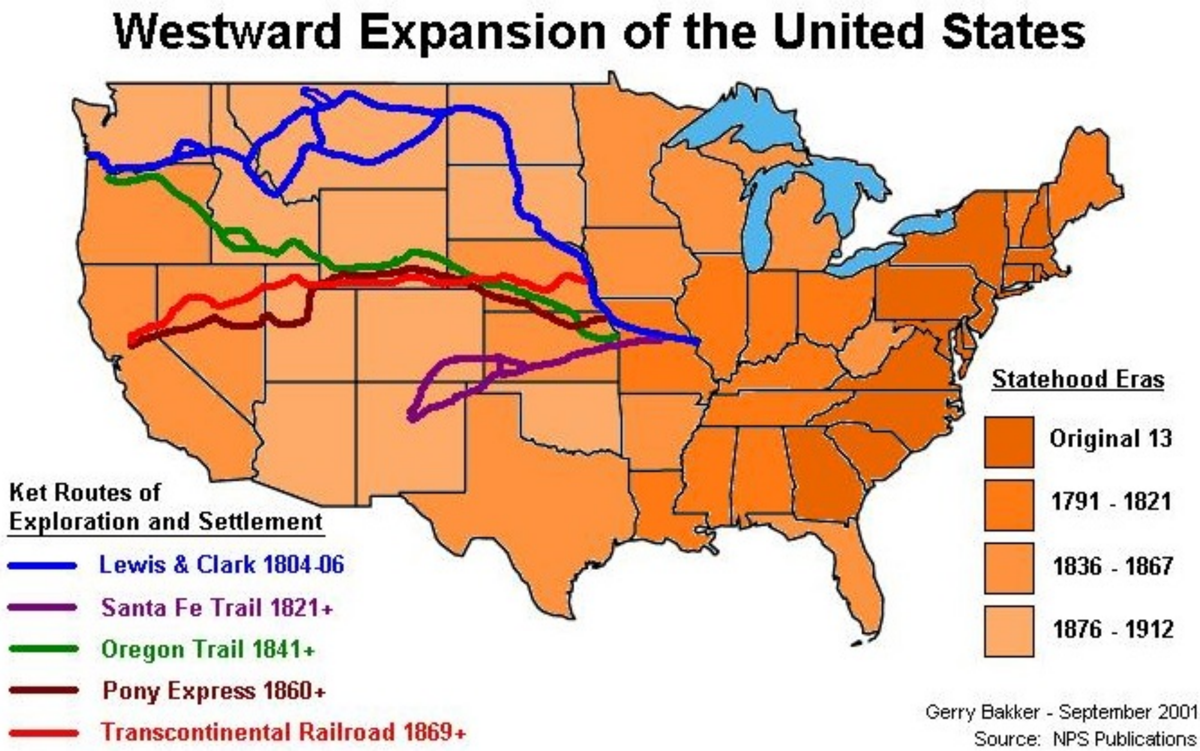

Figure 6 – Westward Expansion of the United States

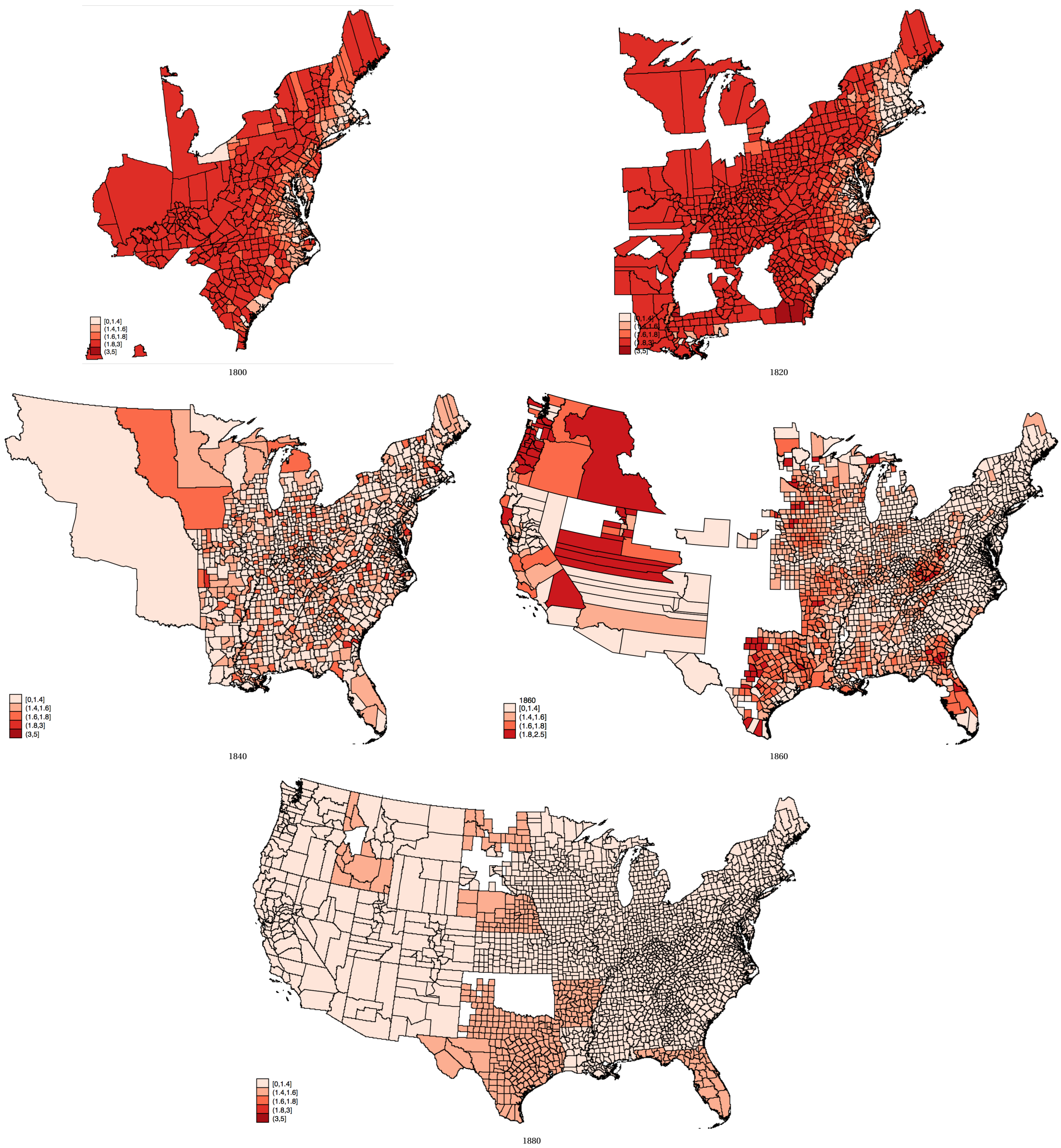

Table 8 – Maps: White Child (0-9) - Woman (16-44) Ratio

B. DATA APPENDIX

B.1. Data Source

Data for this paper are compiled from multiple sources. Ruggles et al. (2015) provide a nationally representative sample of census data linked between 1850 and 1880, which we use to infer the migration status of individuals. Haines et al. (2010) provide county-level data on population and several county and/or state characteristics for all decennials from 1790 to 2002. We make use of the data of 1800 and 1880 to compute CWR and its change. Moreover, we exploit economic characteristics for counties and states in 1850, 1860 and 1870. Oberly

(1991) provide data on military bounty land warrants from 1847 to 1900 at the state level.

B.2. Key Variables

Child-woman ratio: From Haines et al. (2010) for 1800 and from Ruggles et al. (2015) for 1880. It is defined as the ratio between the number of white children 0-9 to the number of white women 15-44 in 1800 and 15-49 in 1880.

Children ever born: From Ruggles et al. (2015). We compute average fertility by cohorts of women. We define a cohort to be five years of birth years. The decline of CEB is given by the difference (of the logarithm) between CEB of the 1893 and 1818 cohort.

Moved county: From Ruggles et al. (2015), 1850-1880 linked samples. It is equal to 1 if the person reports living in a different county in 1880 than 1850, 1860 or 1870, and recoded to equal zero if county borders changed during that time.

Moved state: From Ruggles et al. (2015), 1850-1880 linked samples. It is equal to 1 if the person reports living in a different state in 1880 than 1850, 1860 or 1870, and recoded to equal zero if county borders changed during that time. This variable is also equal to 1 if the individual reports being born in a different state.

Frontier: From authors' computations based on Ruggles et al. (2015) 1850-1880 linked samples. It is equal to 1 if the person moved to a state that is not in this list: Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, West Virginia, Pennsylvania, Virginia, North Carolina, South Carolina.

Distance of migration: From Ruggles et al. (2015). Distance is reported in miles.

Age: From Ruggles et al. (2015). Age reported in years.

Literate: From Ruggles et al. (2015). Equal to one if the individual reports being literate.

Married: From Ruggles et al. (2015). Equal to one if the individual reports being married in early period or in both periods.

Sex ratio: From Haines et al. (2010). Computed as the ratio between total number of men to total number of women.

Railroad access: From Haines et al. (2010). Defined as the fraction of agricultural land that is unimproved. Calculated as the number of acres of unimproved agricultural land divided by total agricultural land (unimproved + improved).

Land availability: From Haines et al. (2010). Defined as the number of miles of railroads in operation.

Farm value per acre: From Haines et al. (2010). It is equal to the log of the total value of farm property divided by the acres of improved agricultural land in a county.

Workers in manufacturing: From Haines et al. (2010). It is computed as the ratio between the total number of men and women working in manufacturing and the total population.

Average wages: From Haines et al. (2010). It is the average wages of laborers and farmhand with board.

Acres: From Oberly (1991). It is the average acres granted to militaries or their families.

Bank and bank deposits: From Haines et al. (2010).

B.3. *Descriptive Statistics*

Variables:	Obs.	Mean	Std. Dev.	Min.	Max.
White Children 0-9 / White Women 15-44:					
1800 (home county)	444	1545.389	349.302	760.915	3393.617
1830 (home county)	1022	1641.389	337.082	731.582	2600
1850 (home county)	1617	1563.122	299.300	349.020	5142.857
1880 (home county)	2510	1389.339	273.082	521.739	2875
1880 (dest. county)	1987	1344.784	237.279	618.951	2153.583
White Children 5-9 / White Women 15-44:					
1830 (home county)	1022	706.528	126.705	315.449	1250
1850 (home county)	1611	749.948	138.686	152.824	2285.714
1880 (home county)	2500	657.584	119.942	205.128	1777.778
1880 (dest. county)	1987	642.927	103.589	297.386	1017.065
Decline in (White Children 0-9 / White Women 15-44):					
1800-1880 (home county)	398	0.254	0.235	-0.441	0.927
1800-1880 (dest. county)	830	0.243	0.231	-0.597	0.953
1850-1880 (home county)	1613	0.171	0.168	-1.311	1.332
1850-1880 (dest. county)	1785	0.166	0.153	-1.358	1.299
Decline in (White Children 5-9 / White Women 15-44):					
1830-1880 (home county)	952	0.154	0.183	-0.623	0.751
1830-1880 (dest. county)	1428	0.138	0.177	-0.743	0.725
1850-1880 (home county)	1609	0.169	0.169	-1.357	1.257
1850-1880 (dest. county)	1783	0.164	0.156	-1.301	1.253
Children ever born:					
1818 (home state)	2473	5.889	1.266	2	11.055
1818 (dest. state)	1962	5.915	1.176	2.014	11.055
1893 (home state)	1428	2.488	0.363	1.255	3.687
1893 (dest.state)	1962	2.476	0.334	1.332	3.687
Decline from 1818 to 1893 (home state)	2473	0.847	0.241	-0.269	1.340
Decline from 1818 to 1893 (dest. state)	1962	0.857	0.200	-0.210	1.340
Percentage of migrants who:					
Moved	1986	0.506	0.273	0	1
Moved counties	1986	0.122	0.159	0	1
Moved states	1986	0.384	0.274	0	1
Moved (elsewhere than frontier)	1986	0.158	0.179	0	1
Frontier	1986	0.348	0.288	0	1
Demographic characteristics of migrants:					
Age	1966	19.981	6.223	0	74
Percentage of Foreign born	1966	0.042	0.102	0	1
Percentage of Literate	1913	0.909	0.183	0	1
Percentage of Married	1966	0.310	0.209	0	1
County characteristics:					
Sex ratio (home)	1895	1.130	1.459	0.852	11.968
Sex ratio (dest.)	1895	1.117	0.371	0.864	6.457
Railroad access, in miles (home)	1824	1030.931	815.226	0	2888.865
Railroad acces, in miles (dest.)	1840	1003.591	737.301	0	2900.750
Percentage of land availability (home)	1891	0.577	0.208	0	0.992
Percentage of land availability (dest.)	1892	0.578	0.190	0.001	0.992
Log farm value per acre (home)	1891	3.477	0.659	1.407	8.880
Log farm value per acre (dest.)	1892	3.576	0.724	1.180	8.564
Percentage of workers in manufacturing (home)	1895	0.023	0.030	0	0.254
Percentage of workers in manufacturing (dest.)	1894	0.024	0.028	0	0.228
Land warrants in acres x distance of migration in miles	1872	10.995	20.074	0	298.320
Average wage of laborers with board (home)	1671	7.065	2.327	3.815	32
Average wage of laborers with board (dest.)	1670	6.940	2.455	3.815	39.50
Average amount of bank deposits, in millions of dollars	1407	793,387	1.74e+07	2695	1.04e+08
Average number of banks, in thousands	1407	52.351	53.488	1	303

Table B.3.1 – Descriptive Statistics

C. MAIN RESULTS

Dependent Variable: ***Decline of CWR from 1850 to 1880***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.032*	0.039**				
	(0.018)	(0.020)				
$MIGD_2$			0.001	0.016		
			(0.024)	(0.025)		
$MIGD_3$			0.050**	0.055**		
			(0.021)	(0.022)		
$MIGFRONT_2$					-0.029	0.004
					(0.026)	(0.024)
$MIGFRONT_3$					0.081***	0.071**
					(0.021)	(0.024)
Demographic controls:						
Age		0.003		0.003		0.002
		(0.004)		(0.004)		(0.005)
Age squared		-0.000*		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Literate		0.082***		0.081***		0.081***
		(0.019)		(0.019)		(0.019)
Married		0.046*		0.047		0.045
		(0.027)		(0.027)		(0.026)
County controls:						
Sex ratio (home)		-0.016***		-0.016***		-0.016***
		(0.002)		(0.002)		(0.002)
Sex ratio (dest.)		0.012		0.011		-0.008
		(0.020)		(0.021)		(0.022)
Railroad access (home)		0.000		0.000		0.000
		(0.000)		(0.000)		(0.000)
Railroad access (dest.)		-0.000		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Land availability (home)		-0.241**		-0.236**		-0.223**
		(0.077)		(0.077)		(0.076)
Land availability (dest.)		0.116		0.107		0.093
		(0.096)		(0.095)		(0.095)
Log farm value per acre (home)		0.035**		0.034**		0.034**
		(0.015)		(0.016)		(0.016)
Log farm value per acre (dest.)		-0.019		-0.018		-0.017
		(0.013)		(0.014)		(0.015)
Workers in manufacturing (home)		-0.811		-0.838		-0.912
		(0.588)		(0.591)		(0.603)
Workers in manufacturing (dest.)		-0.107		-0.074		0.054
		(0.663)		(0.662)		(0.680)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	173	169	173	169	173	169
Observations	1,544	1,469	1,544	1,469	1,544	1,469
R-squared	0.440	0.512	0.441	0.513	0.448	0.515

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term.

Table C.1 – Evidence on Migration and Decline of CWR from 1850 to 1880

Dependent Variable: **_Decline of CWR from 1800 to 1880_**	(7)	(8)	(9)	(10)	(11)	(12)
MIG	0.063*	0.109**				
	(0.038)	(0.043)				
$MIGD_2$			0.016	0.040		
			(0.050)	(0.059)		
$MIGD_3$			0.137*	0.233**		
			(0.078)	(0.071)		
$MIGFRONT_2$					-0.006	0.029
					(0.048)	(0.058)
$MIGFRONT_3$					0.316**	0.369**
					(0.093)	(0.108)
Demographic controls:						
Age		0.003		0.004		0.005
		(0.012)		(0.012)		(0.012)
Age squared		-0.000		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Literate		0.094		0.098		0.094
		(0.068)		(0.069)		(0.070)
Married		0.018		0.027		0.046
		(0.069)		(0.070)		(0.072)
County controls:						
Sex ratio (home)		0.234		0.215		0.212
		(0.251)		(0.250)		(0.250)
Sex ratio (dest.)		0.032*		0.030*		0.023
		(0.016)		(0.016)		(0.016)
Railroad access (home)		-0.000		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Railroad access (dest.)		0.000		0.000*		0.000
		(0.000)		(0.000)		(0.000)
Land availability (home)		-0.169		-0.177		-0.122
		(0.234)		(0.238)		(0.240)
Land availability (dest.)		-0.101		-0.098		-0.159
		(0.277)		(0.279)		(0.283)
Log farm value per ace (home)		-0.003		-0.010		-0.003
		(0.035)		(0.036q)		(0.033)
Log farm value per acre (dest.)		-0.045*		-0.045*		-0.049*
		(0.023)		(0.022)		(0.022)
Workers in manufacturing (home)		3.084**		2.272*		2.109
		(1.403)		(1.422)		(1.409)
Workers in manufacturing (dest.)		-3.072*		-2.740		-1.798
		(1.773)		(1.791)		(1.794)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	112	111	112	111	112	111
Observations	395	385	395	385	395	385
R-squared	0.565	0.600	0.568	0.606	0.577	0.611

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term.

Table C.2 – Evidence on Migration and Decline of CWR from 1800 to 1880

Dependent Variable: **_Decline of CWR from 1800 to 1880_**	Eastern Counties (1)	(2)	Western Counties (3)	(4)
MIGSTATE	0.287**		0.046	
	(0.140)		(0.101)	
MIGFRONT		0.192**		0.050
		(0.081)		(0.111)
Demographic controls	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of clusters (home county)	93	93	83	83
Observations	246	246	116	116
Centered R-squared	0.369	0.474	0.182	0.175
F-statistic	23.86	33.71	10.37	10.15

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. IV regressions. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table C.3 – IV Strategy - Land Warrants - Eastern and Western Counties

Dependent Variable: **_Decline of CWR from 1800 to 1880_**	Eastern Counties (1)	(2)	Western Counties (3)	(4)
MIGSTATE	0.175**		0.155	
	(0.082)		(0.141)	
MIGFRONT		0.166**		0.159
		(0.074)		(0.146)
Demographic controls	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of clusters (home county)	93	93	83	83
Observations	243	243	116	116
Centered R-squared	0.456	0.487	0.131	0.109
F-statistic	28.40	32.70	9.20	8.69

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. IV regressions. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table C.4 – IV Strategy - Destination Wages - Eastern and Western Counties

D. ROBUSTNESS

Dependent Variable: **Decline of CWR from 1800 to 1880**	(1) Excluding 2-sigma outliers	(2)	(3) Excluding 3-sigma outliers	(4)
$MIGD_2$	0.087*		0.055	
	(0.048)		(0.059)	
$MIGD_3$	0.229***		0.218**	
	(0.063)		(0.067)	
$MIGFRONT_2$		0.050		0.035
		(0.050)		(0.058)
$MIGFRONT_3$		0.354***		0.361***
		(0.091)		(0.098)
Demographic controls	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Observations	361	376	365	376
R-squared	0.665	0.620	0.666	0.627

Dependent Variable: **Decline of CWR from 1800 to 1880**	(1) Excluding 5th and 95th percentiles of CWR	(2)	(3) Excluding 5th and 95th percentiles of migrants	(4)	(5) Excluding 5th and 95th percentiles of CWR and migrants	(6)
$MIGD_2$	0.093*		0.048		0.148*	
	(0.049)		(0.090)		(0.064)	
$MIGD_3$	0.193**		0.258**		0.228**	
	(0.057)		(0.082)		(0.064)	
$MIGFRONT_2$		0.075		0.041		0.119**
		(0.047)		(0.083)		(0.058)
$MIGFRONT_3$		0.289**		0.435**		0.353***
		(0.082)		(0.122)		(0.089)
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	343	343	349	349	313	313
R-squared	0.583	0.588	0.598	0.605	0.580	0.586

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a state. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing.

Table D.1 – Evidence on Migration and Decline of CWR: Outliers

Dependent Variable: ***Decline of CWR from 1830 to 1880***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.064*	0.073**				
	(0.036)	(0.035)				
$MIGD_2$			0.036	0.035		
			(0.050)	(0.050)		
$MIGD_3$			0.110*	0.143**		
			(0.059)	(0.061)		
$MIGFRONT_2$					0.015	0.020
					(0.046)	(0.046)
$MIGFRONT_3$					0.219**	0.247**
					(0.074)	(0.080)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	379	379	379	379	379	379
R-squared	0.477	0.506	0.479	0.510	0.487	0.517
Dependent Variable: ***Decline of CWR from 1850 to 1880***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.044*	0.060**				
	(0.025)	(0.027)				
$MIGD_2$			0.052	0.048		
			(0.029)	(0.032)		
$MIGD_3$			0.032	0.084*		
			(0.043)	(0.044)		
$MIGFRONT_2$					0.020	0.037
					(0.028)	(0.030)
$MIGFRONT_3$					0.120**	0.138**
					(0.053)	(0.053)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	379	379	379	379	379	379
R-squared	0.394	0.459	0.394	0.460	0.398	0.464

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing.

Table D.2 – Decline of CWR: Children 5 to 9 years old

Dependent Variable: ***Decline of CEB***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.133**	0.112*				
	(0.060)	(0.059)				
$MIGD_2$			0.090*	0.093**		
			(0.050)	(0.035)		
$MIGD_3$			0.144**	0.118*		
			(0.068)	(0.071)		
$MIGFRONT_2$					0.041	0.058**
					(0.034)	(0.028)
$MIGFRONT_3$					0.157**	0.131*
					(0.070)	(0.075)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
Observations	1,923	1,764	1,923	1,764	1,923	1,764
R-squared	0.033	0.118	0.081	0.119	0.039	0.122

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a state. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing.

Table D.3 – Evidence on Migration and Decline of CEB

Dependent Variable: ***Decline of CWR from 1850 to 1880***	(1)	(2)	(3)	(4)	(5)	(6)
MIG	0.046*	0.045**				
	(0.019)	(0.020)				
$MIGD_2$			-0.024	-0.002		
			(0.025)	(0.026)		
$MIGD_3$			0.090***	0.085***		
			(0.020)	(0.021)		
$MIGFRONT_2$					-0.037	-0.005
					(0.025)	(0.025)
$MIGFRONT_3$					0.118***	0.102***
					(0.022)	(0.022)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	174	172	174	172	174	172
Observations	1,552	1,509	1,552	1,509	1,552	1,509
R-squared	0.439	0.504	0.445	0.508	0.452	0.509

Dependent Variable: ***Decline of CWR from 1800 to 1880***	(7)	(8)	(9)	(10)	(11)	(12)
MIG	0.062	0.119**				
	(0.042)	(0.049)				
$MIGD_2$			-0.039	-0.002		
			(0.049)	(0.055)		
$MIGD_3$			0.254**	0.334***		
			(0.086)	(0.086)		
$MIGFRONT_2$					-0.027	0.015
					(0.050)	(0.055)
$MIGFRONT_3$					0.432***	0.486***
					(0.115)	(0.114)
Demographic controls		Yes		Yes		Yes
County controls		Yes		Yes		Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters (home county)	112	111	112	111	112	111
Observations	396	391	396	391	396	391
R-squared	0.565	0.603	0.576	0.616	0.584	0.621

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. OLS regressions. Each column presents the estimates from a separate regression. The unit of observation is a county. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term. *Demographic controls*: sex, age, age squared, literate, married. *County controls*: sex-ratio, railroad access, land availability, farm value per acre, percentage of workers in manufacturing. Summary statistics and covariates' estimates are presented in Appendix C. See Appendix B.2 for sources and definitions of variables.

Table D.4 – Evidence on Migration and Decline of CWR: Including Women

E. EUROPE

Variables:	Obs.	Mean	Std. Dev.	Min.	Max.
Austria (1869-1951):					
Children 5-9 / Women 15-49	8	329.389	51.697	240.149	390.757
Migrants by decade / Total population × 100	8	1.112	1.240	0.163	3.888
Belgium (1856-1947):					
Children 5-9 / Women 15-49	9	331.042	41.152	242.452	384.712
Migrants by decade / Total population × 100	9	0.236	0.161	0.022	0.408
Denmark (1870-1960):					
Children 5-9 / Women 15-49	10	357.513	33.338	281.905	397.163
Migrants by decade / Total population × 100	10	1.840	0.995	0.448	3.775
Finland (1890-1960):					
Children 5-9 / Women 15-49	8	404.604	57.326	310.480	476.764
Migrants by decade / Total population × 100	8	1.715	1.715	0.081	5.403
France (1851-1936):					
Children 5-9 / Women 15-49	17	293.951	26.620	208.238	327.719
Migrants by decade / Total population × 100	17	0.107	0.079	0.010	0.318
Germany (1871-1939):					
Children 5-9 / Women 15-49	8	328.653	64.499	219.954	381.370
Migrants by decade / Total population × 100	8	1.029	0.850	0.174	2.715
Italy (1861-1951):					
Children 5-9 / Women 15-49	9	371.492	34.168	310.118	417.715
Migrants by decade / Total population × 100	9	3.153	3.625	0.108	11.131
Netherlands (1859-1960):					
Children 5-9 / Women 15-49	11	384.419	27.984	343.205	432.810
Migrants by decade / Total population × 100	11	0.733	0.786	0.045	2.951
Norway (1855-1960):					
Children 5-9 / Women 15-49	11	377.516	51.473	257.075	453.333
Migrants by decade / Total population × 100	11	3.731	3.040	0.190	9.345
Spain (1855-1960):					
Children 5-9 / Women 15-49	11	372.290	55.997	285.329	478.900
Migrants by decade / Total population × 100	11	2.227	2.262	0.019	6.130
Sweden (1857-1960):					
Children 5-9 / Women 15-49	12	341.836	41.759	234.116	384.564
Migrants by decade / Total population × 100	12	2.252	2.254	0.125	6.834
Switzerland (1870-1960):					
Children 5-9 / Women 15-49	11	320.731	26.167	266.102	346.466
Migrants by decade / Total population × 100	11	0.976	0.764	0.239	2.898
United Kingdom (1851-1951):					
Children 5-9 / Women 15-49	9	352.131	35.073	296.935	393.894
Migrants by decade / Total population × 100	9	6.977	3.262	0.656	12.547

Table E.1 – Descriptive Statistics