Migration, Social Change, and the Early Decline in the United States Fertility*

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Abstract

This study examines the impact of internal migration on the fertility transition in 19th-century United States. The findings reveal that fertility declined more rapidly in counties with higher rates of outward migration, particularly toward the western frontier. To estimate the causal effect of migration on fertility decline, I use the number of acres granted to American war veterans by Congress between 1847 and 1855 as an instrumental variable. Migration, combined with limited remittance technology, encouraged parents to prioritize precautionary savings. This shift contributed to the decline of multigenerational family structures and fostered smaller family size norms.

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

Keywords: Child-woman ratio, fertility transition, land warrants, westward migration.

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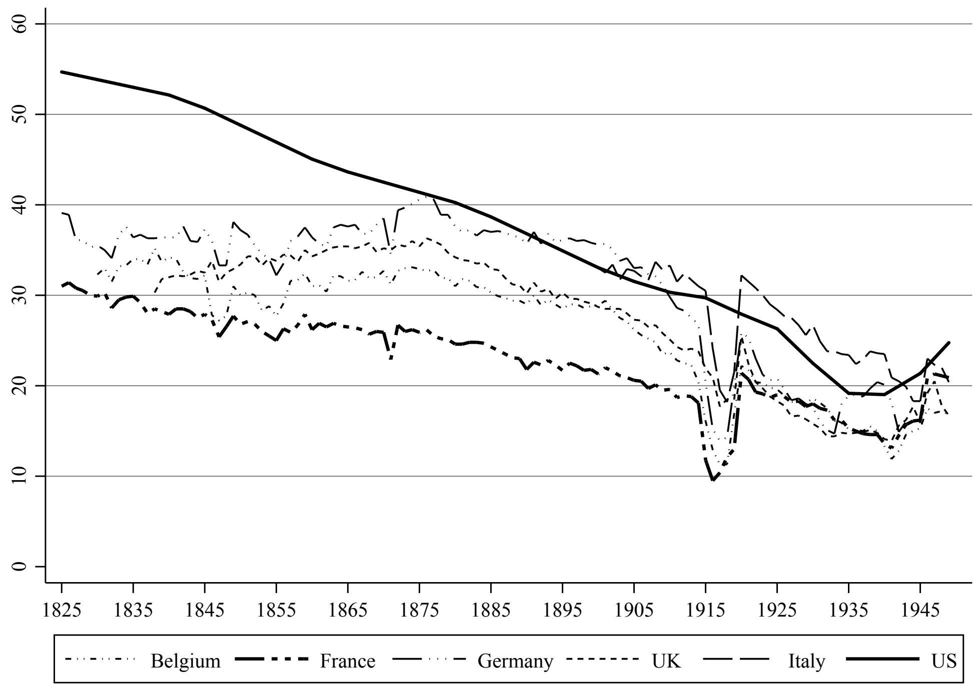
1. INTRODUCTION

The fertility transition in the United States began in the early 19th century, making it different from other Western countries, with the exception of France (Daudin et al., 2019). Unlike its counterparts, which experienced sustained decreases in birth rates during the late 19th or early 20th century, the United States had already embarked on a fertility decline much earlier. As shown in Figure 1, the crude birth rate in the United States decreased from approximately 55 around 1825 to approximately 33 by 1900.

Figure 1: Births per 1,000 population



Sources: European data are from Mitchell (2003). United States data are from Haines (2008).

These temporal variations challenge conventional theories that predominantly attribute changes in fertility to structural shifts in the costs and benefits associated with child care in the context of modern economic progress, including urbanization, industrialization, higher literacy rates and increased participation of the female workforce. As I shall elaborate in the following, the decline in American fertility began well in advance of the emergence of many of these influential factors.

I propose an alternative explanation that aligns with the timing and geographic patterns of the decline in fertility in the United States. This theory focuses on a transformation in family social norms, where the traditional patriarchal structure, reliant on intergenerational transfers, began to dissolve as young men from eastern regions migrated westward. As documented by Ferrie (2006), migrants were attracted by abundant natural resources in regions far from the initial settlements along the Atlantic coast. By the mid-19th century, farmers sought fertile lands in the Great Plains, while those moving further west and northwest exploited mineral and timber resources. By the late 19th century, population growth rates across regions had converged, resulting in a more uniform geographic distribution (Vandenbroucke, 2008b, Figure 2).

The migration process disrupted intergenerational transfers due to the lack of remittance technology, particularly for long-distance moves. This shift incentivized parents to adopt precautionary savings strategies. Lewis (1983) notes that the savings rate rose from 16% to 22% between 1830 and 1900, with approximately one-quarter of this six-percentage point increase attributed to a decline in the dependency rate, the ratio of dependent children to adults.

I investigate whether the characteristics of migrants moving westward and the distance of their migration played a role in the decline in the child-woman ratio.[1] This research strategy is based on the diverse geographic patterns of fertility decline. Initially, fertility decreased in the eastern regions, and by the end of the century, the disparities in the child-woman ratio between counties had decreased and the variance in this ratio was halved (Haines and Hacker, 2011).[2]

In the baseline regression analysis, I find that migration is associated with approximately a 10-percentage point decrease in the child-woman ratio in the home county from 1850 to 1880. In particular, this correlation becomes stronger with increasing migration distance. Specifically, moving to frontier counties, those located in states outside the original settlements, contributes to a 50 percentage point decline in the child-woman ratio. In contrast, migra-

[1]The child-woman ratio is calculated as the ratio of the number of white children aged 0 to 9 to the number of white women aged 15 to 44 per 1,000 in a given year.

[2]Westward expansion refers to the 19th-century movement of settlers into the American West, triggered by events such as the Louisiana Purchase, the Gold Rush, and the Oregon Trail.

tion within the same state or not involving frontier destinations has a statistically insignificant or smaller effect on the child-woman ratio. This pattern highlights the importance of distance as a determinant of the correlation between the percentage of migrants and the child-woman ratio. To account for variations in migration patterns across the United States, I include fixed effects at the year and county level in the analysis, which capture any heterogeneity in these patterns.

To mitigate potential endogeneity concerns, I draw on the historical institutional context and analyze the impact of US government land policies on both migration patterns and the child-woman ratio. Specifically, between 1847 and 1855, Congress granted land parcels to veterans of American wars and their heirs through the Homestead Acts. The act of 1847 allocated approximately 90,000 land warrants exclusively to veterans of the Mexican War. The act of 1850 awarded around 188,000 warrants as a type of land pension, primarily for veterans of the War of 1812. In 1852, the act extended around 11,000 warrants to veterans of specific Indian wars. The most substantial land grant act, enacted in 1855, comprised over 263,000 warrants, which either supplemented earlier grants with additional acreage or extended coverage to veterans who did not initially qualify for benefits.

The average number of acres granted and their geographical locations are used as sources of exogenous variation (Oberly, 1991). The underlying idea is that families with members who had served in American wars received federal land grants, providing incentives to migrate to the states where this land was located. This mechanism results in a quasi-random assignment of migrants and is linked to a significant reduction in the child-woman ratio. As a robustness check, I perform a placebo test by examining whether there is a correlation between fertility changes from 1800 to 1820 and migration patterns from 1850 to 1880. As expected, the estimates are not significantly different from zero, suggesting that the empirical model effectively captures the effects of westward migration while mitigating other confounding factors.

Then, I examine the mechanisms underlying the relationship between migration and fertility decline, focusing on how migration to frontier regions, driven by the pursuit of land and economic opportunity, reshaped family dynamics and savings behavior. Using census data and historical literature, I document a decline—exceeding 10%—in the proportion of multigenerational families by the late 1800s, reflecting a shift towards smaller and more independent households. This transformation was influenced not only by westward migration, but also by broader economic changes that weakened traditional patriarchal structures.

At the same time, new economic opportunities in urban centers and western regions contributed to further changes in family dynamics and an increase in savings rates. To explore this relationship between financial development and migration, I examine county-level data, including the number of banks per capita and the average distance to the nearest bank (Fulford, 2015). The analysis reveals a positive correlation between east-west migration and key bank indicators. This finding supports the hypothesis that the traditional system of intergenerational support, which relied on children contributing labor on farms, shifted towards reliance on banking deposits for financial security. The transformation of the American family during this period, driven by economic changes and the attraction of new opportunities, played an influential role in shaping regional savings patterns.

The empirical analysis is based on historical data obtained from multiple sources. To measure internal migration at the county level, the Census Tree is used, a database of record links across US censuses for the periods 1850-1860, 1860-1870, and 1870-1880 Ruggles et al. (2021), Ruggles et al. (2024), Buckles et al., 2023, Price et al., 2021, Price et al., 2023a, Price et al., 2023b, and Price et al., 2023c). This comprehensive data set provides detailed information on individuals' county of residence during the 1850, 1860, and 1870 censuses, as well as their destination county in the linked 1860, 1870 and 1880 samples, along with other relevant demographic characteristics. In Section 2.2, I explain why this measure of outward migration likely provides a more accurate depiction compared to state-level methods proposed by Carter et al. (2001) and Rosenbloom and Sundstrom (2003). The former infers migration numbers from changes in population composition over census decades (Carter et al., 2001), while the latter relies on discrepancies between state of birth and state of residence reported during census interviews (Rosenbloom and Sundstrom, 2003). Due to the unavailability of county-level internal migration data for the period 1800-1840, this analysis focuses exclusively on the second half of the nineteenth century.

For fertility and county characteristics, I use the methodology of Haines and Hacker (2011) and data from Ruggles et al. (2021) and Ruggles et al. (2024). Fertility is approximated using the child-woman ratio, defined as the number of white children aged 0 to 9 per 1,000 white women aged 15 to 49 years. It is important to note that this ratio does not explicitly account for changes in age structure or marriage patterns, both of which underwent significant transformations during the period studied. Changes in age structure, in the absence of fertility reduction, could potentially affect the child-woman ratio. To address this, I examine the impact of age composition on the child-woman ratio over time and control for the proportion of men and women in different age groups across all empirical specifications. I also use an alternative measure, focusing on children aged five to nine, to account for the high child mortality rates prevalent during that era. The results confirm the robustness of my findings.

Literature Review. In this section, I examine existing theories of fertility decline and discuss the contribution of this study to understanding the phenomenon. A key observation made by demographers, as emphasized by Notestein (1945), is that fertility transitions often coincide with or follow reductions in mortality rates. According to Notestein (1945), in societies with high mortality rates, couples tend to have more children to ensure that the desired number of offspring survive. However, as mortality rates decline, the need to have as many "spare" children diminishes. This explanation was initially based on the post-World War II experience of developing countries, where decreases in infant and child mortality were followed by declines in fertility (Guinnane, 2011). However, this argument does not align with the timing of historical declines in fertility and mortality. As shown in Figure A.1 in the Appendix, using data from Haines (2001), there was no sustained decrease in the infant mortality rate until the 1890s.

Yasuba (1962) and Easterlin (1976) suggest that the increase in population density or decreased land availability played a significant role in the long-term decline in fertility. Yasuba (1962) argues that the differences in population density between the eastern and western regions of the United States could explain the geographical patterns of fertility. As the acquisition of new land in settled areas became more difficult and expensive, and as the distance between settled areas and new land increased, fertility in older communities could have decreased due to decreased demand for children or changes in marriage patterns. Based on this argument, Easterlin (1976) suggests that parents had an altruistic motive to accumulate and pass on family wealth. As land became scarcer and more expensive, fertility declined as parents sought to preserve and transfer assets.

However, these theories have limitations. First, improvements in transportation and communication, coupled with the availability of public land through auctions and rising agricultural incomes, should have made it easier to purchase farmland. Second, these theories do not explain why fertility rates were high at the beginning of the 19th century and why the fertility decline began precisely when American land policy made vast public land available for settlement. Acts such as the Land Ordinance of 1785, the Indian Removal Act of 1830, the Preemption Act of 1841, and the Homestead Acts of 1862 facilitated the transfer of land from the federal government to individuals. Consequently, the perceived threat of land scarcity may have been greater in 1800 than at any time between 1815 and 1840.

An alternative theory proposed by Sundstrom and David (1988) suggests that the high demand for children in previous years was driven by the desire of parents for security in old age. In this view, having many children was a way to ensure ongoing support and access to resources when parents' ability to sustain themselves diminished in old age. However, this motivation would have weakened as nonagricultural labor market opportunities improved in the early nineteenth century. Sundstrom and David (1988) found that non-agricultural labor market opportunities had a large negative effect on rural white fertility when analyzing state-level data for 1840.

The contribution of my work builds upon Sundstrom and David (1988)'s theory, but focuses on a more granular county-level analysis, leveraging geographic variation in migration. This approach allows for a more accurate estimation of the impact of migration on the decline in the child-woman ratio from 1850 to 1880. State-level data cannot offer the same precision, especially given the limited number of organized states at that time. Additionally, the analysis highlights the role of migration distance, challenging Sundstrom and David (1988)'s theory, which does not differentiate between nearby and distant non-agricultural opportunities. Moving away from one's family was not enough; the distance had to be significant enough so that interactions and remittances became costly due to geographical restrictions. Thus, while I do not discount the importance of industrial development, I argue that there were concurrent determinants of fertility decline in nearby rural areas. Accordingly, the data show that including the percentage of men working in manufacturing does not affect the correlation between the child-woman ratio and the percentage of migrants from 1850 to 1880.

The analysis is also connected to the macroeconomic literature on the transition of fertility, particularly the work of Galor and Weil (2000) and Galor (2005), who introduced a unified growth model explaining the historical evolution of population, technology and economic output. Their model emphasizes the importance of microfoundations, suggesting that the transition to sustained economic growth is driven by technological advances, population dynamics, and investments in human capital. It also highlights how differences in economic performance can be influenced by geography, history, institutions, and factors that promote the accumulation of human capital.

Research by Vandenbroucke (2008a) and Vandenbroucke (2008b) demonstrated that decreases in transportation costs led to westward migration and that population growth was crucial for land investments. However, their focus was on international immigration, while my analysis highlights the importance of internal migration and land availability in the Midwest as key incentives for migration. In particular, the peak of international migration from Europe to the United States occurred at the beginning of the following century, further distinguishing the timing and nature of the migrations studied here. By examining the characteristics of westward migrants and migration distances, I gain additional insights into the factors influencing fertility decline, particularly in rural areas.

In addition, recent studies by Ager et al. (2020) and Bau (2021) have explored the relationship between structural changes and fertility transition. Ager et al. (2020) investigated the impact of the spread of agricultural pests in the American South in the 1890s, finding that households that remained in agriculture reduced fertility because children were considered a normal good, while those transitioning to manufacturing experienced a fertility decline due to the higher opportunity costs of raising children in an industrial setting. Lower earning opportunities in agriculture also decreased the value of child labor, leading to increased schooling, consistent with the qualityquantity fertility model. Unlike this study, which focuses on the impact of sectoral changes on fertility, my analysis emphasizes the role of internal migration patterns and geographic distance as determinants of fertility decline, providing a spatial perspective on this transition.

Bau (2021) examines traditional arrangements for the life after marriage for daughters and sons in specific ethnic groups, suggesting that these practices affect the support of old age for parents and incentivize parental investment in child human capital. The presence of large-scale social programs, such as pension plans, can weaken these incentives and signal cultural change, contributing to understanding the economic implications of kinship traditions in low-income countries. Furthermore, Rossi and Godard (2022) study the motive for fertility security in old age and found that social pensions can significantly reduce fertility, particularly among individuals in the latter stages of reproductive life. These results imply that improving social protection for the elderly may play a crucial role in promoting fertility decline, particularly in sub-Saharan Africa. It is worth noting that the United States Social Security Act was not signed into law until 1935.

In general, this research contributes to our understanding of the American fertility transition by offering an alternative perspective that considers the impact of internal migration and cultural shifts in family norms. By analyzing county-level data, this study provides a more detailed view of how internal migration and economic opportunities may have influenced fertility patterns in the 19th century. These insights add to the broader discourse on fertility transitions, particularly in the context of historical and regional variations.

This paper is organized as follows. Section 2 provides a description of the historical context. In Section 3, I present the data, the baseline estimates, and the identification strategy. Section 4 explores the mechanisms underlying the findings and the results of various robustness checks. Finally, Section 5 offers concluding remarks.

2. Historical Data

In the empirical analysis, several variables are examined, including the child-woman ratio (CWR, hereafter), which serves as a dependent variable. I also consider various independent variables that capture the characteristics of westward migration, as well as economic and social factors at the county level.

2.1. Dependent Variable: The Child-Woman Ratio

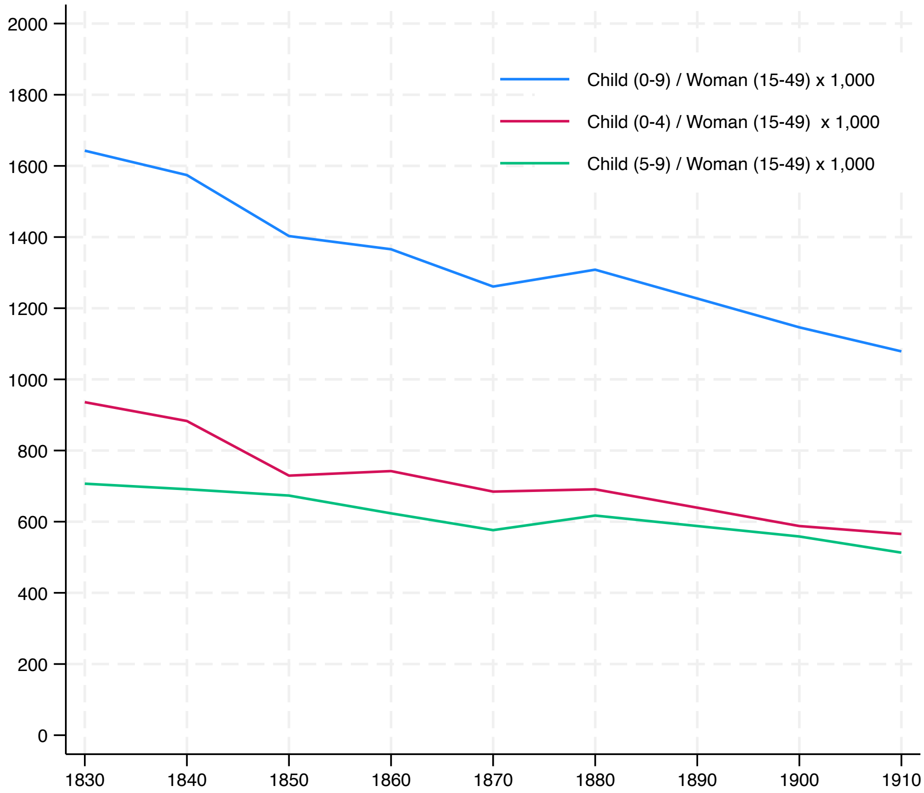
Given the limitations of the census data available from Ruggles et al. (2021) and Haines (2010), directly calculating fertility rates (that is, the number of children born per woman) at the county level is not feasible. Instead, I use the CWR as an indirect measure of fertility. The CWR represents the number of white children aged 0-9 per 1,000 white women aged 15-44 in a given year (Carter et al., 2006). Although it does not provide a direct fertility rate, the CWR serves as a useful proxy to capture historical changes in fertility patterns.

Figure 2 presents the CWR for various decennial periods, with the exception of 1800, 1810, and 1820, where data on the number of white women are only available for the age group 26-44. To refine the analysis, additional ratios are also considered based on children aged 0-4 and 5-9 years. These adjusted ratios offer a more comprehensive view of fertility patterns, incorporating factors such as child mortality that could affect the number of children in each age group.

All three lines exhibit a downward trend over time, indicating a general decline in the CWR. The highest CWR line decreases from 1,647 to 1,079 children aged 0-9 per 1,000 women, representing a 34 percent drop. The lowest CWR line, representing children aged 5-9 years of age per 1,000 women, drops from 707 to 513, marking a 27 percent decline. Throughout the empirical analysis, I use both fertility measures to demonstrate the robustness of the findings, including using the non-standard measure based on children aged 5-9.

Figure 3 presents a scatter plot showing changes in the CWR between states during the studied period, highlighting regional differences and convergence patterns. The x-axis represents the state CWR in 1830 (or 1850 for the West Region), while the y-axis shows the state CWR in 1910. The points on the 45-degree line indicate states in which the CWR remained constant between these two time points. Points below the line represent states with a decline in the CWR, while points above the line represent states with an increase.[3]

Figure 2: Child-Woman Ratio



Sources: Authors' computations from Ruggles et al. (2021) and Ruggles et al. (2024).

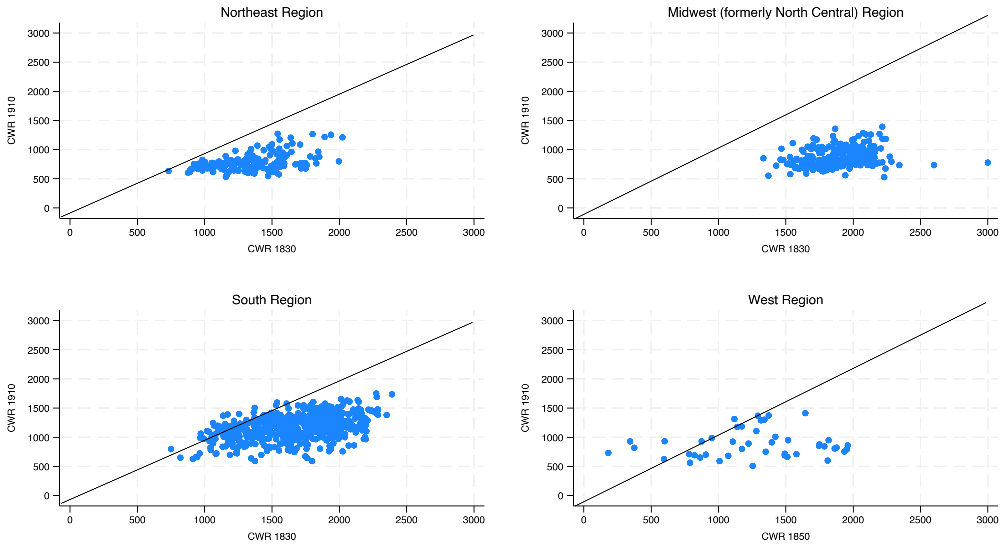
The scatter plot reveals several key insights. First, it shows significant east-west differences in CWR trends during the studied period. New England, for instance, had the lowest CWR at the start of the nineteenth century. The eastern region, including New England, experienced the most substantial decline in CWR during the first half of the century, followed by the Midwest. The analysis also reveals a north-south gradient, with southern regions initially exhibiting higher CWRs compared to New England, and this trend persisted throughout the century. By 1910, the Midwest had seen its fertility levels converge with those of leading regions such as New England and the Middle Atlantic.

For the western region, due to limited data availability for earlier periods, Figure 3 presents CWR data only for 1850 and 1910. The scattered distribution

[3]The map of the CWR can be found in the Appendix, Table B.1.

of points on both sides of the 45-degree line indicates that fertility decline began later in the western region compared to other regions. However, by the end of the century, the western region's fertility patterns started to align more closely with those observed elsewhere in the country, indicating a broader convergence in fertility behavior.

Figure 3: Regional CWR



Sources: Authors' computations from Ruggles et al. (2021) and Ruggles et al. (2024). Each point represents a state.

Another observation made by Haines and Hacker (2011) is that urban areas generally had lower CWRs compared to rural areas. Between 1800 and 1840, both rural and urban areas experienced a decline in the CWR. Although rural areas continued to have higher CWRs than urban areas, the gap between them narrowed as both rural and urban residents began to limit the size of the family. Consequently, from 1850 onward, the variation in CWR across different geographical areas became less pronounced. These patterns provide valuable information on the regional dynamics of fertility decline in the United States during the study period.

The CWR is a widely used measure of historical fertility, but it comes with certain limitations that must be considered in the analysis. One significant challenge is the lack of adjustment for the age structure. In the early years of the United States, the population was predominantly young (Gibson, 2010). However, as migrants settled in various regions along the frontier during the 19th century, the population gradually aged. Consequently, some of the apparent initial decline in fertility could be attributed, at least partially, to changes in the age structure of the female population and, hence, shifts in the population's age pyramid over time.

Furthermore, compared to many European countries, the United States had a significantly higher birth rate in the early nineteenth century (as shown in Figure 1). Therefore, part of the initial fertility decline might simply reflect a convergence toward the premodern European fertility norm, driven by changes in the age distribution of the population. Alterations in age structure alone, without an actual reduction in fertility, can influence the CWR by increasing or decreasing it. As a result, the CWR can underestimate or overestimate the actual changes in fertility behavior. In addition, the CWR is susceptible to factors such as differential mortality, possible under-enumeration of women and children, and combined effects of marriage and marital fertility.

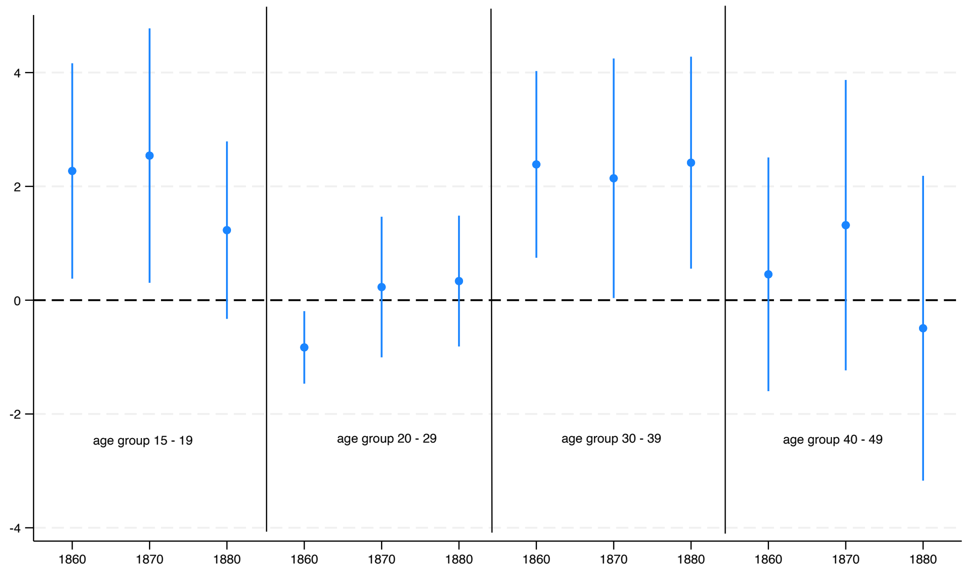
To investigate the potential impact of the change in age structure on fertility trends, an initial analysis examines the relationship between age structure and CWR. The goal is to assess whether changes in the age pyramid significantly impacted fertility trends, potentially explaining part of the observed fertility decline. I perform an OLS regression, with the CWR as a dependent variable and dummy variables for age groups, years, and interactions between age groups and years as independent variables, in addition to county-fixed effects. Figure 4 presents the coefficient estimates along with their associated confidence intervals. These coefficients illustrate the relationship between the CWR and the interaction of the percentage of women in various age groups with the census years.

The reference year for the analysis is 1850, with a primary focus on studying the evolution of age group shares from 1850 to 1880. This period forms the core of the empirical analysis.[4] Figure 4 shows that the composition of women in the different samples cannot be ignored. Therefore, the empirical analysis includes the proportion of women and men in various age groups to account for the composition of the population. Despite this, the regression findings reveal that changes in age group proportions between 1850 and

[4] It is important to note that the available data on migrants cover this specific time range, which aligns with the research objectives.

1880 did not have a statistically significant effect on the CWR.

Figure 4: CWR and Women Age Groups



Sources: Authors' computations from Ruggles et al. (2021) and Ruggles et al. (2024).

2.2. Westward Migration

I draw on several historical sources to summarize the expansion of the nation, including the works by Billington and Ridge (2001) and Paxson (1924). A pivotal moment in this expansion occurred in 1803 when President Thomas Jefferson negotiated the purchase of the Louisiana Territory from France. This acquisition, which stretched from the Mississippi River to the Rocky Mountains and from Canada to New Orleans, effectively doubled the size of the United States. The Louisiana Purchase opened vast opportunities for expansion, settlement, and economic growth. Figure 5 visually illustrates the extent of the Louisiana Purchase, highlighting the significant increase in the area of land that became part of the United States.

This territorial expansion laid the foundation for a period of intense westward migration and exploration, with pioneers and settlers moving into new lands and territories in search of opportunity, resources, and a better life. The westward expansion had profound consequences for the nation's development, reshaping its geography, economy, and society. It enabled further exploration and settlement of the American West, leading to the establishment of new states and the growth of key industries, such as agriculture, mining, and transportation. The ethos of westward expansion and manifest destiny became integral to American identity, fueling the nation's growth and shaping its vision for the future.

Figure 5: Territorial Expansion of the United States

Source: Modern School Supply Company and Rowles (1919).

By 1840, the western frontier had become a land of opportunity and promise, drawing millions of Americans seeking economic prosperity and a better life. By this time, approximately 7 million people — 40 percent of the nation's population — had already settled in the trans-Appalachian West. Inspired by the explorations of pioneers such as Lewis and Clark, many individuals and families left their homes in the East to venture west, motivated by the prospects of independence and upward mobility.[5]

In 1843, the "Great Emigration" saw a thousand pioneers undertake the arduous journey along the Oregon Trail to reach the Oregon Territory, then under British control. Thousands more settlers moved into the Mexican territories of California, New Mexico, and Texas. Texas, having gained indepen-

[5]For more information about the Lewis and Clark expedition, visit https://www.history.com/topics/19th-century/lewis-and-clark.

dence from Mexico in 1837, joined the Union as a slave state in 1846. In the same year, Great Britain ceded control of Oregon, allowing it to enter the United States as a free state. The 1830s and 1840s saw significant westward migration, with pioneers moving into regions such as Michigan, Arkansas, Wisconsin, and Iowa. More adventurous families took the challenging Oregon Trail, aiming to reach the Pacific coast in pursuit of new opportunities.

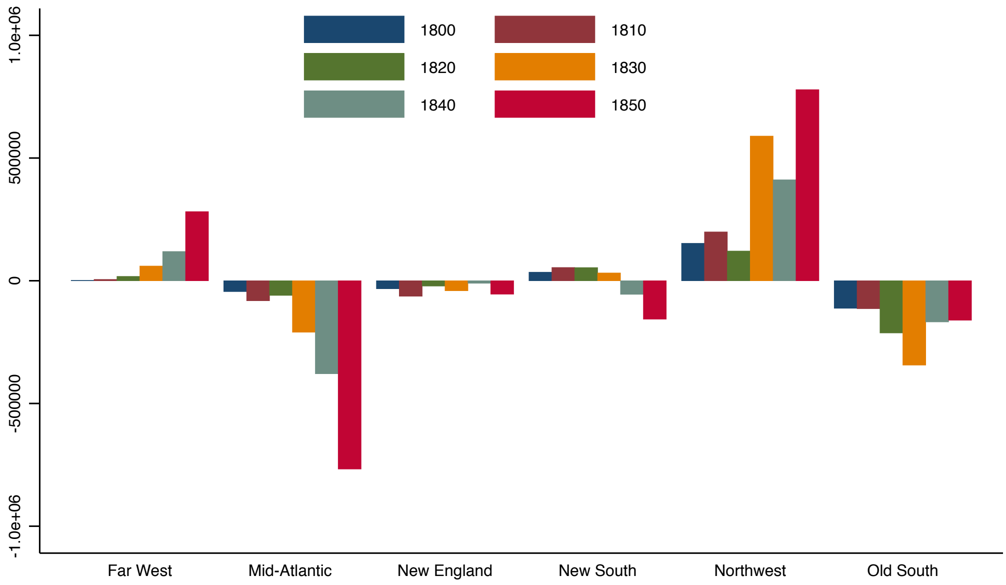
The year 1849 marked a significant surge in California's population due to the gold rush, attracting prospectors from all over the world. During the same time, Mormons began settling in Utah. In the pre-Civil War era, migration continued to populate the Mississippi River valley, Texas, the southwestern territories, and the new states of Kansas and Nebraska. The Civil War further spurred the settlement of gold and silver rich regions, leading to the development of areas such as Oregon, Colorado, Nevada, Idaho, and Montana. By the late 1880s, as the range cattle industry declined, families began to take advantage of the unsettled Great Plains to establish farms, signaling the gradual end of the westward movement. By the early 1890s, the frontier no longer existed within the 48 contiguous states.

To illustrate migration trends from 1800, Figure 6 presents estimates of net interregional migration for each decade from 1800 to 1850. This valuable measure, collected by McClelland and Zechauser (1982), provides insight into the patterns of population movement during this pivotal period in American history, highlighting the substantial scale of migration as individuals and families sought new opportunities and contributed to the westward expansion of the United States.

From 1800 to 1860, significant population changes occurred within the United States. The mid-Atlantic region (New York, New Jersey, and Pennsylvania) experienced the largest net out-migration, surpassing even the net population loss of the Old South by more than 75%. Out-migration from the Mid-Atlantic region accelerated between 1800 and 1820 and doubled again from 1830 to 1860, ultimately accounting for about two-thirds of the total net in-migration into the Northwest region during this period.

The Northwest, which encompassed states west of the Appalachians and north of Tennessee, saw the highest population gain, with a net influx of nearly four million people between 1800 and 1860. Meanwhile, both New England and the Old South experienced net population losses. In particular,

Figure 6: Net Interregional Migration of White Men 1800-1860



Source: McClelland and Zechauser (1982). Far West includes Dakota, Nevada, Oregon, Utah, Idaho, Montana, Arizona, California, New Mexico, and Colorado. Mid-Atlantic includes New England includes New York, New Jersey, and Pennsylvania. Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. The New South includes Kentucky, Tennessee, Alabama, Florida, Mississippi, Missouri, Arkansas, Louisiana and Texas. Northwest includes Ohio, Indiana, Illinois, Michigan, Wisconsin, and the northeastern part of Minnesota. The Old South includes Virginia, Delaware, Maryland, Georgia, North Carolina and South Carolina.

the Old South initially gained population from 1800 to 1840, but began losing population thereafter, as the nation became increasingly divided over issues such as slavery and economic development.

These migration patterns reveal the forces that shaped regional development and population distribution during this era of intense national growth and transformation. The westward movement was driven by economic opportunities, the search for more fertile lands, and political factors that contributed to the gradual shift of population centers across the United States.

For empirical analysis and to construct the sample of internal migrants, I use the Census Tree, the largest database of record links among historical US censuses for the periods 1850-1860, 1860-1870, and 1870-1880 (Ruggles et al., 2021, Ruggles et al., 2024, Buckles et al., 2023, Price et al., 2021, Price et al., 2023a, Price et al., 2023b, Price et al., 2023c). This dataset enables a detailed study of migration patterns at the county level. The sample consists of US-born individuals aged 15 to 65 years, with a primary focus on white men and women.

Table 1 presents the results of the probit regression (columns 1 and 2) and OLS (column 3) that analyzes the factors that influence migration decisions and distances. In columns (1) and (2), the dependent variable is a binary indicator: 1 if individuals have moved any distance (column 1) or specifically moved from East to West (column 2) during one of the three periods, and 0 otherwise. In column (3), the dependent variable is the logarithm of the migration distance (in miles). All regressions include fixed effects for county and year.

Table 1 provides information on the demographic, social and economic factors influencing migration behaviors in the United States from 1850 to 1880. The results show that women were significantly less likely to migrate compared to men across all measures: they had lower probabilities of migrating any distance (column 1) or moving specifically from East to West (column 2), and they also tended to migrate shorter distances (column 3).

Age had a modest but significant effect, with older individuals less likely to migrate any distance or move east to west, although it did not significantly impact the migration distance. Marital status played a notable role, with married individuals having a lower likelihood of migrating both any distance and from East to West, and covering shorter distances when they did migrate.

The size of the family, measured by the number of children, showed mixed effects: having more children slightly increased the probability of migration at any distance but reduced both the likelihood of east-west migration and the migration distance. Literacy also had mixed effects; it reduced the probability of any migration, but increased both the likelihood of East-West migration and the distance traveled.

Rural residency was positively associated with overall migration, particularly in distance, suggesting that individuals from rural areas tended to migrate farther away. Finally, labor force participation had a positive association with migration likelihood for any distance and East-West migration, although it slightly reduced the average migration distance.

Table 1: Characterizing Migration Patterns

Dependent Variables:	Migration Choice		Log of
	Any distance	East-West	Migration Distance
	(1)	(2)	(3)
Women	-0.167***	-0.203***	-0.197***
	(0.004)	(0.009)	(0.005)
Age	-0.017***	-0.006***	-0.000
	(0.000)	(0.000)	(0.000)
Married	-0.014***	-0.096***	-0.128***
	(0.003)	(0.005)	(0.003)
Number of children	0.004**	-0.003*	-0.015***
	(0.001)	(0.002)	(0.001
Literacy	-0.082***	0.051**	0.082***
	(0.008)	(0.015)	(0.006)
Rural	0.011***	-0.077**	0.177***
	(0.004)	(0.029)	(0.022)
Labor force participation	0.022***	0.044***	-0.014***
	(0.004)	(0.010)	(0.003)
Home county FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	16,205,347	16,205,347	4,763,152

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. Probit regressions in columns (1) and (2); OLS regression in column (3). Each column presents the estimates from a separate regression. The unit of observation is an individual. White heteroskedastic standard errors adjusted for clustering at the county level in parentheses. All regressions include a constant term.

These findings underscore the multifaceted nature of migration patterns during this period, highlighting the influence of gender, age, marital status, family structure, literacy, rural background, and participation of the labor force on migration choices and distances. The results provide valuable context for understanding population movement dynamics in the era of US westward expansion.

3. Empirical Strategy

In this section, I outline the methodology and regression equations used to examine the correlation between migration patterns and the decline in the

CWR. The final dataset was constructed systematically. I began with three migrant samples that span 1850-1870, 1860-1870, and 1870-1880, compiling a comprehensive dataset of approximately 16 million individual-level observations. These samples were then aggregated into a panel dataset at the county level for the Census years 1850, 1860, and 1870.

Subsequently, I merged the CWR data and county characteristics for these years at the county level. Finally, I integrated the aggregated migrant data with the combined CWR and county characteristics dataset. This process resulted in a refined dataset of approximately 5,000 observations at the county-year level.

3.1. Estimating Equations

To begin this analysis, I provide evidence of a correlation between migration patterns and fertility decisions, specifically focusing on the decline in the CWR. Migrants who moved out of state or toward the frontier are closely associated with declines in the CWR, likely because of their departure from family's production roles in their original locations. Thus, both the distance and destination of migration emerge as significant factors in this relationship.

In defining the dependent variable, let $CWR_{i(t+10)}$ denote the ratio of white women aged 15-44 to children aged 0-9 or 5-9 (depending on the specification) in county i in year $(t+10)$ where $(t+10) = 1860, 1870, 1880$. This measure follows the approach described in Goldstein and Klüsener (2014). This 10-year lag reflects the assumption that the effects of migration on fertility are not immediate but unfold over time, as family formation and childbearing patterns adjust to new circumstances. I estimate the following OLS model:

$$CWR_{i(t+10)} = \alpha_i + \gamma_t + \beta Migr_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}. \tag{3.1}$$

The primary independent variable, $Migr_{it}$, represents the percentage of individuals who moved from their "home" county i in $t = 1850, 1860, 1870$ to a different county by the subsequent decade. The structure of the historical data set allows us to include fixed effects of county (α_i) and year (γ_t) to control for county-specific and time-specific influences. In this framework, ϵ_{it} denotes the error term. The coefficient β measures the change in CWR associated with a one-percentage point increase in the percentage of migrants. I hypothesize that $\beta < 0$, suggesting that higher migration rates correlate with lower CWR in the origin county.

To examine further migration destinations, I conducted two analyses. First, I segment migrants into three groups: those who remained, those who migrated within the same state ($MigrCounty$), and those who moved out of state ($MigrState$). The first model is as follows:

$$CWR_{i(t+10)} = \alpha_i + \gamma_t + \beta_1 MigrCounty_{it} + \beta_2 MigrState_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}. \quad (3.2)$$

The hypothesis posits that out-of-state migrants contribute more significantly to the decline in CWR, suggesting that $\beta_2 < 0$, with β_1 potentially non-significant, and $|\beta_1| < |\beta_2|$.

In a subsequent model, I analyze two groups: those who migrated out of state ($MigrState$) and those who did not migrate or moved within the same state. The model is specified as follows:

$$CWR_{i(t+10)} = \alpha_i + \gamma_t + \beta MigrState_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}. \quad (3.3)$$

I expect $\beta < 0$, indicating that out-of-state migration correlates with a decrease in CWR.

In addition, a third migration measure focuses on *east-west* migration. This category comprises destination states excluding those in the East, specifically Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, West Virginia, Pennsylvania, Virginia, North Carolina, and South Carolina. Including this measure, the empirical model is as follows:

$$\begin{aligned} CWR_{i(t+10)} &= \alpha_i + \gamma_t + \beta_0 MigrCounty_{it} + \beta_1 MigrNoEW_{it} \\ &\quad + \beta_2 MigrEW_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}. \end{aligned} \quad (3.4)$$

Here, $MigrNoEW$ denotes the percentage of migrants moving to states outside the frontier, while $MigrEW$ denotes migrants moving to western states. In particular, $MigrState_{it} = MigrNoEW_{it} + MigrEW_{it}$. I expect $|\beta_2| > |\beta_1|$ and $\beta_2 < 0$, suggesting that migration to western states has a greater negative impact on the CWR, while β_1 may be negative or statistically insignificant.

Lastly, I estimate another equation where the main independent variable,

$MigrEW$, captures the percentage of migrants moving to western states:

$$CWR_{i(t+10)} = \alpha_i + \gamma_t + \beta MigrEW_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}. \tag{3.5}$$

In all the equations presented, the matrix **X** includes the characteristics of migrants at the county and migrant level for the years 1850, 1860, and 1870, which can influence the childbearing decisions of individuals. These characteristics encompass economic conditions, demographic composition, and other relevant variables. By controlling for these factors, the analysis aims to isolate the effect of migration on the CWR. Tables 2 and Table C in the appendix summarize the estimated coefficients and their statistical significance for each model.

The unit of analysis is the home county during the decennial years $t = 1850, 1860$ and 1870, with the migrant characteristics measured at the county and year level. These characteristics include gender, number of children, age, farm status, urban status, participation in the labor force, level of literacy, and marital status. Aggregated county-level characteristics, such as the shares of men and women by age group (0-14, 15-29, 30-44, 45-54, 55-64, 65+), average age, literacy rate, percentage of the US-born population, labor force participation rate, occupational score, urban population, acres of unimproved land, farm value per acre, percentage of manufacturing workers, number of churches per inhabitant and farms per inhabitant, are also incorporated.[6]

All models from (1) to (10) include the characteristics of the migrant and county of origin, as well as fixed effects for the county of origin and year. In columns (1) to (5), the dependent variable is the CWR calculated using children aged 0 to 9 years. Column (1) shows a statistically significant negative correlation between the percentage of migrants and the CWR, as estimated from equation (3.1). Specifically, a 1% increase in migrant percentage corresponds to a 9.7% lower CWR level.

In column (2), equation (3.2) distinguishes between county and state migrants. The results align with the hypothesis that migration distance matters: The coefficient for county migrants is small and not statistically significant, while the coefficient for state migrants is negative and highly significant, suggesting that long-distance migration, rather than short-distance, has a large

[6] Further details on these variables are available in Appendix A.

impact on CWR.

Table 2: OLS Estimates of the Effects of Migration on CWR

Dependent Variable:	***Children 0 to 9 / Women 15 to 44***					***Children 5 to 9 / Women 15 to 44***				
CWR	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Migrants (β)	-0.097**					-0.031*				
	(0.032)					(0.016)				
County migrants (β_1)		0.006					0.002			
		(0.036)					(0.019)			
State migrants (β_2)		-0.367***					-0.118***			
		(0.061)					(0.029)			
State migrants (β)			-0.368***					-0.118***		
			(0.061)					(0.028)		
County migrants (β_0)				0.011					0.000	
				(0.036)					(0.002)	
Other than E-W migrants (β_1)				-0.338***					-0.127***	
				(0.064)					(0.030)	
East-West migrants (β_2)				-0.568***					-0.056	
				(0.124)					(0.057)	
East-West migrants (β)					-0.465***					-0.019
					(0.119)					(0.055)
Migrant controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,787	4,787	4,787	4,787	4,787	4,787	4,787	4,787	4,787	4,787
R-squared	0.906	0.904	0.900	0.900	0.898	0.852	0.852	0.854	0.854	0.852

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. 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. Full regression results are in Table C.

The column (3) estimates the equation (3.3), and the coefficient for $MigrState$ remains robust and significant, strengthening the association between state migration and lower CWR. Column (4) presents the results of the estimation equation (3.4), where migrants moving from East to West show a significantly larger negative impact on the CWR than those migrating within or between eastern states, results also confirmed in column (5). This finding suggests that the migration direction, specifically towards the western frontier, strongly correlates with reduced fertility.

Columns (6) to (10) repeat the analysis using children aged 5 to 9 years as dependent variables to account for potential child mortality effects. Although the coefficients are generally smaller and sometimes less precise, the negative correlation remains consistent with previous predictions.

These findings highlight the demographic impact of westward migration on fertility declines during the US frontier expansion. However, potential endogeneity issues warrant caution in interpretation, as unobserved factors or reverse causality, such as lower fertility rates that potentially drive migration, could affect these results. Addressing these concerns is crucial for accurately understanding the causal mechanisms underlying the observed decline in CWR.

3.2. Instrumental Variable Estimates

To strengthen the theoretical framework and test the proposed explanation, I perform an instrumental variable (IV) analysis. This approach helps address potential endogeneity concerns, such as unobserved factors that could influence both migration patterns and declines in the CWR. The IV analysis is designed to provide consistent estimates of the coefficients of interest, thus mitigating biases from omitted variables.

The primary motivation for employing an IV approach is to ensure that the observed negative correlation between migration and CWR is not confounded by other factors, such as shifts in the sex ratio that might decrease the likelihood of marriage and subsequently the fertility rates. If these factors were the main drivers, then an exogenous fertility shock would not substantially affect the migration-CWR relationship being analyzed.

To identify a causal relationship between the share of westward migrants and the fertility rate, it is crucial that migration patterns are not shaped by factors independently influencing local fertility preferences. For example, if migrants came primarily from economically thriving areas or regions with progressive views on family dynamics and lower fertility, the results could be confounded. To address this, I develop an instrument based on land warrant allocations, which served as a significant incentive for eastern populations to migrate westward.

Between 1847 and 1855, Congress passed four land warrant acts that granted approximately 60 million acres of land to veterans and their heirs as a military service reward. This widespread incentive, which affects around one in nine US families, makes it a robust instrument for migration analysis. The IV is constructed from data from the ICPSR Military Bounty Land Warrants in the United States dataset (1847-1900) (Oberly, 1991), which details the state of residence of veterans at the time of their land warrant applications. This random sample of 0.5% of issued land warrants provides a solid foundation for the construction of the instrument.

The IV is based on two main variables: the total acreage awarded in the destination state and the distance between the centroid of the state of origin and that of the destination state. Specifically, I calculate the average number of acres granted in the destination state and the average distance between the origin and destination states for each migrant. The merging process aligns the migrants' home counties with the states of residence of veterans or their beneficiaries at the time of application. To maintain a focus on land-driven migration, only land warrants not sold for cash are included in the analysis.

The hypothesis is that both the amount of land awarded and the distance to it significantly influence migration decisions. The summary statistics in Table 3 show an average acreage awarded of 1,340 acres and an average migration distance of about 160 miles. These metrics provide a strong basis for IV analysis, designed to yield a more accurate estimation of the causal impact of migration on the CWR during the westward expansion.

Table 3: Summary Statistics on the Awarded Acres and Distance from State of Beneficiaries

	(1) Mean	(2) Median	(3) Std. Dev.	(4) Min.	(5) Max.	(6) Obs.
Granted acres	1,340.84	200.86	3,408.11	0.19	54,871.99	5,655
Distance (miles)	159.64	120.83	179.99	17.08	4,213.61	5,655

Source: Authors' computations using Oberly (1991).

The IV model is specified as follows, with equations (3.6) and (3.7) representing the first and second stages:

$$Y_{it} = \mu_i + \nu_t + \delta IV_{it} + \mathbf{X}_{it}\Gamma + \omega_{it} \tag{3.6}$$

$$Z_{it} = \alpha_i + \gamma_t + \beta \widehat{Y}_{it} + \mathbf{X}_{it}\Lambda + \epsilon_{it}, \tag{3.7}$$

where i indexes county in year t. The dependent variable Y_{it} represents migration indicators (that is, $Migr_{it}$, $MigrState_{it}$, $MigrFront_{it}$), while IV_{it} is the instrumental variable described above. The predicted values $\widehat{Y}_{it}$

from the equation for the first stage are used to estimate the outcome variable Z_{it} in the second stage. The fixed effects of the county (μ_i and α_i), the fixed effects of the year (ν_t and γ_t), and the covariates $\mathbf{X}_{it}$ are included.

Table 4 provides the first stage and 2SLS estimates, with robust F statistics that indicate the strength of the instrument. The results suggest that beneficiaries receiving larger acreages farther from their origin have a higher probability of migrating, confirming the instrument's validity.

Table 4: First-Stage and IV-2SLS Estimates of the Effects of Migration on CWR

	First-stage estimates		**IV-2SLS estimates**				**Reduced form**	
Dependent Variable:	Migrants	East-West migrants	CWR Children 0 to 9		CWR Children 5 to 9		CWR Children 0 to 9	CWR Children 5 to 9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Granted acres	0.139** (0.043)	0.149*** (0.010)					-0.334*** (0.060)	-0.161*** (0.032)
Distance	0.543*** (0.025)	0.029*** (0.006)					-0.165*** (0.034)	-0.072*** (0.018)
Migrants			-0.336*** (0.065)		-0.149*** (0.034)			
East-West migrants				-2.558*** (0.414)		-1.210*** (0.222)		
Migrant Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test of excluded instruments	244.82	109.36						
Observations	4,753	4,753	4,753	4,753	4,753	4,753	4,753	4,753

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. 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. Full regression results are shown in Table D.1.

The analysis reveals that the shares of granted acres and migration distance are strongly correlated with migration decisions, as indicated by a substantial Kleibergen-Paap F-statistic. The magnitude of the point estimates suggests that beneficiaries receiving larger acreages at more distant locations show an average migration decision value approximately 0.14 units higher than the reference group, maintaining other covariates constant.

The 2SLS estimates in columns (3) and (5) provide evidence that migration (regardless of distance) accounts for roughly 34 and 15 percent of the variation in CWR, respectively. Long-distance migration has an even stronger impact on CWR, indicating that migration substantially influenced fertility decisions and contributed to the demographic shifts observed during the westward expansion. The estimates in reduced form in columns (7) and (8) further support these findings, showing that lower levels of CWR are consistently associated with a higher share of granted acres and longer migration distances.

The testing of alternative age groups for children in the CWR calculation has minimal effect on the estimates, underscoring the robustness of the findings. This consistency across different age groups of children - and despite the potential influences of infant mortality - reinforces the reliability of the results, confirming the impact of westward migration on the decline of CWR.

3.2.1 OLS and IV Coefficients

The considerable difference between the IV and OLS coefficients for East-West migrants suggests a potential downward bias in the OLS estimates. This bias probably arises from several factors. First, endogeneity bias may influence the OLS estimates if unobserved factors correlate with both migration decisions and fertility outcomes. The IV approach addresses this issue by utilizing exogenous variation in migration patterns, reducing this source of bias.

Second, measurement error in the migration variable may attenuate the OLS estimates, while the IV strategy, assuming the instrument is less prone to these measurement issues, can help correct for this attenuation. Selection bias may also play a role, as migrants might self-select in ways not fully captured by observable characteristics. The IV estimates represent a local average treatment effect for those whose migration decisions were influenced by the land warrant policy. This "complier" group may have experienced greater fertility effects than the average migrant.

Additionally, omitted variable bias could affect OLS estimates if unaccounted factors correlate with both migration and fertility. The IV strategy mitigates this by relying on the exogenous variation introduced by land warrants. Lastly, reverse causality can affect OLS estimates if fertility decisions influence migration choices; however, the IV approach helps isolate the causal impact of migration on fertility outcomes.

The larger IV coefficient suggests that East-West migration's effect on fertility decline may be more substantial than OLS estimates indicate, underscoring the importance of addressing endogeneity concerns in studying the migration-fertility relationship in this historical context.

4. Mechanisms

I now turn to an examination of the mechanisms underlying the finding that internal migration is associated with lower fertility.

4.1. Family Composition

The decline in fertility and changes in family structures were key demographic shifts experienced by American families during the 19th century. As noted in Ruggles (2007), the proportion of 65- and older people living in the same household as their children decreased significantly, from 74 percent in 1850 to about 60 percent by the end of the century. This trend reflects a gradual shift away from traditional patriarchal family structures in which multiple generations lived together.

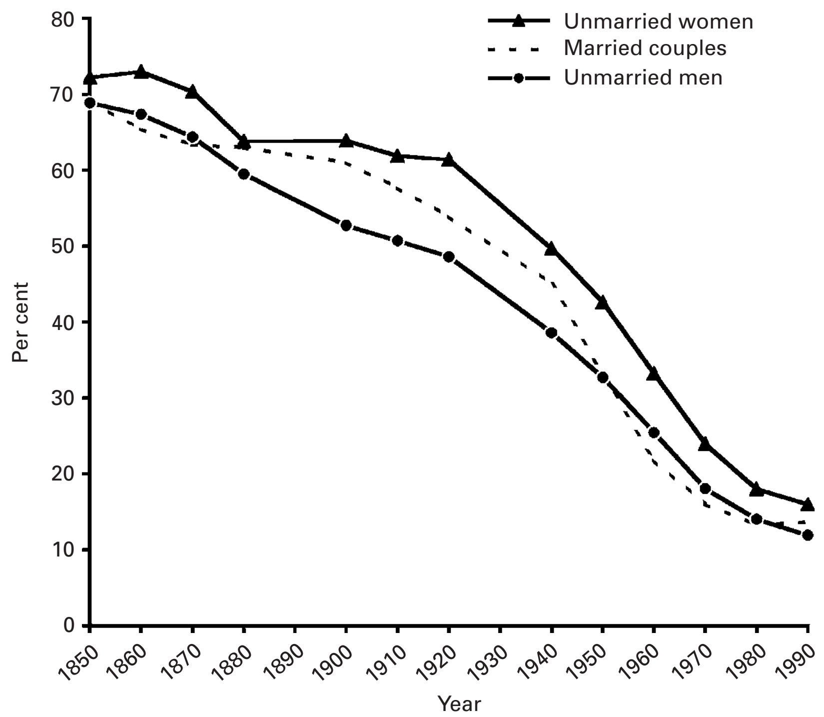
At the beginning of the 19th century, most Americans lived on farms, with approximately three-quarters of the labor force engaged in agricultural labor. In this agrarian society, family labor was crucial to farm productivity, and nearly all capable family members contributed to the household economy. Even those not directly involved in farming often relied on family income for their livelihoods.

However, as the century progressed, new employment opportunities emerged in factories and other non-agricultural sectors. Factory jobs surged between 1850 and 1900, along with rapid growth in clerical, sales, and professional occupations. The expansion of well-paying wage labor offered young men an alternative to farm work, encouraging them to leave home in pursuit of these opportunities and reducing their dependence on the traditional multigenerational family structure.

Figure 7 illustrates the percentages of elderly whites who remained with their own children according to sex and marital status in the United States between 1850 and 1990, highlighting changes in family support dynamics and the decline in multigenerational households during this period.

These demographic and economic changes suggest a link between expanding economic opportunities, changes in labor patterns, and evolving family structures. As the economy transitioned from agricultural labor to wage labor, the dynamics of the family changed, resulting in smaller family sizes and a decreased prevalence of multigenerational households.

Figure 7: Multigenerational Families: United States, 1850–1990



Sources: Ruggles (2003), p.143.

The prospect of migrating to more affordable land in the West also influenced family support patterns, contributing to the decline in multigenerational coresidence. As young people moved westward in search of new opportunities, they often left their parents behind, making it necessary for those who stayed to seek alternative means of support in old age.

To further investigate how migration influenced family composition, I estimate the effects of internal migration on several indicators of multigenerational residence. Specifically, I measure the percentage of families co-residing with the respondent's mother, father, both parents, and both parents within farm households.[7]

[7]Farm households are defined by Ruggles et al. (2021) and Ruggles et al. (2024) as any household containing a person with the occupation "farmer".

Table 5 presents the results of these estimates. I find that East-West migration had a substantial and statistically significant negative impact on the prevalence of multigenerational families between 1860 and 1900. The presence of parents, especially the mother, is inversely correlated with the percentage of migrants. This effect is more pronounced in farm households, as shown in column (4).

Table 5: IV-2SLS Estimates of the Effects of Migration on Family Composition

Dependent Variable:	Co-residents with			
	Mother (in law)	Father (in law)	Parents (in law)	Parents (in law) in farm household
	(1)	(2)	(3)	(4)
	A. 2SLS Estimates			
East-West migrants	-0.203***	-0.140**	-0.234***	-0.265***
	(0.059)	(0.057)	(0.060)	(0.064)
	B. First Stage Estimates **Dependent Variable: East-West migrants**			
Granted acres	0.149***	0.149***	0.149***	0.144***
	(0.011)	(0.010)	(0.011)	(0.011)
Distance	0.028***	0.028***	0.028***	0.204**
	(0.006)	(0.006)	(0.006)	(0.068)
F-test of excluded instruments	108.40	108.40	108.40	96.40
Observations	4,761	4,761	4,761	4,604
Migrant Controls	Yes	Yes	Yes	Yes
Home county FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. 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.

These findings suggest that migration influenced family structure by reducing coresidence with parents, particularly in traditional farm households, where familial labor was once crucial. As more young people migrated westward, the economic and social reliance on extended family structures diminished, supporting a shift toward smaller, nuclear family units. This shift was especially pronounced in regions affected by the westward expansion, where family structures adapted to the new socio-economic realities.

The evolving dynamics of intergenerational transfers and the decline of family-based support systems led to a greater reliance on savings and alternative financial solutions for the security of older people. As regions developed and urbanized, access to banks and financial institutions became more feasible, facilitating this change. Between 1830 and 1900, the United States saw a notable rise in savings rates, partly driven by a reduction in the dependency rate: fewer elderly individuals were relying on their children for support.

To further examine this shift, I use county-level data from Fulford (2015) to construct indicators of financial development and explore their association with the percentage of migrants. Table 6 presents 2SLS estimates from equations (3.6) and (3.7), indicating significant relationships between migration and various banking indicators.

Table 6: IV-2SLS Estimates of the Effects of Migration on Financial Development

Dependent Variable:	Banks per hab.	Banks per man hab.	Distance from bank
	(1)	(2)	(3)
	A. 2SLS Estimates		
East-West migrants	0.176	0.958**	-1.127***
	(0.111)	(0.448)	(0.196)
	B. First Stage Estimates		
	Dependent Variable: East-West migrants		
Granted acres	0.144***	0.144***	0.144***
	(0.011)	(0.011)	(0.011)
Distance	0.188**	0.188***	0.188**
	(0.068)	(0.068)	(0.068)
F-test of excluded instruments	96.19	96.19	96.19
Observations	4,605	4,605	4,605
Migrant Controls	Yes	Yes	Yes
Home county controls	Yes	Yes	Yes
Home county and year fixed effects	Yes	Yes	Yes

$***p<0.01$, $**p<0.05$, $*p<0.1$. 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.

In column (1), I assess the relationship between the number of banks per capita and migration, observing an increase in bank density over time, particularly during the 1880s. Although the coefficient is positive, it lacks statistical precision. Column (2) refines this analysis by focusing on the male population, where the effect is larger and statistically significant.[8] In column (3), I examine the average geographic distance to the nearest bank by county and find that migration is associated with a higher density of banks, leading to better access to banking services.

In general, these findings suggest that migration played an important role in the reshaping of intergenerational transfers and stimulating financial development, particularly the expansion of banks. As families left traditional support networks, they turned increasingly to financial institutions to secure their economic futures and save for old age. This underscores the complex interplay between demographic changes, migration, and financial development in the United States of the 19th century.

4.3. Robustness Checks

Table 7 presents the results of several robustness checks to validate the IV estimates on the impact of frontier migration on the CWR. The estimated equations are (3.6) and (3.7).

To address potential outliers that could bias the results, counties in the bottom and top 5 percent of the distributions for CWR (columns (1) and (4)), East-West migrants (columns (2) and (5)), and both variables simultaneously (columns (3) and (6)) were excluded. The findings show that removing these outlier counties does not materially affect the estimates, further reinforcing the robustness of the IV results.

In column (7), I perform a placebo test to examine whether frontier migration from 1850 to 1880 is correlated with historical CWR values from 1800 to 1820. This test assesses the possibility of a spurious correlation between migration and past CWR levels. The results do not reveal a significant relationship, supporting the validity of the IV strategy by confirming that the instrument is not associated with historical variations of the CWR.

[8] The Equal Credit Opportunity Act of 1974 later granted all American women, married or single, the right to open bank or credit accounts.

Table 7: Robustness Checks

Dependent Variable:	*CWR* Children 0 to 9			*CWR* Children 5 to 9			Placebo test
	CWR extreme values	Migrant extreme values	CWR & Migrant extreme values	CWR extreme values	Migrant extreme values	CWR & Migrant extreme values	CWR 1800-1820
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				A. 2SLS Estimates			
East-West migrants	-2.363***	-6.255***	-5.529***	-1.184***	-3.454***	-3.182***	-1.989
	(0.390)	(1.037)	(0.987)	(0.212)	(0.588)	(0.559)	(1.670)
				B. First Stage Estimates			
				Dependent Variable: East-West migrants			
Granted acres	0.166***	0.063***	0.073***	0.164***	0.067***	0.030***	0.051***
	(0.011)	(0.006)	(0.006)	(0.011)	(0.006)	(0.006)	(0.010)
Distance	0.035***	0.006*	0.009**	0.039***	0.006*	0.009**	0.471***
	(0.071)	(0.003)	(0.037)	(0.007)	(0.003)	(0.003)	(0.022)
F-test of excluded instruments	121.21	63.20	65.87	119.66	63.20	65.87	231.67
Observations	4,261	4,432	3,979	4,250	4,432	3,979	1,424
Migrant Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home county FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$. 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.

5. Conclusion

This study aims to deepen our understanding of the factors driving the early fertility transition in the United States. Focusing on the period from 1850 to 1880, I investigate the impact of internal migration on fertility rates. By employing an instrumental variable approach, I use significant land grants awarded by the U.S. Congress to veterans and their heirs between 1847 and 1855 to isolate the causal influence of migration on the decline of the child-woman ratio in migrants' counties of origin.

My findings indicate that economic opportunities in the western regions, particularly through accessible land, were a powerful incentive for migration. This westward movement played a pivotal role in the reshaping of fertility norms in eastern counties. The analysis emphasizes the importance of the migration distance. As distances increased, transfers and support between family members became less feasible, leading to changes in family composition and fertility decisions.

To investigate the underlying mechanisms, I examined changes in multi-generational coresidence. This research shows that migration contributed to the decline in the traditional family-based agricultural economy and significantly impacted financial development, as reflected in the growth in the number and density of banks.

In general, the estimates suggest that migration not only reshaped the cultural dynamics within the receiving counties, but also had profound effects on the counties of origin. Westward migration emerged as a critical factor in driving the fertility transition in the latter half of the 19th century. Economic opportunities in the West influenced reductions in agricultural labor force participation and shifts away from multigenerational households in the East.

In addition, these findings may extend beyond the historical context of the United States. Similar patterns may exist in European migration to the United States and its effects on fertility transitions in various historical settings. Future research could explore these patterns in other historical and regional contexts to examine whether such correlations are recurring phenomena across time and place.

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A. Data

Data for this paper are compiled from multiple sources. To infer migration status from the Census Tree, we utilize a database of record links among the historical US censuses for the periods 1850-1860, 1860-1870, and 1870-1880 (Ruggles et al., 2021, Buckles et al., 2023, Price et al., 2021, Price et al., 2023a, Price et al., 2023b, Price et al., 2023c). The county-level population and various county and state characteristics for all decennials from 1790 to 2002 are provided by Haines (2010). I specifically used data from 1850, 1860, 1870, and 1880 to compute the CWR and analyze its changes. Furthermore, i used the economic and demographic characteristics of counties and states from 1850, 1860, and 1870, as provided by Ruggles et al. (2021) and Ruggles et al. (2024). Data on military bounty land warrants, which cover the period 1847 to 1900 at the state level, are sourced from Oberly (1991). Historical data on banking institutions are obtained from Fulford (2015).

Child-woman ratio: From Haines (2010) for all decennials from 1830 to 1870, and from Ruggles et al. (2021) and Ruggles et al. (2024) for the decennials from 1880 to 1910. It is defined as the relationship between the number of white children 0-9, 0-4, or 5-9 to the number of white women per 1,000 women 15-49.

A.1. Migrant Variables: Ruggles et al. (2021) and Ruggles et al. (2024)

Farm: FARM. It is equal to one if the individual reports belong to a farm household.
Number of children: NCHILD. It counts the number of own children (of any age or marital status) residing with each individual.
Number of children less than 5 yo: NCHLT5. It counts the counts the number of own children age 4 and under residing with each individual.
Women: SEX. It is equal to 1 if the individual declares being a woman.
Age: AGE. Age reported in years.
Literacy: LIT. This variable is equal to 1 if the individual reports being literate.
Labor force participation: LABFORCE. It indicates whether a person participated in the labor force.
Urban: URBAN. Indicates whether the location of a household was urban or rural.

A.2. County Variables: Ruggles et al. (2021), Ruggles et al. (2024) and Haines (2010)

Percentage of men and women by age group: From Ruggles et al. (2021) and Ruggles et al. (2024). Several variables are used to calculate the percentage of white men and women by age group.
Age: From Ruggles et al. (2021) and Ruggles et al. (2024), AGE. Age reported in years.
US born: From Ruggles et al. (2021) and Ruggles et al. (2024), BPL. It is equal to 1 if an individual is born in the United States.
Labor force participation: From Ruggles et al. (2021) and Ruggles et al. (2024), LABFORCE. It indicates whether a person participated in the labor force.
Literacy: From Ruggles et al. (2021) and Ruggles et al. (2024), LIT. It is equal to 1 if you are literate (reads and writes).
Occupational score: From Ruggles et al. (2021) and Ruggles et al. (2024), OCCSCORE. It is a constructed variable that assigns occupational income scores to each occupation.
Urban: From Haines (2010). Definition as the relationship between urban and total population ($urb850/totpop$).
Unimproved acres: From Haines (2010). It is 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 ($acunimp/(acunimp + acimp)$).
Farm value: From Haines (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 ($farmval/acimp$).
Manufacturing per pop.: From Haines (2010). It is calculated as the relationship between the total number of men working in the manufacturing industry and the total population ($mfglabor/totpop$).
Churches per population: From Haines (2010). It is defined as the relationship between the total number of churches and the total population ($churches/totpop$, where $churches$ is the sum of all the churches in the county).
Farms per pop.: From Haines (2010). It is calculated as the relationship between the total number of farms and the total population ($farms/totpop$).

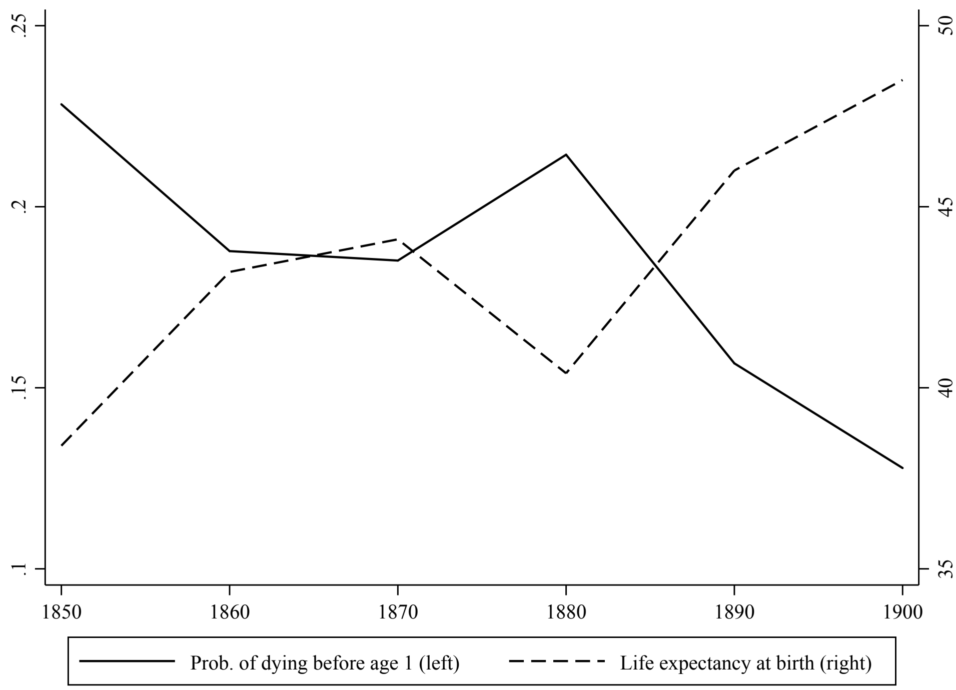
A.3. *Instrumental Variables: Oberly (1991)*

Granted acres: Authors' computation using the variable ACRES.
Distance: Authors' computation using data of state of residence and state of granted acre location.

A.4. *Mechanism Variables: Ruggles et al. (2021), Ruggles et al. (2024) and Fulford (2015)*

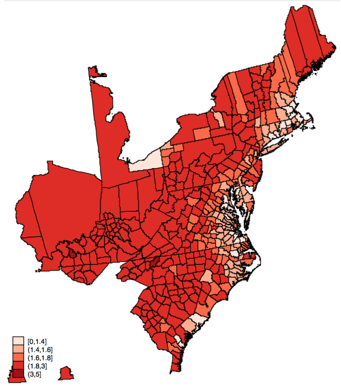
Family composition: Authors' computation using variables MOMLOC and POPLOC from Ruggles et al. (2021) and Ruggles et al. (2024).
Banks per hab. and Banks per man hab.: Authors' computation using the variable BANKS in Fulford (2015).
Distance from bank: Authors' computation using the variable MEANDIST in Fulford (2015).

Figure A.1: Infant Mortality and Life Expectancy at Birth

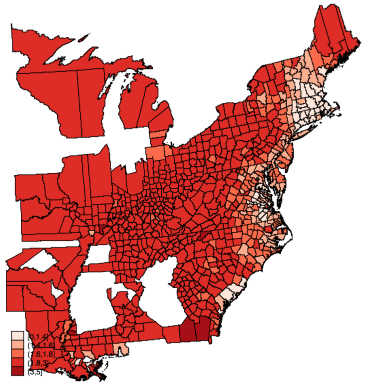


Sources: Authors' computations using data from Haines (2001).

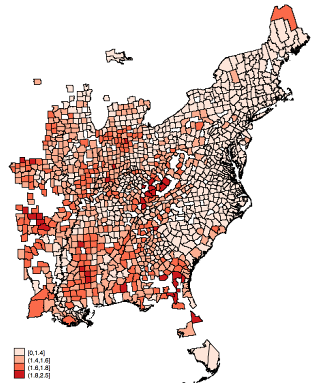
Table A.4.1: Map of Child-Woman Ratio 0-9 years old



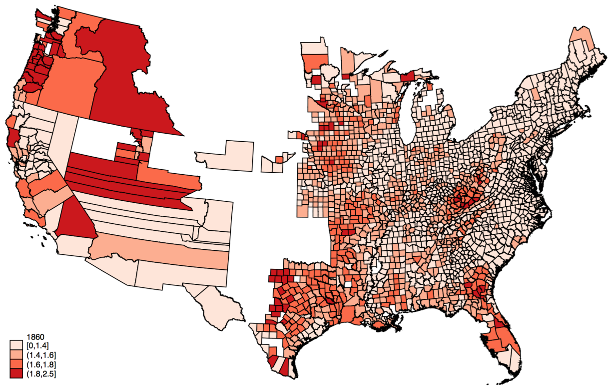
1800: obs 444; mean 3.974; st dev 0.937; min 1.839 (VA); max 8.524 (TN)



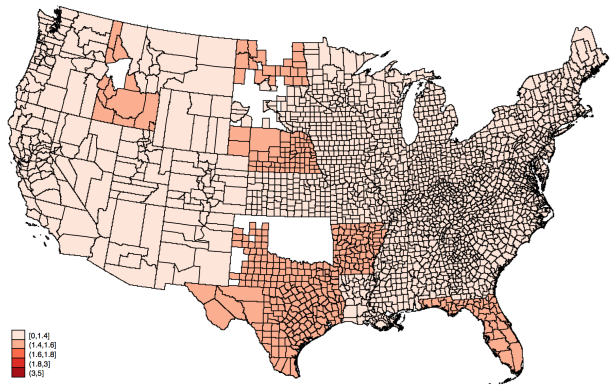
1820



1850: obs 1,660; mean 1.860; st dev 0.391; min 0 (MI); max 5 (MI)



1860



1880: obs 2,544; mean 1.308; st dev 0.297; min 0 (KA, MN, ND, SD, TX); max 4 (TX)

Source: ICPSR "'Historical, Demographic,Economic and Social Data: The United States, 1790-2002"

Table B.1: Descriptive Statistics: Child-Woman Ratio

	1850				1860				1870				1880			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
$\frac{\text{White children 0 to 9}}{\text{Women 15 to 44}} * 1000$	1402.63	262.87	343.89	2145.16	1363.06	267.72	0	3636.36	1260.80	275.35	0	4500	1293.73	262.82	0	2272.73
$\frac{\text{White children 5 to 9}}{\text{Women 15 to 44}} * 1000$	673.08	123.32	153.12	125.00	622.02	125.08	0	1636.36	576.978	127.927	0	2000.00	615.62	115.14	0	1454.54
Observations	1541				1997				2262				2260			

Table B.2: Descriptive Statistics: Migrants and Control Variables

	1850				1860				1870			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Migrants	0.381	0.141	0.072	1	0.392	0.154	0	1	0.361 1	0.142	0	1
County migrants	0.202	0.107	0.031	0.814	0.210	0.108	0	1	0.198	0.101	0	1
Other than E-W migrants	0.147	0.112	0.003	0.777	0.161	0.125	0	1	0.147	0.124	0	1
E-W migrants	0.032	0.057	0	0.440	0.020	0.039	0	0.405	0.016	0.033	0	0.329
Home county controls												
% men 0-14	0.436	0.066	0.009	0.553	0.410	0.077	0	0.667	0.398	0.082	0	0.573
% men 15-29	0.282	0.0402	0.187	0.673	0.289	0.049	0	0.741	0.284	0.056	0	0.796
% men 30-44	0.167	0.037	0.067	0.500	0.180	0.054	0	0.750	0.176	0.064	0	0.667
% men 45-64	0.167	0.037	0.067	0.500	0.180	0.054	0	0.750	0.176	0.064	0	0.667
% men 65+	0.0205	0.010	0	0.063	0.020	0.012	0	0.090	0.025	0.014	0	0.143
% women 0-14	0.453	0.052	0.185	0.581	0.442	0.053	0	0.667	0.419	0.054	0	0.750
% women 15-29	0.290	0.025	0.211	0.581	0.292	0.036	0	1	0.292	0.039	0	1
% women 30-44	0.151	0.021	0.067	0.297	0.157	0.028	0	0.500	0.167	0.026	0	0.533
% women 45-64	0.151	0.021	0.067	0.297	0.157	0.028	0	0.500	0.167	0.026	0	0.533
% women 65+	0.020	0.012	0	0.077	0.019	0.013	0	0.104	0.023	0.014	0	0.144
Age	21.221	3.812	11.500	63	21.514	2.110	16.769	32.769	22.381	2.313	14.428	36.615
US born	0.938	0.123	0	1	0.902	0.128	0.119	1	0.892	0.143	0.053	1
Labor force participation	0.895	0.128	0	1	0.462	0.128	0.018	1	0.517	0.104	0	1
Literacy	0.826	0.188	0	1	0.869	0.136	0.136	1	0.697	0.247	0	1
Occupational score	18.337	4.517	10.250	80	18.174	3.051	9.393	40.325	15.731	3.137	8.683	26.090
Urban	0.037	0.128	0	1	0.048	0.145	0	1	0.075	0.339	0	13.564
Unimproved land	0.617	0.194	0	1	0.617	0.213	0	0.997	0.584	0.227	0	0.992
Farm value	29.868	76.640	0	2033.361	43.908	172.135	0	7499.098	45.993	178.795	1.500	7958.638
Manufacturing per pop.	0.018	0.035	0	0.763	0.022	0.042	0	0.647	0.024	0.035	0	0.291
Churches per pop.	0.002	0.001	0	0.017	0.002	0.001	0	0.034	0.002	0.003	0	0.118
Farms per pop.	0.073	0.044	0	1.310	0.074	0.032	0.000	0.263	0.091	0.056	0	1
Migrant controls												
Farms	0.710	0.187	0	1	0.616	0.194	0	1	0.621	0.207	0	1
Number of children	2.382	0.390	0.030	3.467	2.206	0.420	0	4	1.936	0.404	0	3.667
Number of children less than 5 yo	0.739	0.156	0.005	1.250	0.690	0.167	0	1	0.601	0.142	0	1.278
Women	0.451	0.047	0.005	0.545	0.452	0.064	0	1	0.452	0.066	0	0.778
Age	31.062	1.293	24.636	36.259	31.439	1.659	18	56	31.455	1.753	21.190	52
Literacy	0.855	0.163	0.136	2.462	0.896	0.127	0.178	1.300	0.867	0.185	0	1
Labor force participation	0.906	0.090	0.079	1	0.468	0.132	0	1	0.497	0.087	0	1
Urban	0.969	0.117	0	1	0.957	0.136	0	1	0.941	0.149	0	1
Observations	1541				2001				2266			

B. Descriptive Statistics

C. Baseline OLS Estimation

Table C.1: OLS Estimates of the Effects of Migration on CWR

Dependent Variable:	***Children 0 to 9 / Women 15 to 44***					***Children 5 to 9 / Women 15 to 44***				
CWR	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Migrants (β)	-0.097**					-0.031*				
	(0.032)					(0.016)				
County migrants (β_1)		0.006					0.002			
		(0.04)					(0.02)			
State migrants (β_2)		-0.367***					-0.118***			
		(0.06)					(0.03)			
State migrants (β)			-0.368***					-0.118***		
			(0.06)					(0.03)		
County migrants (β_0)				0.011					0.000	
				(0.04)					(0.00)	
Other than E-W migrants (β_1)				-0.338***					-0.127***	
				(0.06)					(0.03)	
East-West migrants (β_2)				-0.568***					-0.056	
				(0.12)					(0.06)	
East-West migrants (β)					-0.465***					-0.019
					(0.12)					(0.05)
Home county controls										
% men 0-14	0.295	0.387	0.382	0.362	0.319	0.238	0.267	0.266	0.275	0.262
	(0.34)	(0.33)	(0.33)	(0.33)	(0.34)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
% men 15-29	0.198	0.342	0.337	0.310	0.196	-0.018	0.0283	0.0270	0.0382	-0.00146
	(0.33)	(0.32)	(0.32)	(0.32)	(0.32)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
% men 30-44	-0.366	-0.232	-0.236	-0.252	-0.358	0.049	0.092	0.091	0.099	0.062
	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
% men 65+	-0.588	-0.519	-0.525	-0.682	-0.830	-0.681*	-0.658*	-0.660*	-0.609	-0.661*
	(0.66)	(0.65)	(0.65)	(0.66)	(0.66)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)
% women 0-14	0.331	0.299	0.304	0.266	0.196	-0.0325	-0.0426	-0.0414	-0.0324	-0.0619
	(0.38)	(0.39)	(0.39)	(0.39)	(0.38)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
% women 15-29	2.100***	2.004***	2.011***	1.981***	1.951***	0.730***	0.699***	0.701***	0.707***	0.691***
	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
% women 30-44	1.553***	1.472***	1.480***	1.449***	1.398***	0.461*	0.435*	0.437*	0.442*	0.418*
	(0.36)	(0.36)	(0.36)	(0.36)	(0.36)	(0.19)	(0.20)	(0.20)	(0.20)	(0.20)
% women 65+	-2.069**	-2.304**	-2.301**	-2.337**	-2.172**	-0.956*	-1.032**	-1.031**	-1.022**	-0.963*
	(0.74)	(0.75)	(0.75)	(0.75)	(0.75)	(0.01)	(0.38)	(0.38)	(0.38)	(0.38)
Age	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
US born	-0.059	-0.075	-0.074	-0.073	-0.059	-0.026	-0.031	-0.031	-0.031	-0.026
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Labor force participation	-0.032	-0.032	-0.032	-0.032	-0.031	-0.006	-0.006	-0.006	-0.006	-0.006
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Literacy	-0.159***	-0.153***	-0.153***	-0.152***	-0.154***	-0.064***	-0.062***	-0.062***	-0.062***	-0.063***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Occupational score	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Urban	0.009*	0.007	0.007	0.007	0.012**	0.009***	0.008***	0.008***	0.008***	0.010***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Unimproved land	0.099***	0.101***	0.101***	0.097***	0.094***	-0.013	-0.012	-0.012	-0.011	-0.012
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Farm value	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Manufacturing per pop.	-0.438**	-0.416**	-0.415**	-0.421**	-0.463**	-0.187*	-0.180*	-0.180*	-0.179*	-0.195*
	(0.16)	(0.16)	(0.16)	(0.16)	(0.17)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Churches per pop.	-6.549**	-5.812*	-5.839*	-5.727*	-6.009*	-1.587	-1.350	-1.357	-1.376	-1.463
	(2.51)	(2.35)	(2.35)	(2.36)	(2.46)	(1.26)	(1.20)	(1.20)	(1.20)	(1.20)
Farms per pop.	0.460***	0.460***	0.459***	0.464***	0.472***	0.265***	0.264***	0.264***	0.263***	0.266***
	(0.11)	(0.12)	(0.12)	(0.12)	(0.12)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Migrant controls										
Farm	0.116***	0.106***	0.106***	0.108***	0.121***	0.062***	0.059***	0.059***	0.058***	0.064***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of children	-0.249***	-0.244***	-0.244***	-0.240***	-0.242***	-0.161***	-0.159***	-0.159***	-0.161***	-0.162***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of children less than 5 yo	0.625***	0.615***	0.616***	0.611***	0.613***	0.437***	0.434***	0.434***	0.436***	0.436***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Women	-0.453*	-0.605***	-0.607***	-0.610***	-0.424*	-0.246*	-0.295**	-0.295**	-0.293**	-0.222*
	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
Age	0.008	0.007	0.007	0.006	0.007	0.002	0.002	0.002	0.003	0.003
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Literacy	0.015	0.016	0.016	0.016	0.017	0.007	0.007	0.007	0.007	0.007
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Labor force participation	-0.105*	-0.095*	-0.095*	-0.097*	-0.110**	-0.077***	-0.074**	-0.074**	-0.073**	-0.078***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Urban	0.090**	0.090**	0.090**	0.092**	0.094**	0.006	0.006	0.006	0.005	0.006
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
N	4787	4787	4787	4787	4787	4787	4787	4787	4787	4787

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

D. Instrumental Variable Analysis

Table D.1: First-Stage and IV-2SLS Estimates of the Effects of Migration on CWR

	First-stage estimates		IV-2SLS estimates				Reduced form	
Dependent Variable:	Migrants	East-West migrants	*CWR* Children 0 to 9		*CWR* Children 5 to 9		*CWR* Children 0 to 9	*CWR* Children 5 to 9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Granted acres	0.139**	0.149***					-0.334***	-0.161***
	(0.04)	(0.01)					(0.06)	(0.03)
Distance	0.543***	0.029***					-0.165***	-0.072***
	(0.02)	(0.01)					(0.03)	(0.02)
Migrants			-0.336***		-0.149***			
			(0.06)		(0.03)			
East-West migrants				-2.558***		-1.210***		
				(0.43)		(0.22)		
Home county controls								
% men 0-14	-1.314***	-0.136***	0.136	0.090	0.163	0.133	0.522**	0.332**
	(0.18)	(0.04)	(0.27)	(0.28)	(0.14)	(0.151)	(0.26)	(0.14)
% men 15-29	-1.319	-0.163***	0.093	-0.051	-0.072	-0.147	0.488**	0.100
	(0.17)	(0.04)	(0.25)	(0.26)	(0.13)	(0.14)	(0.24)	(0.13)
% men 30-44	-1.021***	-0.07**	-0.455*	-0.516*	0.007	-0.025	-0.182	0.124
	(0.18)	(0.04)	(0.25)	(0.27)	(0.13)	(0.14)	(0.25)	(0.13)
% men 65+	-1.910***	-0.736***	-0.890	-2.451***	-0.822**	-1.572***	-0.404	-0.615**
	(0.41)	(0.10)	(0.59)	(0.69)	(0.31)	(0.37)	(0.58)	(0.31)
% women 0-14	0.722**	-0.090*	0.511	-0.049	0.040	-0.216	0.212	-0.095
	(0.22)	(0.05)	(0.32)	(0.33)	(0.17)	(0.18)	(0.31)	(0.16)
% women 15-29	1.055***	-0.049	2.328***	1.788***	0.836***	0.592**	1.938***	0.662***
	(0.22)	(0.05)	(0.33)	(0.34)	(0.18)	(0.18)	(0.32)	(0.17)
% women 30-44	1.026***	-0.105*	1.876***	1.297***	0.608**	0.347*	1.593***	0.485**
	(0.23)	(0.06)	(0.34)	(0.34)	(0.18)	(0.18)	(0.32)	(0.17)
% women 65+	0.182	-0.160	-2.124**	-2.601	-1.021**	-1.246**	-2.213***	-1.061**
	(0.45)	(0.11)	(0.64)	(0.68)	(0.34)	(0.36)	(0.63)	(0.33)
Age	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.000)	(0.00)	(0.00)
US born	-0.013	-0.000	-0.053	-0.051	-0.022	-0.021	-0.048	-0.020
	(0.03)	(0.00)	(0.04)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)
Labor force participation	-0.005	0.003	-0.034	-0.032	-0.009	-0.009	-0.041	-0.013
	(0.02)	(0.00)	(0.03)	(0.03)	(0.01)	(0.01)	(0.03)	(0.01)
Literacy	-0.014	0.004	-0.160***	-0.140***	-0.064***	-0.055***	-0.152***	-0.060***
	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Occupational score	0.000	-0.000	-0.004***	-0.004***	-0.002***	-0.002***	-0.004***	-0.002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Urban	-0.033***	-0.001	0.001	0.010	0.005	0.009*	0.012	0.010**
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)
Unimproved land	-0.044***	-0.017***	0.088***	0.049**	-0.019*	-0.037***	0.096***	-0.015*
	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Farm value	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Manufacturing per pop.	0.0221**	0.009	-0.406***	-0.496***	-0.170**	-0.210**	-0.507***	-0.216***
	(0.08)	(0.02)	(0.11)	(0.12)	(0.06)	(0.06)	(0.11)	(0.06)
Churches per pop.	-4.299***	0.268	-7.306***	-5.049**	-2.011**	-0.983	-5.693**	-1.291
	(1.18)	(0.29)	(1.71)	(1.79)	(0.91)	(0.96)	(1.66)	(0.88)
Farms per pop.	-0.048	0.001	0.458***	0.514***	0.257***	0.284***	0.507***	0.280***
	(0.06)	(0.00)	(0.09)	(1.79)	(0.01)	(0.05)	(0.09)	(0.05)
Migrant controls								
Farm	-0.002	0.004	0.110***	0.127***	0.059***	0.067***	0.111***	0.060***
	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Number of children	0.063***	0.023***	-0.245***	-0.201***	-0.160***	-0.138***	-0.264***	-0.168***
	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Number of children less than 5 yo	0.054*	-0.021**	0.628***	0.561***	0.439***	0.408***	0.610***	0.431***
	(0.03)	(0.01)	(0.04)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)
Women	-0.179*	-0.08***	-0.637***	-0.645***	-0.335***	-0.347***	-0.553***	-0.297***
	(0.09)	(0.02)	(0.13)	(0.13)	(0.07)	(0.07)	(0.12)	(0.06)
Age	-0.016***	-0.003***	0.005	-0.000	0.001	-0.001	0.009**	0.003
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Literacy	-0.012	0.002	0.012	0.021	0.004	0.009	0.016	0.006
	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Labor force participation	0.017	-0.007	-0.102**	-0.120**	-0.074***	-0.082***	-0.098**	-0.072***
	(0.02)	(0.00)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)
Urban	0.006	0.008	0.086**	0.106**	0.004	0.013	0.084**	0.003
	(0.02)	(0.00)	(0.03)	(0.03)	(0.01)	(0.02)	(0.03)	(0.01)
Home county FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test of excluded instruments	244.82	109.36						
Observations	4,753	4,753	4,753	4,753	4,753	4,753	4,753	4,753

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