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FRONTIER HISTORY AND GENDER NORMS IN THE UNITED STATES

Samuel Bazzi  
Abel Brodeur  
Martin Fiszbein  
Joanne Haddad

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Frontier History and Gender Norms in the United States  
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### **ABSTRACT**

This paper explores how historical gender roles become entrenched as norms over the long run. In the historical United States, gender roles on the frontier looked starkly different from those in settled areas. Male-biased sex ratios led to higher marriage rates for women and lower for men. Land abundance favored higher fertility. The demands of childcare, compounded with isolation from extended family as well as a lack of social and market infrastructure, constrained female opportunities outside the home. Frontier women were less likely to report “gainful employment,” but among those who did, relatively more had high-status occupations. Together, these findings integrate contrasting narratives about frontier women—some emphasizing their entrepreneurial independence, others their prevailing domesticity. The distinctive frontier gender roles, in turn, shaped norms over the long run. Counties with greater historical frontier exposure exhibit lower female labor force participation through the 21st century. Time use data suggests this does not come with additional leisure but rather with more household work. These gender inequalities are accompanied by weaker political participation among women. While the historical frontier may have been empowering for some women, its predominant domesticity reinforced inegalitarian gender norms over the long run.

Samuel Bazzi  
University of California, San Diego  
School of Global Policy and Strategy  
9500 Gilman Drive, 0519  
La Jolla, CA 92093  
and CEPR  
and also NBER  
sbazzi@ucsd.edu

Abel Brodeur  
University of Ottawa  
120 University,  
Social Sciences Building (9037)  
Ottawa, ON, Canada K1N 6N5  
Canada  
abrodeur@uottawa.ca

Martin Fiszbein  
Department of Economics  
Boston University  
270 Bay State Road  
Boston, MA 02215  
and NBER  
fiszbein@bu.edu

Joanne Haddad  
ECARES (European Center for  
Advanced Research in Economics and  
Statistics)  
Université Libre de Bruxelles  
50 Av. Roosevelt CP 114/04,  
office R42.5.202  
1050 Bruxelles  
Belgique  
haddad@nber.org

# 1 Introduction

Gender inequality varies widely between and within countries, even at similar levels of development and despite widespread technological and institutional changes favoring female empowerment. Such persistent differences have prompted a growing number of cultural explanations (see [Giuliano, 2017, 2020](#), for reviews). Some emphasize deep-rooted historical origins of norms around female work, marriage, familial structures, and women in politics, offering novel insights on the modern landscape of gender inequality. This paper shows how America’s frontier history shaped a distinct geography of conservative gender norms across the country. We trace out a process of cultural evolution that enshrined the stark “separate spheres” for men and women observed in classic historical accounts of gender roles in the United States (e.g., [de Tocqueville, 1835](#); [Welter, 1966](#)).

Distinctive demographics and extreme levels of isolation characterized life on the sparsely populated American frontier. Far away from the conveniences of more settled localities, the frontier presented many challenges but also new opportunities, especially for those attracted by land abundance and able to thrive in a harsh environment. Such opportunity amidst isolation fostered unique demographic structures, including male-biased sex ratios, not observed elsewhere. These distinctive settings could affect culture in many domains, including gender roles. We explore this cultural formation using a wealth of data spanning more than 150 years to identify the origins and long-run evolution of the frontier legacy for gender norms.

In the late 19th century, the U.S. Census Bureau introduced the concept of the frontier: the line demarcating the edge of populated settlement. [Turner \(1893\)](#) later references this concept in a classic essay on the America’s frontier character. [Bazzi et al. \(2020\)](#) adopt the formal definition from these studies—the line dividing population densities above and below two people per square mile—and systematically track the frontier’s movement from 1790 onward. The frontier line continually moved westward with successive waves of pioneering settlers. We follow this settlement process using complete-count Census data to document the distinctive features of frontier society that are important for understanding the foundations of gender norms.

Our findings reconcile contrasting historical narratives about frontier women as either empowered and independent or bound by domesticity. Frontier locations had sharply male-biased sex ratios and a disproportionate share of young adults. Frontier women were more likely to be married, at earlier ages, and with older men. Favored by land abundance, fertility was higher. Extended family household structures were less common. The combination of high fertility and isolation amplified domestic duties, leaving limited scope for female “gainful employment” on the frontier. While fewer women reported gainful employment on the frontier, those who did were more likely to be working in high-status occupations. This thick upper tail of entrepreneurial women differed settled areas of the country where men occupied such positions. Together, these patterns, interpreted through the lens of family economics, shed new light on the complex history of women’s life on the frontier. Moreover, we find suggestive evidence that that these differential gender roles on the frontier arose through both selective migration as well as exposure effects.

Examining the association between fertility and female employment across the U.S., we find

magnitudes suggesting that differential fertility on the frontier can explain a modest part of the differential employment. Isolation further contributed: limited access to markets meant that home production was required for most basic needs. Moreover, we show that frontier women had limited recourse to extended family with whom to share the homemaking and childcare burden. It is also possible that lower employment merely implied greater leisure, as women's scarcity increased their bargaining power (as Grosjean and Khattar, 2019, suggest for Australia). We discuss this mechanism, as well as countervailing ones that may have weakened women's bargaining power on the American frontier,<sup>1</sup> and provide suggestive evidence by leveraging variation across states in the rollout of women's legal economic rights.

We then explore whether and how the frontier shaped cultural norms over the long run. We identify the frontier legacy using localized variation in the duration of exposure to frontier conditions. As the frontier moved west, it did so at different speeds in different locations.<sup>2</sup> The longer that frontier settlers had to shape local norms and institutions, the greater the scope for enduring influence. Our core analysis compares modern outcomes across counties with varying total frontier experience (TFE), time on the frontier during the main era of westward expansion from 1790–1890.

Long after frontier conditions had abated, counties with greater TFE exhibit persistently higher fertility and lower female labor force participation (FLFP). Each additional decade of TFE (mean 1.8, standard deviation 1.1) is associated with 0.15–0.2 standard deviations lower FLFP. These sizable differences persist through the 2000s, withstand a battery of place-based confounds of gender norms and TFE, hold across different regions of the country, and are driven by historical exposure to frontier conditions rather than a mere history of low density. At the same time, the fertility differential across high- and low-TFE counties, although still large in the early 1900s, had slightly weakened by the late 20th century, implying that the cultural norms around female work evolved differently than those around childbearing.

Together, these results suggest that historical female domesticity became entrenched as a norm, which was then transmitted across generations. While the liberating aspects of the frontier could have taken over in the long run as isolation dissipated, we find little evidence of such a reversal. Rather, the average woman in high-TFE areas remains more disempowered economically than her counterpart in low-TFE areas.

Twenty-first century data from the American Time Use Survey corroborates our interpretation of persistent female disadvantage. First, women in counties with greater TFE spend significantly more time on housework, which comes at the expense of leisure. These women work less outside the home, but that is more than offset by additional domestic work. While we could not demonstrate as much in the historical era for lack of time use data, these findings go against the notion that lower female employment outside the home on the frontier was a result of stronger bargaining power.

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<sup>1</sup>Male-biased sex ratios were a country-wide characteristic in Australia, while in the U.S. they were specific to the frontier, which, in combination with high mobility, may have prevented the scarcity of women in the local marriage market from translating into greater intrahousehold bargaining power.

<sup>2</sup>Among the factors driving such variation, Bazzi et al. (2020) highlight one that is external to any given county: the flow of immigrants into the U.S., which would hasten westward expansion in subsequent years. Like that study, we leverage the ebb and flows in immigration to construct an instrumental variable for TFE.

Political representation and mobilization may have contributed to the persistent legacy of the frontier for gender norms. Female suffrage originated in the western United States, and we find suggestive evidence that it was more strongly supported by male legislators in high-TFE areas. However, this may have been confined to elite segments of society, and motivated by reasons unrelated to female empowerment.<sup>3</sup> These same high-TFE areas exhibit less grassroots mobilization for female suffrage in the early 1900s, relatively smaller increases in turnout after suffrage is introduced in 1920, and greater opposition to the women's rights movement later in the century. Female political representation is also persistently lower in high-TFE areas. Overall, the lack of female leaders in public life may have limited role-model-based mechanisms for gender empowerment and, more generally, restricted the scope for prestige-biased cultural change favoring egalitarian gender norms (see [Henrich and Gil-White, 2001](#), on the role of leaders in cultural evolution).

Survey-based measures of conservative gender attitudes provide further insights on the enduring constraints to women's opportunities. In high-TFE areas, respondents are more likely to believe a woman's place is in the home and that men make better leaders. We find similar patterns across both genders, suggesting that women internalized these conservative frontier norms across successive generations. These norms plausibly emerged in response to frontier conditions historically, and, over time, may have reinforced gender inequality despite secular trends in the other direction.

Our study offers a unifying gender-based perspective in the large literature on the history and legacy of the American frontier. While some of the early influential scholarship on the frontier neglected women entirely (e.g., [Turner, 1893](#)), later work provided rich insights into the varied lives of women in these settings ([Faragher, 2008](#); [Jeffrey, 1998](#); [Jensen, 1981](#); [Myres, 1982](#)). We provide the first extensive quantitative analysis of how the American frontier shaped gender roles historically and its long run legacy for gender norms. Our findings suggest that while the frontier may have provided a setting favorable to some strong and independent women, the more typical female experience was isolating and confined to the domestic sphere where reproduction, child-rearing, and home production of basic necessities left little time for engagement in social or public life. The longer communities spent on the frontier, the greater the potential for such gender norms to become entrenched in local culture and institutions.

We bring fresh insights to a large literature on gender inequality (e.g., [Blau and Kahn, 2000](#); [Goldin, 1990, 2006](#)). We build on previous contributions that highlight cultural determinants ([Fernández et al., 2004](#); [Fernández and Fogli, 2009](#); [Fogli and Veldkamp, 2011](#)) and their historical origins (e.g., [Alesina et al., 2013](#); [Grosjean and Khattar, 2019](#)). Our focus on the American frontier centers a distinctive historical feature of a country where the ideology of "separate spheres" took an acute form in the "cult of true womanhood" ([Welter, 1966](#)), and where present-day gender norms vary widely despite nationwide technological and institutional changes favoring women's empowerment. Our findings may be relevant beyond the United States: the implications of geographic and social isolation in an extreme historical context may shed light on how it operates in other contexts

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<sup>3</sup>Scholarship on suffrage raises several explanations for the early suffrage movement in Western states, including, among others, an effort to increase the voting population and hence states' representation in national politics (see [Braun and Kvasnicka, 2013](#); [Mead, 2006a](#); [Teele, 2018](#)).

where it is less stark but still relevant.<sup>4</sup>

While focusing on gender norms, our paper contributes to a larger literature on the historical roots and persistence of cultural traits. We trace out the process by which gender roles during early stages of development lead to long-run gender inequalities in economic and political life by shaping conservative norms. This enduring imprint of gender roles among early settlers resonates with Zelinsky's (1973) "doctrine of effective settlement," which argues that the earliest settlers can have disproportionate influence on the long-run culture of a place. Our findings complement those of Haddad (2021), who shows that the gender norms among the earliest foreign immigrants to a given county have outsized influence on the long-run prevalence of those norms, and Bazzi et al. (2020), who uncover the persistent legacy of individualistic culture originated in frontier settlements. The entrenchment of early societal structures is a key mechanism for persistence underlying the frontier legacy, and it resonates with work showing that early settlers' culture has larger long run effects in places with underdeveloped institutions (see, e.g., Grosjean, 2014; Couttenier et al., 2017; Brodeur and Haddad, 2021, for other instances in American history).

The rest of this paper is organized as follows. Section 2 offers a brief historical background on the American frontier and a conceptual discussion of how the frontier may have shaped gender norms. Section 3 documents gender disparities on the historical frontier and examines the underlying roots. Section 4 characterizes the long run legacy of frontier history for gender inequality and the conservative norms that support such social structures. Section 5 concludes.

## 2 Historical and Conceptual Background

This section begins with a brief overview of the history of frontier settlement and the distinctive characteristics of frontier societies. We then offer a framework for understanding how frontier conditions might affect gender norms during the settlement era and in the long run.

### 2.1 American Frontier History

From colonial times until the late 19th century, the United States underwent a process of rapid population growth and territorial expansion. Throughout this period, waves and waves of settlers continually pushed out the westward-moving frontier as the country dispossessed indigenous groups of their native lands. A report by the U.S. Census titled "*Progress of the Nation*" (Porter et al., 1890) and an influential contemporaneous essay by Turner (1893) defined the frontier as the line dividing settlements with population density of two or more per square mile from those with less. Bazzi et al. (2020) operationalize this definition using GIS methods and Census data to track the frontier throughout the 1790–1890 period.

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<sup>4</sup>See Anderson (2022) and Jayachandran (2021) for rich and extensive surveys of the large and growing literature in development economics on the causes and consequences of gender norms in the modern economy. In one example of the sort of mechanisms we highlight on the historical frontier, Marcos (2023) shows how the absence of grandmothers reduces FLFP in modern Mexico.

Frontier counties are those (i) in close proximity to the frontier line (100 kilometers in the baseline analysis) and (ii) with population density below six people per square mile (a cutoff stipulated by Porter et al. as the onset of post-frontier settlement). Non-frontier counties are those more than 100 kilometers inside the frontier line and/or with more than six people per square mile.<sup>5</sup> We also build a measure of each county’s total frontier experience (TFE) reflecting the number of years that county met criteria (i) and (ii) during the period 1790–1890. Maps showing the history of the frontier during this period can be found in Figures 1 while TFE is displayed in Figure 2.

Two forms of isolation characterized frontier counties historically: low population density and remoteness. Low density implied isolation from other people within a given location. Proximity to the frontier line meant isolation from population hubs and markets to the east, and in most cases limited interaction with the federal government. With such isolation came a lack of social infrastructure, making frontier life “rough, crude, hard, and dangerous,” as Overmeyer (1944) put it. On the other hand, land was abundant on the frontier, offering economic opportunities for those leaving more densely settled locations, agricultural and otherwise, to the east.

Frontier populations were distinctive along several dimensions. Historians, demographers, and economists have documented higher male-to-female ratios and higher shares of prime-age adults in frontier locations (e.g., Eblen, 1965). Bazzi et al. (2020) confirm these patterns using all available Census data; they also find greater individualism, as proxied by the share of infrequent names among children. We briefly revisit and expand their analysis here with a specific focus on the distinctive demographic structure found on the frontier.

Figure 3 displays the distribution of historical population by age, sex, and frontier status from 1850 to 1890.<sup>6</sup> This population pyramid highlights some distinctive features of frontier populations. First, sex ratios at the frontier were extremely male-biased: compared to a mean sex ratio of 1.09 in non-frontier counties, the average frontier county had 0.34 additional males for every female. Second, there was a disproportionately large share of prime-age adults on the frontier. These two features are related: an outsized presence of young males explains a large part of the skewness in sex ratios. Finally, the child–women ratio was uniquely high in frontier counties, a result of more young children and fewer women.

## 2.2 Roots of Frontier Gender Norms

The distinctive features of the frontier shaped many aspects of individual and social life, including gender roles. This section draws from historical accounts of women on the frontier, interpreted through the lens of family economics, to understand how frontier conditions shaped gender in-

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<sup>5</sup>For each Census year beginning in 1790, we consider the county-level population density per square mile, and for inter-censal years, we use interpolated density (assuming a constant annual population growth rate that matches the decadal growth rate). In each year, we locate the frontier using contour lines that divide counties with population densities above and below two people per square mile. Full details on the underlying GIS procedure, including discussion of smaller frontiers located off the main contour lines, can be found in Bazzi et al. (2020).

<sup>6</sup>1850 is the first year for which we have complete-count census data that allows for detailed breakdowns of population by gender and age. 1890 is the final year of the frontier era as conceived by Porter et al. (1890) and Turner (1893). While this figure combines all populations for 1850–1890 without any adjustment, the picture is basically unchanged after normalizing by decade-specific populations.



equalities and norms. Some historical narratives portray frontier life as blurring gender roles and empowering women, while others point to structural forces that confined women to motherhood and domesticity. Scarcity of labor and skewed ratios favored women's position in frontier society, while high fertility and isolation constrained their participation in public life. We describe these countervailing forces and explain how the two narrative threads are, in fact, complementary.

Narratives of female economic empowerment on the frontier illustrate how labor scarcity and economic necessity undermined gender roles. The counterpart of low density was land abundance, which implied high returns to labor. Isolation necessitated self-reliance, as it reduced the scope for drawing on markets or social networks. To satisfy basic needs in the absence of physical or social infrastructure, frontier women often performed tasks elsewhere reserved for men (Myres, 1982).<sup>7</sup> This in turn would often lead to an improved position for women. Flexner and Fitzpatrick (1996, pp. 8-9) argue along the same lines: "...by the demands it made on human beings for survival, frontier economy established a certain rough egalitarianism which challenged other, long-established concepts of propriety. Women were just as indispensable as men, since a household which lacked their homemaking skills, as well as nursing, sharpshooting and hunting when needed, was not to be envied."<sup>8</sup> Harris (1984, p. 47) argues that women had "considerable status within the family" and that "[m]en and women generally had different roles to play, but the mutuality between the sexes enforced by the needs of homesteading expanded women's power to negotiate and win."

Besides the overall sparsity of people on the frontier, there was a stark relative scarcity of women. Male-biased sex ratios increased women's power in the frontier marriage market, where "young women did not have to accept the first available suitor" (Jeffrey, 1979, p. 66). The impact of skewed sex ratios on the relative power of women is a factor emphasized in other contexts by, for example, Angrist (2002) and Grosjean and Khattar (2019). Women's bargaining power on the marriage market due to their scarcity may have dissipated *after* marriage, as the isolating conditions on the frontier implied a virtual absence of outside options.<sup>9</sup> Yet, the threat of leaving or of entering a non-cooperative arrangement remained, as married women may have retained some bargaining power based on their economic importance in the context of labor scarcity.

A contrasting narrative emphasizes that while frontier women took on work traditionally associated with men, they were still burdened with most childcare and domestic work. Gender roles were blurred for kids on the frontier, but such roles abruptly emerged in the transition to adulthood and in marital life.<sup>10</sup> Jeffrey (1979) argues that because there was little to no reallocation of

<sup>7</sup>"The frontier, like the trail, tended to blur sex roles" as "[e]veryone was expected to 'lend a hand,' leading "women to perform tasks ordinarily considered outside their sphere," like building houses, clearing land, digging wells, planting, and harvesting (Myres, 1982, p. 160).

<sup>8</sup>Such skills would have naturally been valued in the marriage market: Riley (1981, p. 57) notes "the choosing of a mate on the frontier was a matter of economic necessity ... Good health and perseverance were premium assets while the charm and ability to entertain that one values so highly in a society of mechanization and leisure time was only of tangential significance ... the women who could not sew nor cook had no place on the frontier" (see also Martin, 1975).

<sup>9</sup>Male-biased sex ratios on the American frontier may have had weaker effects on women's bargaining power *before* marriage than in the Australian context studied by Grosjean and Khattar (2019) or among the immigrant groups in the U.S. studied by Angrist (2002). Female scarcity was a country-wide or group-wide characteristic in these cases, while frontier areas were outliers compared to other places in the U.S., where high internal mobility could have dampened the marriage-market impact of local female scarcity.

<sup>10</sup>On the frontier, there was much less gender differentiation in common children's games, and girls would help their



power towards women within the household, the erosion of gendered work was asymmetric: while women took on men's responsibilities, this was not met by a commensurate increase in men taking on women's roles.<sup>11</sup> Frontier women performed many of the tasks that men performed. Moreover, women were almost exclusively in charge of child-rearing and domestic work, often in the absence of extended family support, especially from elder women like grandmothers.

High fertility rates enlarged the burden of women's tasks on the frontier. This distinctive demographic feature was likely related to the land abundance and high returns to labor. Malthusian mechanisms imply that decreasing returns to labor in the presence of a fixed factor (e.g., land) entail a negative association between population density and fertility (see [Ashraf and Galor, 2011](#); [De la Croix and Gobbi, 2017](#)). Pointing in the same direction, economic historians of the United States argue that land availability, one of the defining features of the frontier, was conducive to high fertility ([Easterlin, 1976](#); [Forster et al., 1972](#); [Schapiro, 1982](#); [Yasuba, 1961](#)). Abundant, inexpensive land encouraged the formation of new households, as it was easier for newly married couples to acquire land, and it reduced incentives to restrict family size. Labor scarcity would also increase the demand for children, especially as children started to work at a young age on family farms. High fertility meant that a large fraction of women's prime-age working hours were spent either pregnant or nursing (see [Albanesi and Olivetti, 2016](#)). Together with disproportionate childcare duties, high fertility thus compounded women's domestic burden.

Isolation further exacerbated women's domestic burden on the frontier. Limited access to markets meant that home production was required for most basic needs. In settled areas with denser markets, households could outsource the provision of goods and services that were too costly or simply unavailable on the frontier. The domestic tasks of frontier women included: cooking, food production, and processing, including butter, cheese, preserved foodstuffs, home dairy, and chicken; making soap and candles; spinning, weaving, and sewing to manufacture and repair clothes, hosiery, table and bed linen; washing and ironing; housecleaning; and all healthcare activities.<sup>12</sup> This entailed a strong tie to the domestic sphere.<sup>13</sup> In the economics literature, [Greenwood et al. \(2005\)](#), [Cavalcanti and Tavares \(2008\)](#), and others argue that modern appliances—refrigerators, vacuum cleaners, washing machines, dryers, dishwashers, and microwaves—were “engines of liberation,” freeing up women's time from household tasks. This has implications for our analysis.

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fathers with work just as much as boys, with domestic work usually left to adult females. But according to [West \(1989, pp. 142-143\)](#), “[t]he fact that Victorian values still held a lot of sway on the frontier meant that as girls hit mid-teens, their parents increasingly tried to reorient them away from outdoor tasks and make them more ‘lady-like’. This caused a fair amount of cognitive stress and frustration on the part of young women that had spent most of their time in the prior decade from five to fifteen learning to ride and break horses, plow a field, plant, and harvest, and fire a gun.”

<sup>11</sup>In her words, “Even though frontier conditions forced them into manly pursuits and led them to modify some of their standards, they hardly pressed for a liberation from female norms and culture. Much of the ‘freedom’ which women experienced was the freedom to work even harder than they had before, with dramatic results” ([Jeffrey, 1979, p. 72](#)). [Myres \(1982\)](#) also notes that “frontier women were essentially conservative, and few of them abandoned their conception of women's nature or ceased to value ‘female culture’.”

<sup>12</sup>See [Riley \(1981, p. 87\)](#) and [Myres \(1982, p. 240\)](#): “Although by the nineteenth century, factories were beginning to produce foodstuffs, clothing, and others goods previously provided by home production, frontier women continued to manufacture such items themselves because neither the goods, nor the cash to obtain them were readily available.”

<sup>13</sup>[Sochen \(1976, p. 43\)](#) notes: “All of woman's work in frontier and rural America centered around the home. The chores could be unending, difficult, and challenging, but they did not remove her from her home. They could be physically and emotionally trying, but they remained womanly because they focused upon the wife-mother role of woman.”

Modern appliances were absent in the 19th century, but at least some households had the opportunity to buy goods and services instead of producing them at home. These market opportunities were more scarce on the frontier, imposing greater constraints to female liberation from domesticity.

Besides increasing home production needs, the isolation of the frontier may have reduced women's bargaining power once married, despite their scarcity in the marriage market. Isolation entailed a lack of social protection and opportunities outside the home. The lack of a dense network of close relationships in the community meant that married women had little recourse to help start over or find safety during episodes of domestic violence. The frontier's high mobility and lack of social infrastructure likely limited the sort of norms that would protect victims.<sup>14</sup> While kin networks can be protective against spousal abuse (see, e.g., [Figueredo et al., 2001](#)), resorting to relatives was often not an option in isolated frontier locations. Moreover, male-biased sex ratios may have fostered masculinity norms (as shown by [Baranov et al., 2020](#), for Australia), which could have increased the prevalence of violence generally with potential spillovers on women. The vulnerability of women on the frontier may help explain why, in the face of labor scarcity, there was an asymmetric erosion of gendered work that disproportionately burdened women.<sup>15</sup>

### 2.3 Persistence of Frontier Gender Norms

The frontier's distinctive gender roles, featuring high fertility and low employment, may have fostered gender norms that prescribed domesticity. The presence of empowered women on the frontier could have pushed in the opposite direction. Insofar as frontier life shaped gender norms, this cultural imprint might have persisted, through intergenerational transmission, well beyond the frontier era in a given place. This hypothesis echoes [Zelinsky's \(1973\)](#) "doctrine of first effective settlement," in which early settlers determine the long-run evolution of culture.<sup>16</sup> It also resonates with economic theories of intergenerational transmission in which initial conditions affect long-run cultural equilibria (see, e.g., [Bisin and Verdier, 2010](#)). Early frontier settlers had outsized influence on initial institutions and social norms, making the frontier era in any given county a likely critical juncture in its cultural trajectory.

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<sup>14</sup>The weakening of social pressure against within-household violence is described by [West \(1989, p. 152\)](#) in reference to child abuse: "In these mixed and transient societies, the power of public opinion naturally was diluted. Adults who might have been restrained under the watchful eyes of neighbors and relatives felt freer to act on their impulses." [Handy-Marchello \(2007\)](#) argues that "violence frequently shattered the peace of pioneer households" and describes cases in which "neighbors did not attempt to intervene."

<sup>15</sup>The gender division of labor may have reinforced female isolation. According to [Stansell \(1976, p. 92\)](#), "[w]omen were also unable to reconstitute the network of female friendships which had been an accustomed and sustaining part of daily life 'back home.' ... During summers and warmer weather ... men traveled down to buy supplies and negotiate loans, and rode to nearby claims to deliver mail, borrow tools, or share news. ... 'As soon as the storms let up, the men could get away from the isolation,' wrote Mari Sandoz, Nebraska Writer and daughter of a homesteader, 'But not their women.'" [Sochen \(1976, p. 42\)](#) paints a similar picture: "The man on horseback, moving across the prairie and plains, is a common image; the woman bending over the open fire, sewing, reading, nursing the baby, or tending to the sick is the usual female portrait of frontier women. The striking difference is critical and surely based on reality. The men moved around, ever searching and socializing, while the women remained close to home, hearth, and family."

<sup>16</sup>In his words, when "an empty territory undergoes settlement [...] the specific characteristics of the first group able to effect a viable, self-perpetuating society are of crucial significance for the later social and cultural geography of the area, no matter how tiny the initial band of settlers may have been" ([Zelinsky, 1973, p.p. 13-14](#)).

We examine the long-run legacy of the frontier using localized variation in the duration of exposure to frontier conditions. For places stuck on the frontier for several decades, the scope for entrenchment of frontier cultural norms would have been greater than in places washed over by the frontier within a few years. In Section 4, we identify the frontier legacy over the long run by exploiting this variation, across counties, in historical exposure.

In addition to fostering early norms of high fertility and low participation in labor markets, domesticity and female seclusion may have entrenched those norms over time by limiting access to emerging opportunities for empowerment in the public sphere. Throughout the 20th century, various technological and institutional changes enabled women in the United States to deepen and expand their participation in economic and political life (Goldin, 2006, 2021). While frontier conditions had long abated by the time these transformations took place, the frontier legacy of domesticity and seclusion may have hindered the local embrace of such national trends.

The persistence of conservative gender norms adopted by early settlers may have been supported by cultural and/or religious configurations, such as the “cult of true womanhood” (Welter, 1966). This ideology, America’s rather extreme version of the doctrine of “separate spheres,” specified piety, purity, submissiveness, and domesticity as the four cardinal female virtues. In his observations about 19th century American society, de Tocqueville (1835) reflected on the stark differentiation in gender roles (which he viewed as consistent with the egalitarian values of democracy in America): “In no country has such constant care been taken, as in America, to trace two clearly distinct lines of action for the two sexes, and to make them keep pace one with the other, but in two pathways which are always different.” The bundling of female domesticity with other cultural configurations that were widespread in the U.S., like conservative religion, may have ensured the persistence of the frontier legacy.

### 3 Fertility and Gender Inequality on the American Frontier

Having briefly described some of the distinctive demographics of frontier locations in Section 2.1, we now focus on fertility and gender disparities in employment outcomes. We start by characterizing these differences and then explore candidate explanations.

#### 3.1 Estimating Equations

We describe socioeconomic differences on the frontier with the following equation:

$$x_{ct} = \alpha + \beta \text{frontier}_{ct} + \theta_{d(c)} + \theta_t + \varepsilon_{ct}, \quad (1)$$

where  $x_{ct}$  is some characteristic for county  $c$  at time  $t$ ,  $\text{frontier}_{ct}$  is frontier status, and  $\theta_{d(c)}$  and  $\theta_t$  are Census division and year fixed effects, respectively. In this historical regression, we focus on the frontier era through 1890, measuring outcomes based on complete-count Census data compiled by the Integrated Public Use Microdata Series (Ruggles et al., 2019). The sample is restricted to counties

that lie between the 1790 frontier line in the eastern U.S. and the 1890 frontier line in the heartland.<sup>17</sup> We cluster standard errors within  $60 \times 60$  square-mile grid cells that cover counties in our sample following [Bester et al. \(2011\)](#). Inference is robust to other forms of spatial autocorrelation.

We further characterize the frontier differential by unbundling the two dimensions of isolation: (i) proximity to the frontier line, and (ii) low population density. The following specification disentangles these two components:

$$x_{ct} = \alpha + \beta_1 \text{near frontier line}_{ct} + \beta_2 \text{low population density}_{ct} + \theta_{d(c)} + \theta_t + \varepsilon_{ct}, \quad (2)$$

where *near frontier line*<sub>ct</sub> is an indicator for counties within 100 km of the frontier line at time *t*, and *low population density*<sub>ct</sub> is an indicator for population density below six people per square mile.

We also probe the variation in density and proximity beyond the binary restrictions used to define frontier status. We estimate the following equation to provide a clearer picture of the density gradient and the east–west gradient that underlie the average frontier differentials in [Table 1](#):

$$x_{ct} = \alpha + g(\text{isolation}_{ct}) + \theta_{d(c)} + \theta_t + \varepsilon_{ct}, \quad (3)$$

where  $g(\cdot)$  is a local linear regression function recovered using the [Robinson \(1988\)](#) estimator, and *isolation* is either population density or distance to the frontier line.

### 3.2 Fertility, Marriage, and Family

We begin, in [Table 1](#), by describing the higher fertility rates on the frontier. We use a common historical proxy for fertility, the child–women ratio, measured as the number of children under the age of 5 over the number of women in their childbearing age (15–49) times 1000. Our sample comprises frontier and non-frontier counties from 1850 to 1880.<sup>18</sup> Frontier counties have on average 10% higher child–women ratios than non-frontier counties (column 1, panel A). This is likely an underestimate insofar as infant mortality was higher on the frontier, where health infrastructure was relatively underdeveloped. The differential fertility is associated with both dimensions of frontier isolation: counties within 100 km of the frontier line have 52 more under-5 children per 1,000 women than those east of the 100 km cutoff, and counties under six people per square mile have nearly 42 more under-5 children per 1,000 women (column 1, panel B). In other words, high fertility on the frontier is not merely a product of its low density. These findings resonate with historical work on fertility, which showed substantially higher child–women ratios in rural areas and a steep east–west gradient of increasing fertility ([Haines, 1994](#); [Jones and Tertilt, 2007](#); [Steckel, 1992](#)).

Higher marriage rates accompanied the higher fertility rates for women on the frontier. In the average non-frontier county, 70% of women aged 15 plus had ever been married (i.e., including widows and divorcees), while these rates were 5 percentage points (p.p.) higher in the average

<sup>17</sup>This is the most conservative sample restriction that is used as a baseline in [Bazzi et al. \(2020\)](#). Extending the analysis to include the frontier counties on the West Coast and/or those living in counties more than 100 km beyond the 1890 frontier line leaves the results largely unchanged and, if anything, amplifies some of the effect sizes.

<sup>18</sup>Prior to 1850, we lack gender  $\times$  age breakdowns in county-level tabulations. The 1890 microdata was lost in a fire.

frontier county (column 2, panel A). Meanwhile, the share of men ever married was much lower on the frontier than elsewhere (column 3, panel A). This is consistent with the skewed sex ratios, especially among prime-age adults, described above with reference to Figure 3. On the male-biased frontier, women would have found marriage partners more easily than in non-frontier settings with greater gender parity. Again, for both outcomes, we see in panel B that the frontier differential is shaped not only by low density but also by proximity to the frontier line. Overall, then, although low-density rural areas typically have higher marriage and fertility rates, the frontier differential goes beyond that, perhaps in part because of the forces we describe in Section 2.

Another, related feature of frontier marriage patterns was the prevalence of large age gaps between spouses. Among married couples, men are roughly 0.25 years older than women relative to a mean of 4.4 years outside the frontier (column 4, panel A), though, unlike other outcomes in Table 1, the age gap differential is largely explained by the lower density on the frontier (panel B). Presumably as a result of sharply male-biased sex ratios, marriage rates were higher on the frontier for women of all ages, and particularly so for very young women (see Figure 4). The corresponding age gaps might have compounded the other sources of bargaining power imbalance within marriages on the frontier, to the extent that men could exert greater authority over younger spouses.

The remaining columns of Table 1 bear out two other features of frontier life that likely constrained female opportunities outside the home. First, female divorce rates were one-third lower on the frontier, implying that either divorce was less common or divorced women were more likely to leave the county; the latter explanation is supported by Appendix Table A.1, discussed below. Second, households on the frontier comprised smaller extended family structures and fewer elder females. Households with more than two generations were nearly one quarter less likely on the frontier than the non-frontier (column 6, panel A). Households with grandmothers present were similarly less prevalent (column 7) as were households with extended family members from within the same generation as the household head (column 8). These patterns suggest greater intergenerational isolation for women on the frontier than for those living in settled communities.

**A Semiparametric Look at Frontier Differentials.** Using equation (3), we conduct a semiparametric analysis of how outcomes in Table 1 vary with density and proximity to the frontier. For density, Appendix Figure A.1 reveals sharp structural breaks for some of the  $x$  characteristics, including sex ratios and the prime-age adult share (originally shown in Bazzi et al., 2020) as well as the shares of men ever married, spousal age gaps, and extended family presence. The breaks occur in the range of 2–6 people per square mile, consistent with the frontier density cutoffs stipulated by the Census Bureau in the 1800s. For other outcomes like fertility, the frontier differential is not a result of such a sharp structural break so much as a gradual change as we move towards less dense counties. Appendix Figure A.2 presents analogous estimates of  $g(\cdot)$  for distance to the frontier line. The graphs reveal a similar pattern of distinctiveness close to the frontier cutoff of 100 km to the east, with a few outcomes exhibiting noticeable breaks in that vicinity.

**Marriage Dissolution.** In Appendix Table A.1, we complete our description of marriage patterns with an assessment of dissolution patterns. To do this, we use a linked sample of married men in 1870 and 1880 from the Census Linking Project (Abramitzky et al., 2020).<sup>19</sup> We find higher rates of marriage dissolution on the frontier (column 1), owing to the combination of more absent spouses due to informal separation (column 2), divorce (column 3), and widowing (column 4). The latter is consistent with greater female mortality on the frontier, which could partly result from higher fertility in a context of high maternal mortality risk.

### 3.3 Women’s Work

With higher marriage rates, higher fertility, less divorce, and more limited family structures, frontier society was generally inhospitable to “gainful employment” for women. Here, we provide evidence on these distinctive patterns of female labor, restricting attention to the period from 1860 to 1880 because the 1850 Census only records employment activities for men but not women. While measures of labor force participation are not available until 1940, we consider the share of women aged 16 and above that report a “gainful occupation.”<sup>20</sup>

Table 2 shows that, on average, frontier counties exhibit 2.5 p.p. lower rates of gainful employment by females, compared to a mean of 12% in non-frontier counties (column 1, panel A). This frontier differential in female gainful employment is due to both lower density and greater isolation (panel B). These differential rates of “gainful employment” may understate the actual differential rate of female labor force participation due to unpaid family labor and social stigma (Burnette, 2021; Chiswick and Robinson, 2021; Goldin, 1990, 2006; Riley, 1981). One specific concern relates to the greater prevalence of unpaid family labor in agriculture, where many women participated in farm production of marketed goods but were not counted as farmers (see Chiswick and Robinson, 2021). Given the predominance of agriculture on the frontier, this may lead to differential under-reporting of female employment. To address this, we calculate an alternative measure of gainful employment among all households in a county with at least one male member working in agriculture. The results, displayed in column 2, are qualitatively similar to our baseline.

While the average frontier women was less likely to be gainfully employed, those women working did so in higher-status occupations than their counterparts in already-settled parts of the country. Column 3 of Table 2 shows that, among those gainfully employed, average occupational income scores were nearly 10% higher among women working on the frontier. These scores, ranging from 0 to 80, capture occupation-specific incomes based on 1950 Census data (Ruggles et al., 2019).<sup>21</sup>

Importantly, this is not an artifact of a general frontier differential in occupational income scores

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<sup>19</sup>Unfortunately linking women across Census records would require other sources given the pervasive practice of changes in last names with changes in marital status.

<sup>20</sup>For details, see Chiswick and Robinson (2021) and the “Integrated Occupation and Industry Codes and Occupational Standing Variables in the IPUMS” at <https://usa.ipums.org/usa/chapter4/chapter4.shtml>.

<sup>21</sup>We also obtain a positive frontier differential in female occupational scores when we consider the scores proposed by Saavedra and Twinam (2020), who use a machine learning approach to construct an alternative score that adjusts for industry, occupation, and demographics. The frontier coefficient in that regression is 0.871 (standard error 0.169), and the mean of the dependent variable for non-frontier counties, for reference, is 7.22.



common to both genders. Taking the ratio of average female to average male scores, column 4 reveals greater parity in occupational status among men and women on the frontier relative to elsewhere. Panel B shows that this frontier differential in the prevalence of high-status women can be explained both by proximity to the frontier line and its low population density.<sup>22</sup>

Figure 5 provides further insight into the work patterns of women with gainful occupations. We report the shares of women in the top ten occupations from 1860–80, using *occ1950* occupational categories from IPUMS and lumping some categories into bigger groups.<sup>23</sup> The figure shows the shares of all women with gainful occupations in each category for the frontier (with colored bars) and for the rest of the country (with empty bars). To ease visualization, the colored bars for the frontier depict three types of economic activities: green for agriculture, yellow for manufacturing activities, and red for services or non-production occupations in any sector.

Looking across frontier and non-frontier bars in Figure 5, we see clear patterns underlying the higher average status of gainfully employed women on the frontier. First, the combined shares of the two agricultural categories are similar for the frontier and elsewhere, but the share of owners and tenants is higher on the frontier, while the share of farm laborers and wage workers is higher elsewhere. When looking at relatively high-status categories, outside the frontier a sizable share of gainfully employed women were “operative and kindred workers”; employment of this kind, usually at manufacturing firms, was much less common on the frontier. But on the other hand, two categories with even higher status were more common on the frontier: teachers and “managers, officials, and proprietors.” The latter included hotel keepers, restaurant keepers, saloon keepers and bartenders, traders and dealers. Importantly, while historical narratives suggest that prostitution was an integral part of frontier life (Butler, 1987) and much more common than in the rest of the country, this does not seem to be a first-order driver of the observed frontier differential in upper tail working women. Women reporting prostitution as an occupation were classified by IPUMS within the distinct category of “Attendants, professional and personal service (not elsewhere classified),” which has an occupation score of 13 and is not among the top ten categories in Figure 5.<sup>24</sup>

**Averages versus Upper Tails: Reconciling Frontier Narratives.** Our findings above on frontier women’s work—lower rates of gainful employment but higher status among working women—help reconcile contrasting historical narratives. Many portray strong, empowered women in entrepreneurial roles, highlighting the liberating potential of the frontier compared to the constrained Victorian structures of settled societies to the east. On the other hand, isolated women bound to domesticity are also a common image in frontier history. Our findings here suggest that both nar-

<sup>22</sup>Appendix Figures A.1 and A.2 report results from a semi-parametric exploration of the associations between female work patterns with population density and proximity to the frontier.

<sup>23</sup>The share of working women not included in any of these categories is similar on and off the frontier (around 12%), and so is their average occupation score (around 27). Thus, their omission from the figure does not distort the comparison.

<sup>24</sup>Sex work does not explain the excess mass of frontier women working in service- and trade-based occupations and does not appear to be pervasive enough on the frontier to explain its relatively thicker upper tail of female occupational standing. Using the 10% 1880 Census sample, we compute the share of working women who report “Prostitute” as their occupation. We find that about 1.3% of women in the labor force report being a sex worker in comparison to only 0.018% for non-frontier counties. There are several caveats to this analysis. Most importantly, perhaps, is the undercounting of sex workers due to social stigma, which was arguably stronger outside the frontier (Rutter, 2005).



ratives are part of the same picture. While the mass of women on the frontier found themselves relatively more constrained by homemaking duties, a small share of frontier women reached the upper echelons of society taking on highly visible and high-return roles in the local economy. Given their visibility, such women may have occupied an outsized presence in frontier mythology. Yet, historiographic accounts correctly include the experience of most women as well.

The combination of lower female employment rates with higher status among working women on the frontier can be explained through the lens of a standard Roy model (see, e.g., [Mulligan and Rubinstein, 2008](#)). If there is positive selection of women into labor market participation, an equilibrium with lower participation is bound to feature relatively high earnings and/or status among working women. If there were stronger factors that constrained women from leaving their homes for work on the frontier, then women would only do so if they had the capabilities to earn high enough returns. In such contexts, selection would make the set of working women on the frontier display higher status than elsewhere. The next section examines the factors that may have shaped these observed patterns.

**Selective Migration.** The distinctive patterns of marriage, fertility, and women’s work on the frontier may reflect selective migration to the frontier, exposure effects that shaped settlers’ behavior while on the frontier, or both. We explore selective migration in Appendix Table [A.2](#), focusing on a sample of married couples in 1870 and 1880 from the Census Linking Project ([Abramitzky et al., 2020](#)).<sup>25</sup> In Panel A, we consider differences in 1870 between couples that migrated to the frontier and those who remained in the non-frontier during the ensuing decade. In all specifications, we include fixed effects for state of residence in 1870; in even columns, we also control for husbands’ occupational scores, to ensure we are capturing differences in gender roles within couples, not just overall differences across couples. We do the same in panel B but also restrict the sample to couples in which the husband was initially in agriculture, addressing possible concerns about compositional differences.

Appendix Table [A.2](#) shows that selective migration is important for some outcomes but appears to work against the frontier differential for others. Compared to others from settled areas in 1870, frontier migrants had fewer children (columns 1-2), implying that selective migration does not mechanically account for higher fertility on the frontier. Frontier migrants exhibit bigger age gaps (columns 3-4), with magnitudes large enough to explain the frontier differential in column 4 of Table [1](#). These migrants also exhibit lower female employment rates (column 5-6), but this selection effect explains only a quarter or a fifth of the overall frontier differential in column 1 of Table [2](#), suggesting scope for exposure effects of frontier life. Finally, women who moved to the frontier with their husbands report lower occupational scores conditional on gainful employment (columns 7-8), suggesting that the thick upper tail of working women on the frontier is not driven by selective migration among already-married women. Together, these estimates point to both selection and

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<sup>25</sup>As in our analysis of marriage dissolution above, we focus here on married couples as we cannot link unmarried women across Census rounds. This is of course a natural population on which to focus given our interest in understanding frontier gender roles within the predominant marital institution.

exposure effects being important in explaining the distinctiveness of frontier gender roles in the historical era, and thus also contributing to the persistent frontier legacy that we identify in Section 4.

### 3.4 (More than) A “Child Penalty”?

Lower female employment rates on the frontier may have been, to some extent, a result of high fertility. In this historical period, women bore the brunt of childcare activities all across the United States. On the frontier, where land abundance favored high fertility, the burden of childcare may have been more extreme. A large literature documents the presence of “child penalties” in wages and employment for women working in the modern U.S. economy (see, e.g., [Kleven et al., 2019](#); [Kleven, 2022](#)). This section examines the extent to which lower rates of female employment on the American frontier were driven by the large burden of high fertility.

We focus on women living in agricultural households on the frontier and elsewhere to make more compelling comparisons. Columns 1–3 of Table 3 show, using individual-level regressions, the frontier differentials in fertility and female gainful employment. Column 3 indicates a similar differential as observed at the county level in prior results: frontier women are about 3 p.p. less likely to report a gainful occupation. We then provide a rough approximation to gauge the size of the child penalty, regressing reported gainful employment by women on the total number of children (column 4) and the number of children under five (column 5). For women in agricultural households across the U.S., each child (under five years old) is associated with a 1.5 p.p. (3 p.p.) reduction in the likelihood of gainful employment.<sup>26</sup>

Combining the estimates in columns 1 and 5, we arrive at a rough sense of the extent to which a “child penalty” might account for the frontier’s lower female employment in column 3. Frontier women had on average 0.1 more children under five, and each child under five is associated with a 3 p.p. lower likelihood of employment; so this channel would account for slightly more than one-tenth of the overall lower female employment on the frontier.<sup>27</sup> These exercises are of course subject to strong caveats, but insofar as the magnitudes are still informative, they suggest that differential fertility explains a non-trivial but moderate share of the lower female employment on the frontier.

As the child penalty does not account for most of the lower employment, frontier women must have spent more time on housework and/or leisure. It is possible that household work on the frontier, combined with child-rearing demands, left little or no time for work outside the home. A survey by the U.S. Department of Agriculture that collected daily time use records in the 1920s indicates that women across America spent very long hours in household work, and that this burden was higher for women in rural households, especially those with young children ([Pidgeon, 1937](#), pp. 29-30).<sup>28</sup> The frontier was bound to exacerbate the burden of housework and childcare, as isola-

<sup>26</sup>These figures appear small compared to recent estimates of the child penalty (e.g., 22 p.p. in [Kleven, 2022](#)), but this comparison is among working women (i.e., related to 100 p.p. employment rates) whereas in our case the reference rate is 12 p.p. Thus, the historic child penalty we estimate is sizable in relative terms.

<sup>27</sup>A similar figure is suggested by adding a control for children under five in column 3, which makes the coefficient on the frontier dummy drop by about ten percent.

<sup>28</sup>Among >2,000 homemakers in rural and urban areas, women spent on average 51 hours a week in housework; this

tion forced home production of most goods and services, and, as we showed in Table 1, there were often no extended family with whom to share that burden.

It is also possible that frontier women enjoyed higher leisure thanks to stronger bargaining power. Grosjean and Khattar (2019) argue, along these lines, that historically male-biased sex ratios in Australia strengthened bargaining power of women in the marriage market, leading to lower female labor participation and higher levels of leisure. In addition, land abundance on the American frontier may have favored greater leisure than in non-frontier rural locations, through an income effect. Together, these factors may have offered frontier women the benefit of being supported financially while spending their time at home caring for children rather than working in factories or as domestic servants. Female bargaining power may have influenced not only the quantity of work but also the types of work that frontier women specialized in, with childbearing and household work plausibly being preferable in many cases to common occupations of women elsewhere.

It is also possible that even when female employment on the frontier was lower, childcare and housework were demanding enough to imply less leisure for women. This would be consistent with leisure being lower for everyone on the frontier and/or women’s bargaining power being lower. While female scarcity would confer benefits in marriage markets, these may have dissipated after marriage, since the isolated environment on the frontier offered few outside options. Social isolation and the lack of co-resident extended family would make it difficult to seek redress in the face of domestic grievances or outright abuse. In this account, higher fertility and lower female employment on the frontier would not signal relative power, but rather the opposite.<sup>29</sup>

**Bargaining Power.** To explore whether bargaining power played a role in driving distinctive patterns of women’s work on the frontier, we leverage the interaction between frontier conditions and state-level variation in women’s economic rights (see Geddes and Lueck, 2002; Hazan et al., 2019). Women’s rights to own property and retain their labor earnings, which determined women’s outside options and their bargaining power, were granted at different times in different states over the 19th and 20th centuries (see Appendix Figure A.3). If differential gender roles on the frontier partly reflected differential bargaining power (in either direction), then those patterns were bound to interact with the structural inequalities faced by women in this historical period, including lack of economic rights.<sup>30</sup> Consistent with this idea, Appendix Table A.3 shows that the frontier differential in fertility and employment outcomes largely disappears in states that had granted economic rights to women. For the two other core outcomes we consider, marriage rates and occupational status

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figure was higher in farm households, and even higher in farm homes with young children, reaching 73 hours.

<sup>29</sup>Women may have desired fewer children than men due to the implied burdens, including maternal mortality risk, but that marital disagreement over the number of children was resolved in favor of high fertility (see Albanesi and Olivetti, 2016; Hazan et al., 2021).

<sup>30</sup>To assess the relevance of women’s economic rights we use the following augmented version of equation (1):

$$x_{cst} = \alpha + \beta_1 \text{frontier}_{cst} + \beta_2 \text{economic rights}_{st} + \beta_3 \text{frontier}_{ct} \times \text{economic rights}_{st} + \theta_{d(c)} + \theta_t + \varepsilon_{cst}, \quad (4)$$

where  $\text{economic rights}_{st}$  is a binary indicator equal to one whenever both property rights and earnings rights were available to women living in state  $s$  at time  $t$  (and equal to zero otherwise). This measure follows Hazan et al. (2019) and relies on data from Geddes and Lueck (2002).

among working women, the frontier differentials do not appear to vary with women’s economic rights. While these results suggest that bargaining power may have played some role in shaping frontier gender roles, our analysis leaves open questions that are difficult to answer without survey data on time use or gender attitudes. We use such data, which is only available for more recent periods, in our analysis of long-run legacies of frontier experience.

**Takeaways for the Evolution of Gender Norms.** No matter which bargaining power structure was associated with high fertility and low female employment, the frontier’s distinctive gender roles may have become entrenched as social norms. Many aspects of frontier life could have been absorbed in the culture of early settlers and transmitted to subsequent generations, possibly persisting long after frontier conditions had passed. The pervasive domesticity of most frontier women, possibly adopted as a norm by their daughters, had additional implications for cultural persistence: by limiting the opportunities for participation, empowerment, and liberation in the public sphere that emerged over time, seclusion would tend to hinder the evolution of egalitarian gender norms (see [Evans, 2022](#)). We turn now to evidence of such persistence over the long run.

## 4 The Frontier Legacy in the Long Run

This section establishes the legacy of frontier settlement for gender norms and inequality over the long run. Many decades after frontier conditions had passed, we still find differences across counties in gender roles and the status of women. We first identify which of the gender inequalities characterizing the frontier persisted over time. Next, we explore outcomes on women’s time use only available in the modern era and use those findings to reinterpret some of the data-constrained speculation from our historical analysis. We then look at various forms of female political engagement and gender politics to understand how electoral structures might have reinforced frontier gender norms over the long run. We close by showing how frontier history fostered a persistent set of conservative gender attitudes that would ultimately work against greater gender equality in various domains of public life.

Various mechanisms can induce persistence, including vertical and horizontal cultural transmission as well as interactions with local institutions. For instance, intergenerational transmission of social norms discriminating against female labor force participation may shape labor market institutions. We do not yet take a stand on the particular mechanisms at play. Instead, we focus on characterizing the robust forms of persistence in gender norms from the frontier era, beginning with a set of outcomes from [Tables 1 and 2](#) that we can trace through the 21st century.

Our estimating equation relates total frontier experience in the 20th century

$$y_c = \alpha + \beta \text{ total frontier experience}_c + \mathbf{x}'_c \boldsymbol{\gamma} + \theta_{s(c)} + \varepsilon_c, \quad (5)$$

to outcome  $y$  in county  $c$ , where  $\theta_{s(c)}$  is a state fixed effect. *Total frontier experience* $_c$  (TFE) is the amount of time that a given county remained on the frontier (scaled in decades). In baseline spec-

ifications, the frontier window is from 1790 to 1890, and the sample includes all counties within the 1790 and 1890 frontier lines (see Figure 2). The  $\mathbf{x}_c$  vector comprises predetermined or fixed county-level covariates including latitude, longitude, average rainfall and temperature, elevation, potential agricultural yield, and distance to rivers, lakes, and the coast.<sup>31</sup> The coefficient  $\beta$  therefore identifies a local effect of TFE after partialling out geoclimatic factors that may shape TFE and the given outcome. As in the historical regressions in Section 3, standard errors are clustered on 60×60 square-mile grid cells that cover counties in our sample.

#### 4.1 Frontier History and Modern Gender Inequality

This section examines the long-run legacy of frontier experience for fertility, marriage, and female labor market activities. We consider Census-based outcomes measured in 1940 from the Integrated Public Use Microdata Series (Ruggles et al., 2019) and from 1950 to 2000 from the IPUMS National Historical Geographic Information System (Manson et al., 2019). In Table 4, panel A, we revisit outcomes from the historical regressions in Table 1, now for the year 1940. Panel B does the same for 2000 with slightly amended outcomes given the changes in available measures.

The results in panel A of Table 4 suggest frontier gender norms endured long after the era of westward expansion had ended. By 1940, counties had at least 50 years since frontier conditions prevailed; some had not been on the frontier for more than a century. Yet, the gender roles that characterized frontier life persisted: each additional decade of TFE is associated with significantly higher fertility (column 1), higher marriage rates for both women and men (columns 2 and 3), and lower female labor force participation (FLFP) (column 4). The results in column 3 differ from the historical period, which is intuitively due to the re-balancing of sex ratios in post-frontier society (see Appendix Figure A.4). Even with these significant demographic shifts, women in high-TFE counties are still more bound to the home, as they have more children and supply less labor to the market, even when compared to men (column 5). When they work outside the home, they do so in occupations more distinct from men than do their counterparts in low-TFE counties (column 6).

Many of the findings in Table 4 seem to mirror those in Table 1 from the mid-1800s when most women living in frontier counties were confined to the domestic space given the relatively stronger demands on their time to produce children and basic necessities. To get a sense of the magnitudes, one can multiply the coefficients by two to go from zero to two decades of TFE, which is just above the mean of 18 years. For this comparison, the high-TFE county would, for example, have (i) 26 more children for every 1,000 women, relative to a mean of 376 and a standard deviation (s.d.) of 79, and (ii) 3 p.p. lower FLFP, relative to a mean of 17% and s.d. of 6%.

These long-run correlations with TFE suggest that the initial norms around female seclusion and domesticity on the frontier persisted across generations as part of a sticky cultural configuration. Panel B of Table 4 reinforces this interpretation, showing that most of these strong correlations with TFE, including for FLFP in column 4, persist through the end of the 20th century. Before World War II, female employment rates were very low, but by 2000 FLFP exceeded 50%. Yet, the negative

<sup>31</sup>We tie our hands here, and in robustness checks, by restricting to the same controls used in Bazzi et al. (2020).

association with TFE persisted; see panel (a) of Figure 6, which reports time-varying estimates of equation (5) with female employment measures standardized for each period to make comparisons across time more meaningful despite differences in measurement (especially pre- and post-1940).<sup>32</sup> While the effect size changed over time—first falling through 1940 and then rising thereafter with an outlying jump in 1970—its economic significance remains fairly stable. Each additional decade of TFE is associated with roughly 0.15 s.d. lower FLFP throughout the 20th century. By comparison, the positive association between TFE and fertility declined somewhat over this period but still remained sizable by 2000 (see panel b of Figure 6 and panel B of Appendix Table A.4).

With the frontier legacy persisting for FLFP and, to a lesser extent, fertility, what can we say about possible shifts in gender norms through occupational choice among women in the labor force? Table 5 revisits the analysis from Section 3.3 to see whether high-TFE areas still retain a greater mass of women at the upper end of the occupational distribution. By 1940, working women in high-TFE counties hold relatively higher-status occupations than women in low-TFE counties (column 1, Panel A). And, just as in the frontier era, these differentials remain significant when accounting for differences in men’s occupational standings (column 2, Panel A). The remaining columns of Table 5 explore the role of education in sustaining these differential labor market outcomes. By 1940, we find a generalized under-provision of education in high-TFE locations, which exhibit lower rates of high school graduation among women but little gender gap in attainment (columns 3 and 4). Educational inequality is thus unlikely to explain the persistence of greater female representation in the upper tail of the occupational distribution in high-TFE locations in the mid-20th century. Panel B shows that these estimates persist, for outcomes we observe through 2000.

The findings in Tables 4 and 5 suggest that counties with greater historical exposure to the frontier remain places with fewer independent women, at least in terms of their engagement in economic life outside the home. To substantiate this interpretation of limited female autonomy, we turn to measures of time use and gender attitudes, which offer a unique window into women’s lives at home as well as the perceptions of their role in society. Before doing so, however, we explore the robustness of our findings on FLFP.

**Robustness.** FLFP occupies a central place in our study and in the broader economics literature on gender norms. We focus on this outcome in the ensuing robustness checks. Together, these checks aim to clarify the sources of identifying variation in TFE and, in turn, bolster the case for our proposed interpretation of the long-run correlations.

*Additional controls.* Appendix Table A.6 augments the baseline geoclimatic controls in equation (5) with additional confounds of TFE and FLFP. These include ruggedness and rainfall risk, distance to nearest Indian battle, historical demographics (i.e., slaves, immigrants, Scotch-Irish, and birthplace

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<sup>32</sup>The un-standardized regression-based output, with means and standard deviations in each decade, can be found in panel A of Appendix Table A.4. Further results for the gender gap in labor force participation can be found in Appendix Figure A.5 and Table A.5, which show that the gap has narrowed faster in high-TFE counties. Given the persistent differential in female employment, this suggests relative declines in male labor force participation in high-TFE counties in the late 20th century, some of which may intersect with broader declines in male labor market opportunities during this period (associated, for example, with skill-biased technological change and import competition).



diversity as of 1890) and historical economic factors (i.e., distance to portage sites and mines, connection to railroads, and manufacturing employment as of 1890). The inclusion of these controls one by one has little effect on the point estimate, with the exception of connection to the railroad in 1890, which decreases the coefficient by around one-third. Yet, the estimate remains statistically and economically significant, even when including the full set of controls in the final column. Similar insights hold for FLFP across the entire 20th century (see Appendix Table A.7).

*Alternative frontier definitions.* While our definition of frontier status and hence TFE relied on thresholds in density and proximity, the long-run association of TFE and FLFP is not an artifact of those baseline threshold choices. Appendix Table A.8 demonstrates robustness to various thresholds and alternative treatments of frontiers located off of the main contour lines.

*Regional variation and extended frontier time frame.* We also carry out a regional heterogeneity analysis, add the west coast to our baseline sample of counties, and extend the frontier era through 1950. Appendix Table A.9 shows that the TFE estimates remain negative and statistically significant except when restricting to U.S. counties in the West Census region only, which could be due to the small sample size. More substantively, the point estimates and implied effect sizes are very similar across regions, which suggests that our estimates reflect an underlying legacy of frontier settlement rather than specific features of that process in different parts of the country.

*Disentangling population density.* We address an important confounding influence of population density. In particular, we use several distinct but complementary approaches to disentangling frontier history from a history of low density. First, we control for contemporaneous density. Second, we include indicators for the decile of within-state population density. Third, we implement a nearest-neighbor-matching-type specification that includes fixed effects for within-state pairs of counties that have the most similar population density. Fourth, we split the sample based on contemporaneous urban population shares. Finally, we control for the total number of years from 1790 to 1890 in which a county had population density less than 6 people per square mile. Appendix Table A.10 shows that the frontier legacy for FLFP holds up to these different checks, suggesting that the variation in gender norms across the geography of TFE is distinct from the variation across the geography of density. In other words, our long-run estimates reflect a history of frontier settlement rather than an accumulated history of low density and all that implies for gender roles.

*Instrumental variables strategy.* Lastly, we use an instrumental variables (IV) approach to address residual concerns about endogeneity in the association between TFE and modern outcomes. Following Bazzi et al. (2020), we isolate exogenous variation in TFE due to historical shocks to the settlement process driven by inflows of immigrants to the United States. For each county, the IV captures total immigration flows from Europe to the Atlantic seaboard starting just before the onset of local frontier settlement. We also consider an alternative version of the IV, based on Nunn et al. (2017), that relies on predicted, rather than actual, immigrant inflows induced by climate shocks in Europe. Intuitively, these time-varying flows hasten westward expansion, thereby reducing TFE, but are unrelated to the local conditions of any given frontier county. The IV estimates in Appendix Table A.11 are similar across the two approaches. Together, they confirm the previous OLS results



for key outcome variables in fertility and FLFP, as well as conservative gender attitudes, which we explore at length in Section 4.4 below.

## 4.2 Gender Inequality: Evidence from Time Use Data

Much of our analysis thus far points to an enduring frontier legacy of female disadvantage in the economy. However, low FLFP on its own is not necessarily evidence of disempowerment or adverse forms of gender inequality. Rather, it might simply reflect the higher status of women in society at large and within marriage specifically, such that they are able to engage in greater leisure. This seems at odds with the burden of motherhood on the frontier described in Section 2 and borne out empirically in Section 3. We show here that this interpretation is also inconsistent with prevailing patterns of time use in the 21st century.

In Table 6, we use the American Time Use Survey (ATUS) to explore the day-to-day time allocation of partnered women from 2003 to 2020. This long-running survey captures daily time use, in minutes, across a range of activities inside and outside the home. We group these activities into four categories: work, leisure, household activities, and other.<sup>33</sup> We estimate the relationship with TFE at the individual-level, augmenting equation (5) with survey wave FE and individual-level controls for age, age squared, education status, race, household size, and presence of children below 18 in the household. While the latter may be endogenous outcomes of TFE, the results are not sensitive to their inclusion, and we retain them here to ensure that the time use variation is not simply picking up differential fertility or family structures.

The results in Table 6 suggest that women in high-TFE counties engage in significantly less leisure and more housework than their counterparts in low-TFE counties. Respondents in counties with greater TFE report no significant differences in the extensive margin of any hours worked in the formal labor market (column 1). However, each additional decade of TFE is associated with roughly 2.8% less leisure and 1.6% more housework relative to means of 4.4 and 3.8 hours per day, respectively (columns 3 and 4). In terms of overall time allocation, leisure comprises 22 percent of the day for the average partnered women in the ATUS, and each additional decade of TFE is associated with half a percentage point fall in that share (column 6). There is little relationship between TFE and the residual “other” category (column 5), but we do see a significant positive association with time spent working (column 2). Note, however, that this estimate conflates the extensive and intensive margins of FLFP, and, given the results in column 1, the estimates here seem to be driven by the intensive margin among working women.<sup>34</sup> Importantly, we do not see the same patterns for partnered men, whose time allocation exhibits little systematic or significant association

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<sup>33</sup>Work activities include all time spent working, doing activities as part of one’s job, engaging in income-generating activities (not as part of one’s job), and looking for jobs and interviewing. Leisure activities include all time spent on socializing, relaxing, and leisure as well as engaged in recreational sports and hobbies (this definition aligns with the one used in [Aguilar and Hurst, 2007](#)). Household activities include time spent on a range of household management and organizational tasks. Other includes a smattering of activities ranging from sleep to shopping.

<sup>34</sup>Another potential distinction with our earlier results for FLFP is that the ATUS only covers 402 counties in our baseline sample of 2,034 counties, and low-TFE counties appear to be overrepresented: the mean TFE among respondents in the ATUS is 6 years compared to 18 in the full sample of counties in our baseline county-level specifications. This might explain some of the difference with those earlier results on the extensive margin of FLFP for the full sample.

with TFE (see panel B of Table 6). This suggests that female time use in high-TFE counties is unlikely to be driven by different underlying economic structures that would otherwise affect both genders, and reflects instead a difference in social norms.

Overall, then, it seems that the frontier legacy of low FLFP is not accompanied by greater leisure time at home but rather the opposite as women take on more household work. This aligns closely with our conjectures about how to interpret the low FLFP, high fertility, and lack of extended family support structures at home in the historical era.

### 4.3 Gender Politics: Suffrage and Representation

To better understand the scope of conservative gender norms and how they became entrenched, we now explore the frontier legacy for female political representation and engagement in politics. The history of female suffrage in America features a prominent role for women in Western states, some of which were the first to grant women the right to vote in the late 1800s and early 1900s.<sup>35</sup> Did frontier gender norms contribute to this early embrace of women’s political rights and to women’s participation in politics thereafter? Our findings in Section 3.3 suggest that frontier society was indeed home to a small number of relatively more economically empowered women. Yet, at the same time, our findings elsewhere in Section 3 suggest that most women on the frontier had less autonomy and less opportunities to engage in public life outside the home.

Our results in this section show a contrast between support for suffrage among elites and apathy if not outright opposition among the masses. On the elite side, column 1 of Table 7 shows that congressional representatives in districts with greater TFE were more likely to vote for the 19th amendment in 1919, which recognized women’s right to vote.<sup>36</sup> Each additional decade of TFE is associated with a 4.4 p.p. higher likelihood of a yeas vote relative to the mean of 70%, though the point estimate is not statistically significant at conventional levels ( $p$ -value = 0.11). While political support for suffrage undoubtedly came from various quarters (see the Introduction), some narratives emphasize the role of elite women in pressuring male politicians of the time (see Mead, 2006b; Stefanco, 1987). Some of these women, or their daughters in later years, may have come from the ranks of the upper tail women working outside the home. At the same time, we find no significant differences in the gender composition of House representatives across high- and low-TFE congressional districts from 1917–2020 (column 2). This null result may be due in part to the very limited entry of women into Congress throughout most of the 20th century.

In column 3 of Table 7, we investigate differential voter turnout around the Equal Rights Amendment (ERA). There is no county-level data on voter participation by gender in the elections pre- and post-ERA. We thus follow the work of Cascio and Shenhav (2020) and infer the voter participation rates of women based on overall voter turnout. More precisely, we estimate the excess voter turnout measured as the difference in turnout from the 1924 and 1916 presidential elections. We rely

<sup>35</sup>Wyoming was first in 1869 followed by Colorado in 1893, Utah and Idaho in 1896, Washington in 1910, California in 1911, and Oregon, Kansas, and Arizona in 1912.

<sup>36</sup>We estimate this cross-sectional regression at the congressional district (CD) level using measures of TFE and  $\mathbf{X}$  controls from equation (5) that are area-weighted across all counties within the given CD.

on ICPSR county-level data on presidential election turnout computed on the basis of estimated eligible voters. We find that TFE is negatively associated with excess voter turnout, suggesting that women’s relative political participation was lower at the frontier.<sup>37</sup> The estimate is statistically significant at the 5% level and robust to various sensitivity checks (see Appendix Table A.12).

In the remaining columns of Table 7, we turn to political and social mobilization of women at the local level. First, we find little evidence of popular mobilization for women’s rights in the lead up to and during the 19th Amendment vote. Using data from the “Mapping American Social Movements” project, we explore such mobilization as reflected in National Woman’s Party (NWP) actions from 1914–1922, including demonstrations, meetings, legislative engagements, legal actions, etc. The NWP was an American women’s political organization established in 1916 advocating for female’s suffrage and equal rights. Although NWP actions were rare events, seen in only 24 counties in our baseline sample, such events were nearly half as likely to occur with each additional decade of TFE (column 4). This negative relationship with TFE is consistent with a result in Table 8, discussed below, showing that nearly a century later women (and men) in high-TFE counties report stronger opposition to the women’s rights movement. These findings also resonate with the general lack of female representation in social and public life throughout the frontier era. Second, we consider temperance movement activities, another measure of historical collective action led by women with much more widespread prevalence across counties, and find a similarly negative association with TFE (column 5). Finally, using data on political participation of women at a broader range of political offices, from school boards to mayors to courts (with data from the [Political Graveyard](#)), we find that TFE is associated with lower female representation (column 6).

Overall, our results in this section point to a contrast: while congressional representatives from locations with greater TFE were somewhat more likely to support suffrage, these locations displayed similar levels of female participation in politics and lower levels of female mobilization and voter participation rates. The frontier legacy of gender inequality in politics may have played a part in sustaining and reinforcing the more general exclusion of women from important public roles outside the home. Without women occupying such spaces, there would have been little opportunity for young women to aspire to the sort of gender roles observed in other, more egalitarian societies.

#### 4.4 Gender Norms

The enduring impact of frontier history on gender inequality begs the question: how can this legacy persist? Here, we argue that social norms contribute to such persistence. Using modern survey data, we identify more conservative gender norms in locations with longer frontier histories. The findings suggest that persistent gender norms around work and politics are sustained by a set of conservative views about gender roles, held by both men and women.

We draw on two widely-used surveys capturing gender attitudes. The DDB Needham Life Style Survey (LSS) asks respondents whether they believe a woman’s place is in the home, whether

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<sup>37</sup>We augment the baseline controls and state FE in equation (5) with the shares of male and female populations that are of voting age. Limiting the analysis to states that had not already granted female suffrage prior to 1919 leads to a similar albeit less precise estimate: -0.500 (0.300)\*.

they think the women’s liberation movement is a good thing, whether they believe men are better leaders than women, and whether they believe that men are smarter than women. The LSS rounds with these questions span 1985–98 and cover nearly 90 percent of counties in our baseline sample. The General Social Survey (GSS) asks respondents whether they believe that what most women really want are a home and kids, whether they approve women working, whether they would vote for a female president, and whether they think that women should take care of the home and not the country. The GSS rounds with these questions span 1993–98 and cover 107 counties in our baseline sample. For each question across both surveys, we create a binary indicator equal to one if the respondents agrees with the statement and zero otherwise, rotating all outcomes to go in the same affirmative direction. As with the previous regressions using the ATUS data, we estimate an individual-level analogue of equation (5) and control for age, age squared, and race.

Table 8 shows that men and women exhibit more conservative gender attitudes in counties with greater TFE. Panel A reports estimates pooling men and women, panel B men only, and panel C women only. The frontier legacy is associated with greater support for keeping women at home taking care of the children (columns 1 and 6), out of the labor force (column 7), out of politics (column 8), and out of leadership roles more generally (column 3). It is not surprising that these types of respondents are also more opposed to the women’s rights movement (column 2). Yet, such beliefs do not necessarily come with the view that women are less intelligent than men (column 4) or that women’s role at home must come at the expense of civic duty (column 9). Rather than belaboring specific point estimates, we summarize the magnitudes using a simple mean index across the four outcomes within a given survey. For the LSS, each additional decade of TFE is associated with 1 p.p. more conservative gender attitudes relative to a mean of 30% (column 5). For the GSS, the effect size is larger: 2.8 p.p. relative to a mean of 20% (column 10).

Although effect sizes and precision vary across outcomes, it is clear from panels B and C of Table 8 that both men and women are invested in inegalitarian gender norms in high-TFE communities across America. Putting this together with prior results, we can, at least in part, rule out the possibility that female empowerment on the frontier led to male backlash over the long run. Rather, it seems that gender inequality on the historical frontier persisted over time, and in the long run, women had internalized gender disparities in various domains of private and public life. In an equilibrium sense, those women who embraced these norms more fully may have found greater returns in the local marriage market and in society more generally.

**Religion.** One of the ways in which conservative gender norms on the frontier may have persisted over the long run is through entrenchment with religious norms. [Bazzi et al. \(2023\)](#) trace out the frontier legacy of religious innovation in America and characterize its implications for religious politics over the long run. They find that historical frontier experience is associated with greater prevalence of evangelical Christianity and greater religiosity, as revealed, for example, by the stated importance of religion and frequency of church attendance. A large social science literature connects religiosity and gender norms, and in the LSS data, respondents who consider religion important in their lives display 6.6 p.p. more conservative gender attitudes (as measured in column 5 of Table 8).

It is possible, then, that some of the sticky gender norms we identify in this section are explained by different religious behaviors in high-TFE areas. The same could be said for many different cultural norms, rooted in unique historical conditions that might not persist but nevertheless become ingrained over time through religious doctrine and practice. This is an important area for future research and one where the frontier history may be particularly informative.

## 5 Conclusions

This paper offer evidence from a rich historical setting—the American frontier—showing how the socioeconomic environment shapes gender norms. We see frontier history and the process of westward expansion as a fruitful setting for distinguishing between different theories on the origins of gender norms. The historical record offers disparate views about the female experience on the frontier. We bring centuries of data to bear on this rich history and, in so doing, reconcile competing narratives around the liberating and regressive aspects of gender roles on the frontier. Our findings point to an especially important role for isolation—both from society at large as well as extended family—in limiting the scope for life outside the home and working against the additional bargaining power women might otherwise find in female-scarce environments. A small subset of women found their way to the top of the socioeconomic ladder in ways that might not have been feasible outside the frontier. However, over the long run, the inegalitarian gender norms came to dominate the frontier legacy. Whether some of these persistent norms might have been diluted through technological change and policy innovations remains an important question for future work.

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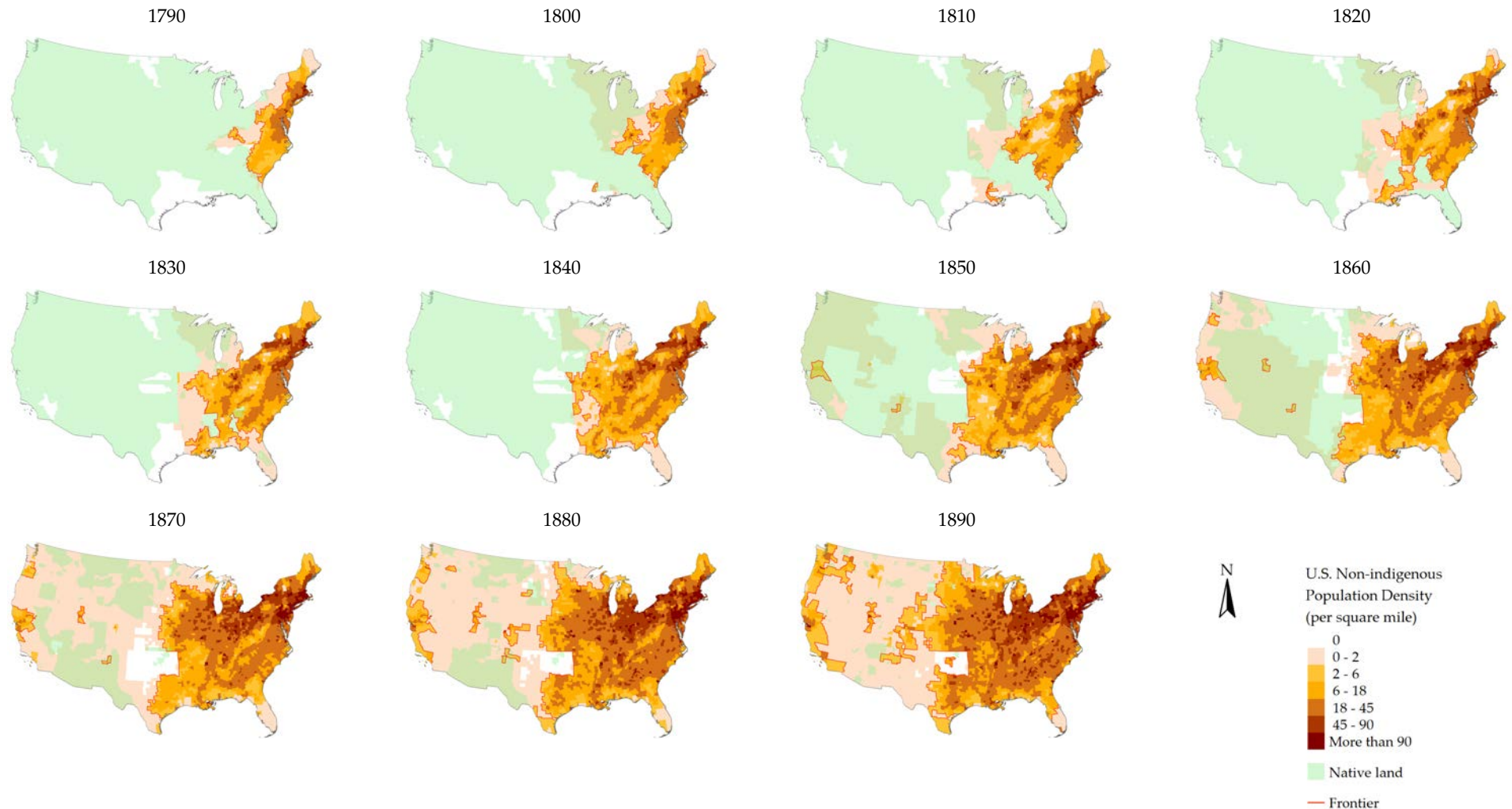


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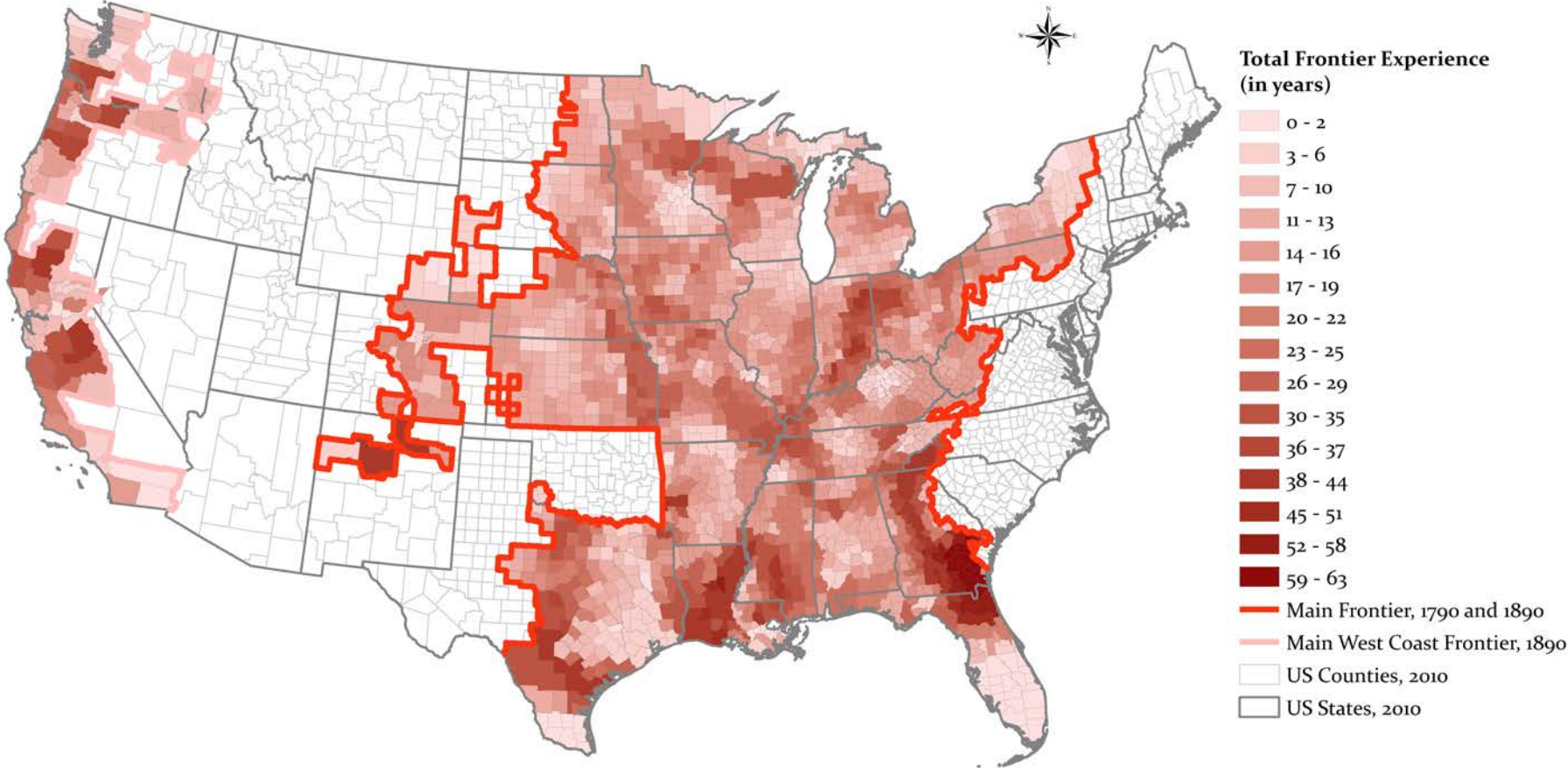
# Figures

**Figure 1: The Evolution of the Frontier, 1790 to 1890**



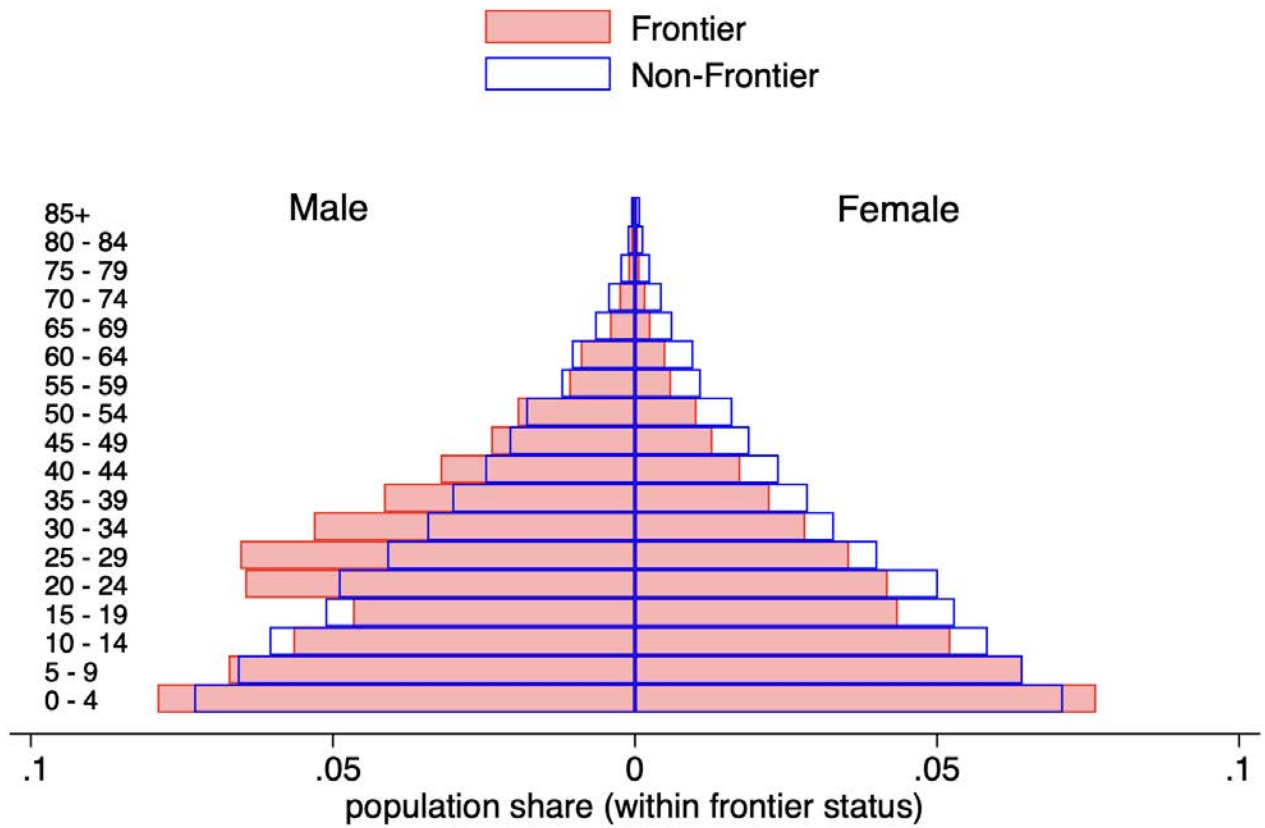
*Notes:* The frontier lines demarcate the contour of counties with U.S. population density below and above 2 people per square mile. We exclude smaller “island frontiers” in the interior and contour line segments less than 500 km. Native land demarcation is based on shapefiles of land transfers digitized by Claudio Saunt from an 1899 publication of the Bureau of American Ethnology supervised by Charles C. Royce (see the “Invasion of America” project at <https://usg.maps.arcgis.com/apps/webappviewer/index.html?id=eb6ca76e008543a89349ff2517db47e6>).

Figure 2: Total Frontier Experience, 1790 to 1890



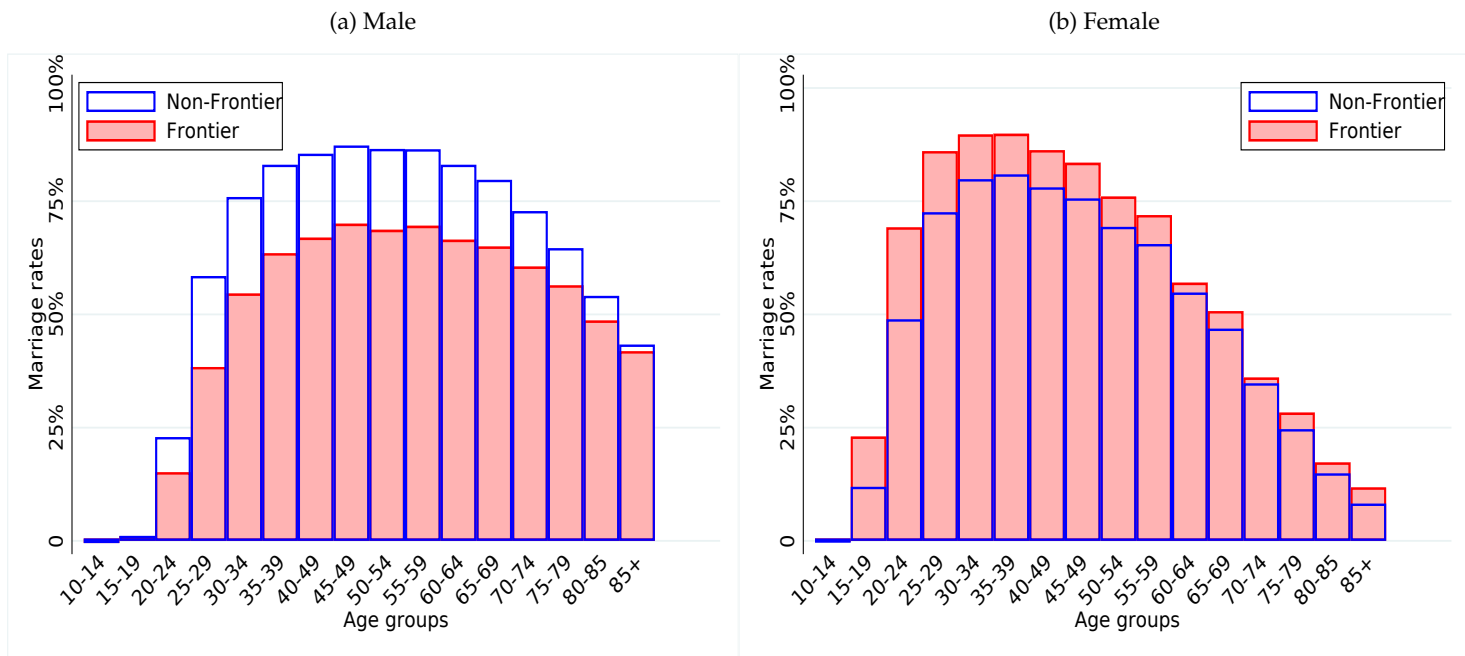
Notes: Total frontier experience is the total number of years the county was within 100 km of the frontier line and its population density was below 6 people per square mile, between 1790–1890. The white areas to the east of the 1790 main frontier line are counties for which we do not know frontier history given the lack of Population Census data before 1790. The white areas to the west are beyond the 1890 frontier line and hence not included in our baseline sample, which is restricted to the frontier era as defined by Porter et al. (1890) in the *Census Progress of the Nation* report. We include many of those counties to the west when extending the frontier era through 1950 for robustness. This is reproduced from Figure 3 in Bazzi et al. (2020).

**Figure 3: Historical Population Pyramids, by Gender and Frontier Status**



*Notes:* Based on complete-count Population Censuses from 1850 to 1880. Each bar reflects the share of the population in the given age×gender cell for frontier and non-frontier counties, respectively.

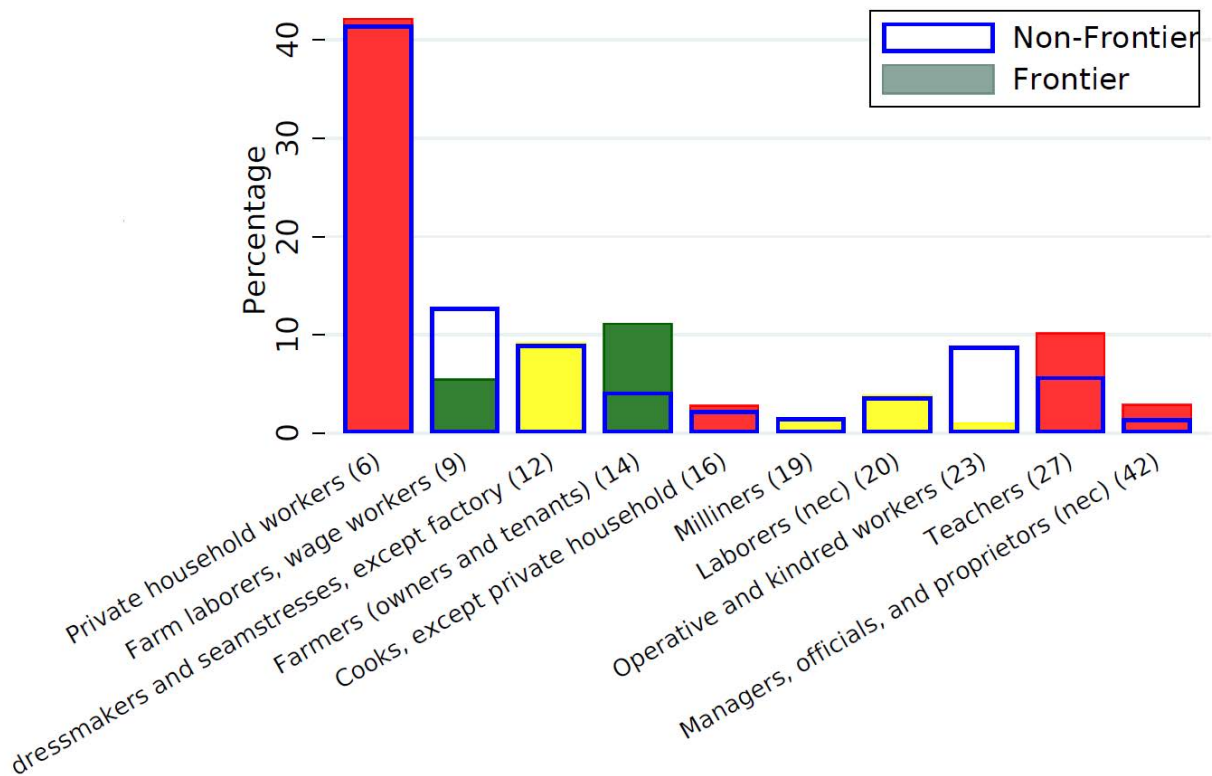
**Figure 4: Marriage Rates at Different Ages by Gender, Frontier vs. Non-Frontier, 1880**



Notes: Based on complete-count Population Censuses from 1880.

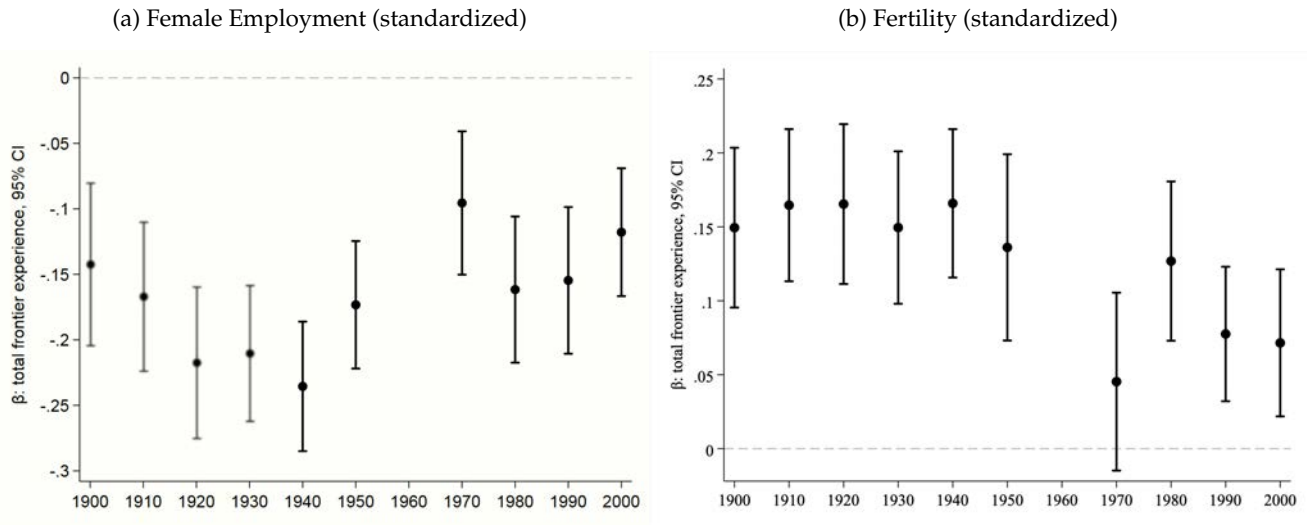


**Figure 5: Main Female Occupations, Frontier vs. Non-Frontier (1860–1880)**



*Notes:* Based on complete-count Population Censuses from 1860, 1870 and 1880. Colored bars reflect frontier areas and empty bars reflect non-frontier areas. We rely on “occ1950” occupational categories from IPUMS. Occupations are lumped into broader categories. The figure shows the shares of all women with gainful occupations for each occupational category. Green depicts agricultural occupations, yellow depicts manufacturing, and red depicts services. Occupational scores from [Ruggles et al. \(2019\)](#) are reported in parentheses; these range from 0 to 80 and assign each occupation a rescaled value representing the median total income (in hundreds of 1950 dollars) of all persons with that particular occupation in 1950.

**Figure 6: The Frontier Legacy for FLFP and Fertility**



Notes: Based on Population Censuses from 1900–2000. The sample includes U.S. counties for which the 1790–1890 period contains their entire frontier experience. OLS estimates are based on a panel analogue of equation (5) that allows the coefficient on *Total Frontier Experience<sub>c</sub>* (in decades) to vary over time with state FE and all x controls interacted with year FE. Figure (a) shows results for female rates of gainful employment until 1940 and labor force participation from 1940 onward for the female population aged 16 plus. Figure (b) shows results for fertility computed as the number of children under the age of 5 over the number of women in their childbearing age (15–49) times 1000. The dependent variables are standardized decade by decade. 1960 is excluded from the analysis due to missing data. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. 95% confidence intervals are displayed.

## Tables

**Table 1: Fertility, Marriage, and Family Patterns on the American Frontier**

	Fertility: Child-Women Ratio (1)	Share of Women Ever Married (2)	Share of Men Ever Married (3)	Age Gap Between Spouses (4)	Share of Divorced Women (5)	Share of Households with ...		
						more than 2 generations (6)	grandmothers (7)	extended family (8)
(A) Baseline Frontier Definition: Low Density and Proximity								
Frontier	68.67*** (11.289)	0.049*** (0.005)	-0.062*** (0.007)	0.239*** (0.066)	-0.001*** (0.000)	-0.010*** (0.001)	-0.006*** (0.001)	-0.006*** (0.002)
(B) Distinguishing Low Density and Proximity to Frontier Line								
Near Frontier Line	52.05*** (7.356)	0.034*** (0.003)	-0.018*** (0.005)	-0.004 (0.052)	-0.0011*** (0.000)	-0.004*** (0.001)	-0.002*** (0.000)	-0.005*** (0.001)
Low Population Density	41.95*** (7.371)	0.025*** (0.003)	-0.035*** (0.006)	0.267*** (0.058)	-0.00 (0.000)	-0.007*** (0.001)	-0.004*** (0.000)	-0.001 (0.001)
Dep. Var. Mean (non-frontier)	671	0.70	0.58	4.36	0.004	0.042	0.018	0.048
Dep. Var. Std. Dev. (non-frontier)	119	0.04	0.05	2.02	0.003	0.011	0.006	0.022
Number of County-Years	6,048	6,048	6,048	6,046	1,834	5,844	5,844	5,844

*Notes:* The unit of observation is a county. The sample includes U.S. counties from 1850–1880 Censuses for columns (1) to (4) and 1880 in column (5). The dependent variable in column (1) is a measure of fertility as captured by county-level child-women ratio computed as the number of children under the age of 5 over the number of women in their childbearing age (15–49) times 1000. The dependent variable in column (2) is the share of women aged 15 plus who were ever married and column (3) is the share of men aged 15 plus who were ever married. For pre-1880, marital status is inferred using two variables from the census: “relate” and “nchild”. Column (4) is the age gap between male and female spouses computed for men and women who report head/spouse as a response to the “relate” question; column (5) is the share of women aged 15 plus who were divorced. The sample includes U.S. counties from 1850–1880 Censuses for columns (6) to (8). In column (6)-(8) we have, respectively, the share of household units with > 2 generations, the share of household units with a grandmother, and the share of household units with extended family within a single generation. *Frontier* is county frontier status at time  $t$ , *Near frontier line* is an indicator for counties within 100 km of the frontier line at time  $t$ , and *Low population density* is an indicator for population density below six people per square mile at time  $t$ . Regressions include Census division and year fixed effects. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 2: Women's Work on the American Frontier**

	Gainful Employment Among ... All Women (1)	Women in Farming Households (2)	Occupational Score for ... Women (3)	Women Relative to Men (4)
(A) Baseline Frontier Definition: Low Density and Proximity				
Frontier	-0.025*** (0.007)	-0.026*** (0.006)	1.052*** (0.278)	0.072*** (0.020)
(B) Distinguishing Low Density and Proximity to Frontier Line				
Near Frontier Line	-0.027*** (0.006)	-0.029*** (0.006)	0.561*** (0.186)	0.030** (0.012)
Low Population Density	-0.007 (0.008)	-0.006 (0.008)	0.463** (0.204)	0.039*** (0.014)
Dep. Var. Mean (non-frontier)	0.12	0.10	12.6	0.74
Dep. Var. Std. Dev. (non-frontier)	0.13	0.13	2.92	0.17
Number of County-Years	4,905	4891	4,795	4,795

*Notes:* The unit of observation is a county. The sample includes U.S. counties from 1860-1880 Censuses for all columns. Column (1) is computed as the number of women among females aged 16 and above that report gainful occupations. Column (2) is computed the same but restricting to all households with at least one male member in the household in agriculture. The dependent variable in column (3) is county-level average occupational score for women who are in the labor force and report a non zero occupational score. Occupational score variable from the [Ruggles et al. \(2019\)](#), ranges from 0 to 80 and assigns each occupation in all years a value representing the median total income (in hundreds of 1950 dollars) of all persons with that particular occupation in 1950. The dependent variable in column (4) is the county-level gender gap in occupational score computed as the ratio of average occupational score for women over average occupational score for men, for women and men who are in the labor force and report a non zero occupational score. *Frontier* is county frontier status at time  $t$ , *Near frontier line* is an indicator for counties within 100 km of the frontier line at time  $t$ , and *Low population density* is an indicator for population density below six people per square mile at time  $t$ . Regressions include Census division and year fixed effects. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 3: Child Penalty for Female Employment, 1860–1880**

	Number of children (1)	Number of children below 5 (2)	Female Gainful Employment (3)	Female Gainful Employment (4)	Female Gainful Employment (5)
Frontier	0.052** (0.026)	0.102*** (0.011)	-0.026** (0.010)		
Number of children				-0.015*** (0.001)	
Number of children < 5					-0.030*** (0.001)
Dep. Var. Mean (non-frontier)	2.09	0.55	0.14	0.14	0.14
Dep. Var. Std. Dev. (non-frontier)	2.3	0.84	0.35	0.35	0.35
Number of Observations	10,943,754	10,943,754	10,943,754	10,969,177	10,969,177

*Notes:* The unit of observation is an individual. The sample includes U.S. counties from 1860–1880 Censuses. The dependent variable in column (1) is the number of children in the household. The dependent variable in column (2) is the number of children below 5 in the household. In columns (3)–(5), the dependent variable is a binary indicator that takes the value of one if a woman reports a gainful occupation and zero otherwise. Regressions include Census division and year fixed effects. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells.

Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 4: The Frontier Legacy of Gender Inequality in the Long Run**

	Fertility: Child-Women Ratio (1)	Share Ever Married Female (2)	Share Ever Married Male (3)	Female Labor Force Participation (4)	Gender Gap Labor Force Participation (5)	Gender Occupational Segregation (6)
(A) Outcomes Measured in 1940						
total frontier experience	13.131*** (2.019)	0.005*** (0.001)	0.002** (0.001)	-0.015*** (0.002)	-0.019*** (0.002)	0.007*** (0.002)
Dep. Var. Mean	375.70	0.78	0.69	0.17	0.22	0.71
Dep. Var. Std. Dev.	79.15	0.03	0.04	0.06	0.07	0.06
Number of Counties	2,032	2,032	2,032	2,033	2,033	2,032
(B) Outcomes Measured in 2000						
total frontier experience	2.493*** (0.881)	0.009*** (0.001)	0.008*** (0.001)	-0.008*** (0.002)	0.001 (0.003)	n/a
Dep. Var. Mean	269.33	0.81	0.75	0.54	0.81	
Dep. Var. Std. Dev.	34.61	0.05	0.05	0.06	0.09	
Number of Counties	2,036	2,036	2,036	2,036	2,036	
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* The unit of observation is a county. The sample includes U.S. counties for which the 1790–1890 period contains their entire frontier experience. Each column reports the OLS estimate of equation (5) for 1940 in Panel (A) and 2000 for Panel (B). In column (1), the dependent variable is the baseline measure for fertility (child-women ratio) computed as the ratio of the number of children under 5 to the total number of women aged 15–49 times 1000. The dependent variable in column (2) is the county-level share of women aged 15 plus who were ever married. The dependent variable in column (3) is the county-level share of men aged 15 plus who were ever married. The dependent variable in column (4) is county-level female labor force participation computed as the number of women in the labor force over the female population aged 16 plus. The dependent variable in column (5) is the gender gap in LFP computed as the ratio of female over male labor force participation rates. The dependent variable in column (6) of Panel (A) is gender occupational segregation, which ranges between 0 (perfect gender integration within the workforce) and 1 (complete gender segregation within the workforce) and identifies the percentage of employed women (or men) who need to change occupations for the occupation distribution of men and women to be equal. Total Frontier Experience is scaled in decades. State fixed effects and predetermined or fixed county-level covariates (latitude, longitude, mean temperature, mean rainfall, mean elevation, distance to coast, river and lake and average agricultural productivity) are included. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with 60 × 60 square-mile cells.

Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.



**Table 5: The Frontier Legacy of Upper Tail Working Women**

	Occupational Score		At least High School Graduates	
	Women's (1)	Gender Gap (2)	Share Female (3)	Gender Gap (4)
(A) Outcomes Measured in 1940				
total frontier experience	0.099* (0.051)	0.017*** (0.003)	-0.010*** (0.002)	-0.002 (0.005)
Dep. Var. Mean	18.04	0.91	0.21	1.33
Dep. Var. Std. Dev.	2.46	0.13	0.08	0.19
Number of Counties	2,032	2,032	2,032	2,032
(B) Outcomes Measured in 2000				
total frontier experience	n/a	n/a	-0.008*** (0.002)	0.000 (0.001)
Dep. Var. Mean			0.77	1.02
Dep. Var. Std. Dev.			0.08	0.04
Number of Counties			2,034	2,034
State FE	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes

*Notes:* The unit of observation is a county. The sample includes U.S. counties for which the 1790–1890 period contains their entire frontier experience. Each column reports the OLS estimate of equation (5) for 1940 in Panel (A) and 2000 for Panel (B). The dependent variables in columns (1) and (2) are, respectively, the county-level average occupational score for women who are in the labor force and report a non-zero occupational score and the county-level gender gap in occupational score computed as the ratio of average occupational score for women over average occupational score for men, for women and men who are in the labor force and report a non-zero occupational score. Occupational scores are not available for 2000. The dependent variables in columns (3) and (4) are the county-level share of women aged 25 plus who graduated high-school and the gender gap in those aged 25 plus who graduated high-school, respectively. See the notes to Table 4 for further details on the specification. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells.

Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 6: The Frontier Legacy of Gender Inequality in Time Use**

	Minutes Per Day Allocated to ...					
	Any Work	Work	Leisure	Household Activities	Other	Leisure Share
	(1)	(2)	(3)	(4)	(5)	(6)
(A) Women Only						
total frontier experience	0.006 (0.005)	3.792* (1.945)	-7.357*** (1.807)	3.627* (1.884)	0.086 (2.424)	-0.005*** (0.001)
Dep. Var. Mean	0.35	137.1	266.0	224.6	799.9	0.19
Dep. Var. Std. Dev.	0.48	220.0	181.0	183.8	184.2	0.13
Number of Individuals	10,177	10,177	10,177	10,177	10,177	10,177
(B) Men Only						
total frontier experience	-0.005 (0.005)	-3.581 (2.427)	0.672 (2.733)	2.936 (1.864)	0.123 (2.181)	0.000 (0.002)
Dep. Var. Mean	0.49	220.5	316.2	135.3	756.2	0.22
Dep. Var. Std. Dev.	0.50	270.7	216.9	155.1	187.0	0.15
Number of Individuals	9,416	9,416	9,416	9,416	9,416	9,416
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Survey Wave Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* The unit of observation is a respondent. Data on time use is based on the American Time Use Survey (ATUS) dataset for the 2003–2020 period. Panel (A) restricts to female respondents and Panel (B) restricts to male respondents. The dependent variable in column (1) is a binary indicator that takes the value of one if the respondent reports spending non-zero minutes per day on work activities such as working, doing activities as part of one’s job, engaging in income-generating activities (not as part of one’s job), and looking for jobs and interviewing and zero otherwise. The dependent variable in column (2) is the number of minutes per day each respondent reported spending on work activities such as working, doing activities as part of one’s job, engaging in income-generating activities (not as part of one’s job), and looking for jobs and interviewing. In column (3), the dependent variable is the number of minutes per day each respondent reported spending in personal interest or leisure activities such as communicating with others and attending parties and meetings; and leisure activities such as relaxing, playing (passive) games (unless playing with children only), watching television, playing or listening to music, reading, writing, and all hobbies. The dependent variable in column (4) is the number of minutes per day each respondent reported spending in household activities such as maintaining their household, household management and organizational activities. In column (5) the dependent variable captures the number of minutes spent on other activities, including sleep (and hence the high mean). Lastly, in column (6), we compute a measure of leisure time as a share of all time spent on all activities. In addition to state FE and baseline geographic controls in Table 4, we also include survey wave fixed effects and individual-level demographic controls: age, age squared, education, race, household size and the presence of children under 18 in the household. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells.

Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 7: The Frontier Legacy around Gender Politics**

	Congressional District		County			
	Rep. Voted For Suffrage 1919 (1)	Share Women House Reps. 1917–2020 (2)	Excess Voting Turnout 1924–1916 (3)	NWP Actions For Suffrage 1914–1922 (4)	Temperance Movement 1870s (5)	Share Women All Politics 1900–2000 (6)
total frontier experience	0.044 (0.027)	-0.002 (0.009)	-0.532** (0.239)	-0.005* (0.003)	-0.0259*** (0.007)	-0.015* (0.008)
Dep. Var. Mean	0.70	0.07	-11.28	0.01	0.18	0.09
Dep. Var. Std. Dev.	0.45	0.13	11.46	0.10	0.39	0.34
Number of Observations	223	226	1,907	2,034	1,743	5,856
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects			Yes	Yes	Yes	Yes
Share Male and Female			Yes			

*Notes:* The unit of observation is a congressional district in columns (1) and (2) and a county in columns (3)–(6). In columns (1) and (2), *total frontier experience* (in decades) and control variables are area-weighted across all counties within the given congressional district. The dependent variable in column (1) is a dummy for whether congressional representatives voted for the 19th amendment in 1919. The dependent variable in column (2) is the mean share of female house representatives in a given congressional district computed as the ratio of the number of female elected house representatives over male and female house representatives in the congressional district. The analysis covers the 65th to 116th congress (since 1917, when the first woman, Representative Jeannette Rankin of Montana, served in Congress). In column (3), the dependent variable is the excess voter turnout measured as the difference in turnout from the 1924 and 1916 presidential elections (i.e., post subtracted by pre ERA). We rely on ICPSR county level data on presidential election turnout computed on the basis of estimated eligible voters. The dependent variable in column (4) is a dummy that takes the value of one if an action related to the National Woman’s Party (NWP) happened and zero otherwise. Data on NWP actions is obtained from “Mapping American Social Movements” Project. The data includes information about arrests, conferences, demonstrations, legal actions, legislative involvement, meetings, and other activities that occurred between 1914–1922. Actions that took place in U.S. cities are geocoded at the county-state level. In column (5), the dependent variable is a dummy that takes the value of one if an activity related to temperance movement occurred and zero otherwise. Data is obtained from [García-Jimeno et al. \(2022\)](#) and includes information about the events related to the temperance crusade that took place, and the nature of these events, classified as meetings, petitions, or marches. Actions that took place in U.S. towns are geocoded at the county-state level. In column (6), the unit of observation is county of residence of people in office. Data is obtained from the Political Graveyard online database. The dependent variable is the county-level share of women in political offices computed as the number of women in office over the number of men and women in office in a given county, normalized by the share of women in the labor force. The latter is computed as the number of women in the labor force out of the entire county-level labor force population (men and women). Political offices included and are not limited to members of Congress, rather, they include elected state officeholders, federal officials, federal judges, etc. We report robust standard errors in columns (1) and (2) and cluster based on grid-cell clustering in the other columns. Baseline geographic controls are included throughout. We also control for the share of male and female population aged 21 and over in 1910 and 1920 in column (3). Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with 60 × 60 square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table 8: The Frontier Legacy of Conservative Gender Attitudes**

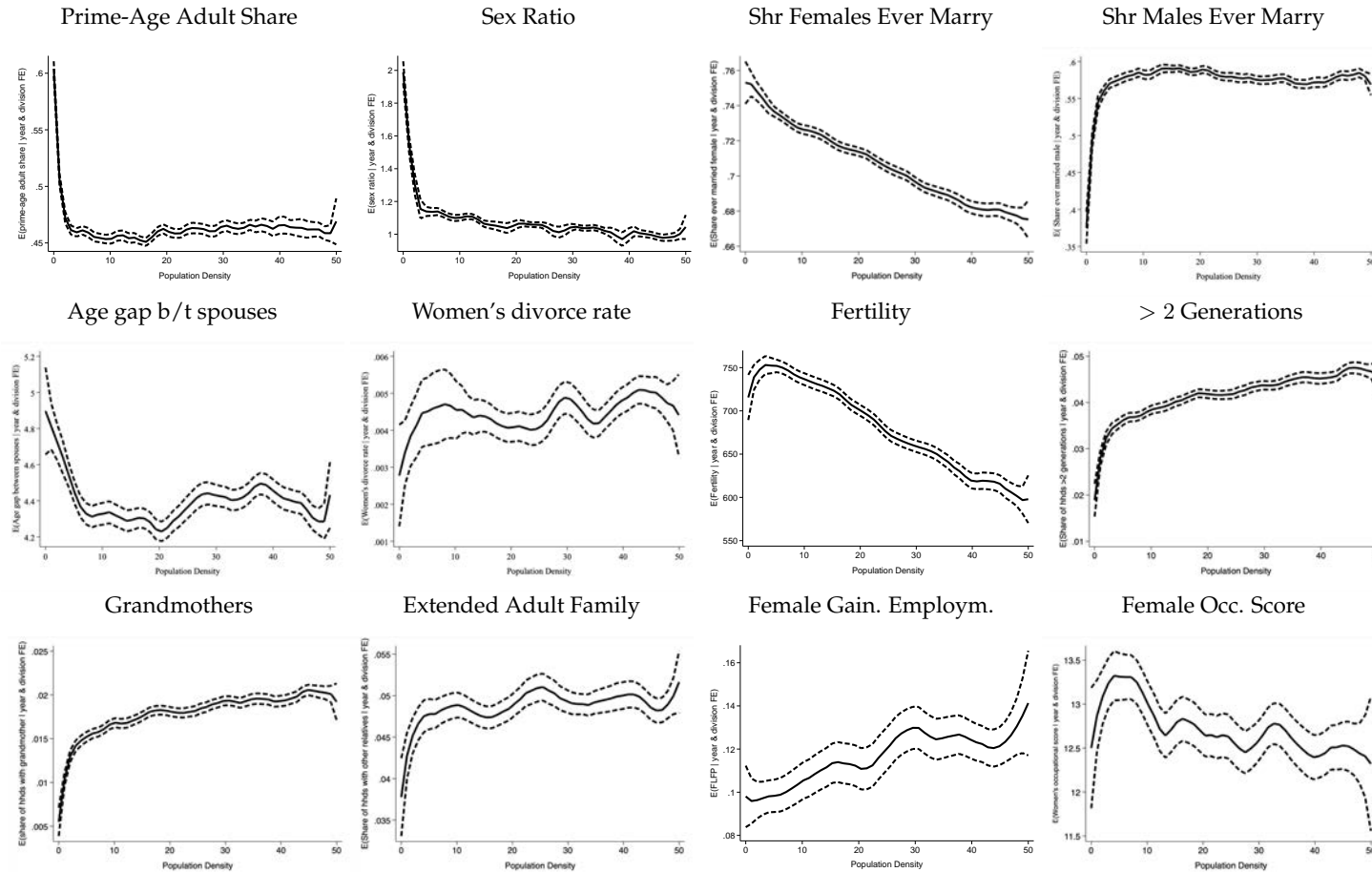
	<i>Life Style Survey (LSS)</i>					<i>General Social Survey (GSS)</i>				
	A Woman's Place is in Home	Anti-Women's Rights Movement	Men Better Leaders	Men Smarter	Mean Summary Index	Women Want Home & Kid	Not Approve Women Working	Not Vote Woman President	Women Take care Home not Country	Mean Summary Index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(A) Both Men and Women										
total frontier experience	0.010*** (0.003)	0.017*** (0.003)	0.010** (0.004)	0.004 (0.003)	0.010*** (0.002)	0.053*** (0.016)	0.016 (0.010)	0.015*** (0.005)	0.015 (0.011)	0.028*** (0.008)
Number of Individuals	25,609	25,569	17,198	25,505	25,763	1,467	3,133	4,523	3,096	5,712
Dep. Var. Mean	0.30	0.41	0.30	0.18	0.30	0.49	0.19	0.07	0.16	0.20
(B) Men Only										
total frontier experience	0.003 (0.005)	0.016*** (0.005)	0.010 (0.007)	0.004 (0.005)	0.008** (0.004)	0.048* (0.027)	0.047*** (0.012)	0.020*** (0.007)	0.006 (0.014)	0.027*** (0.010)
Number of Individuals	11,449	11,436	7,745	11,378	11,512	629	1,347	1,949	1,325	2,481
Dep. Var. Mean	0.33	0.43	0.43	0.29	0.37	0.52	0.18	0.08	0.16	0.21
(C) Women Only										
total frontier experience	0.015*** (0.003)	0.017*** (0.005)	0.009** (0.004)	0.004 (0.003)	0.012*** (0.002)	0.052*** (0.018)	-0.008 (0.012)	0.012 (0.008)	0.023 (0.014)	0.028*** (0.009)
Number of Individuals	14,160	14,133	9,453	14,127	14,251	838	1,786	2,574	1,771	3,231
Dep. Var. Mean	0.29	0.39	0.20	0.09	0.25	0.47	0.19	0.07	0.16	0.20
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Wave Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Demographic X	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The unit of observation is a respondent. The sample includes U.S. counties for which the 1790–1890 period contains their entire frontier experience. Panel (A) reports estimates pooling men and women, panel (B) men only, and panel (C) women only. For the Lifestyle Survey (LSS) in columns (1)-(5): the dependent variables are binary indicators for whether the respondent believes (1) a woman's place is in the home, (2) that the women's rights movement is a bad thing, (3) men are better leaders than women, and (4) men are smarter than women; (5) is a summary mean index across (1)-(4). For the General Social Survey (GSS) in columns (6)-(10): the dependent variables are binary indicators for whether the respondent believes (6) that most women really want a home and kids, (7) women should not work, (8) they would not vote for a woman president, and (9) they think that women should take care of the home and not the country; (10) is a summary mean index across (6)-(9). In addition to state FE and baseline geographic controls in Table 4, we also include survey wave fixed effects and individual-level demographic controls: age, age squared, and race. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with 60 × 60 square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

# Appendix

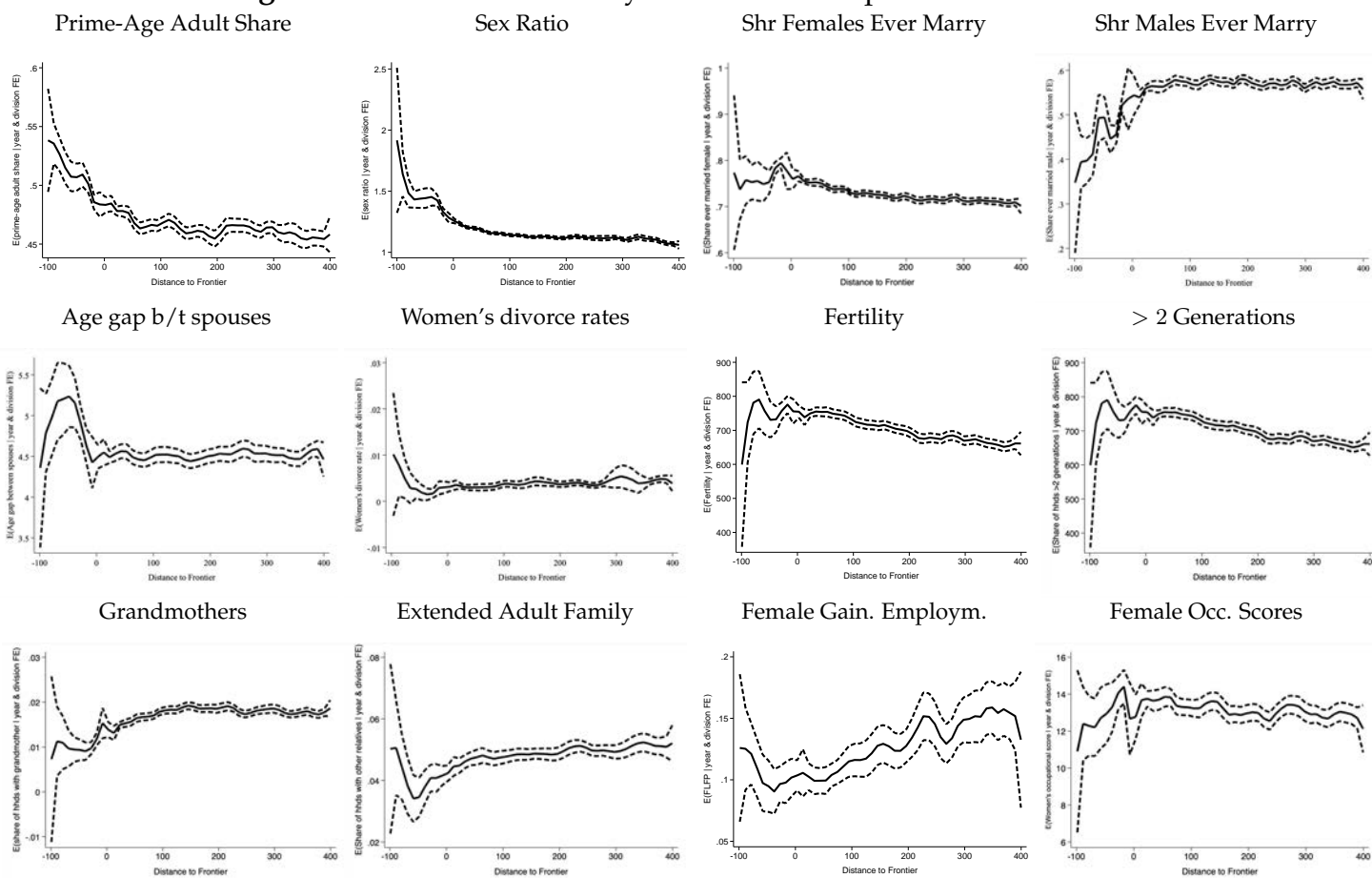
## A Appendix Figures and Tables

Figure A.1: Population Density Gradients: Semiparametric Estimates



Notes: These figures plot semiparametric estimates of equation (3) where the curves  $g(\cdot)$  are based on the Robinson (1988) partially linear approach, pooling across all available years 1790–1890 for each county  $c$ . The specification includes Census division and year fixed effects, which are partialled out before estimating these shapes, and are based on an Epanechnikov kernel and rule-of-thumb bandwidth. The dashed lines are 95 percent confidence intervals. The estimates are recovered over all counties, but the figure zooms in on those with less than 50 people/mi<sup>2</sup> for presentational purposes. Graphs (a) and (b) are reproduced from Figure 4 in Bazzi et al. (2020). (a) *Sex Ratio* for whites is the ratio of the number of white males over white females. (b) *Prime-Age Adult Share* is the fraction of whites aged 15–49 over the total number of whites. See the notes to Tables 1 and 2 for details on the other outcomes.

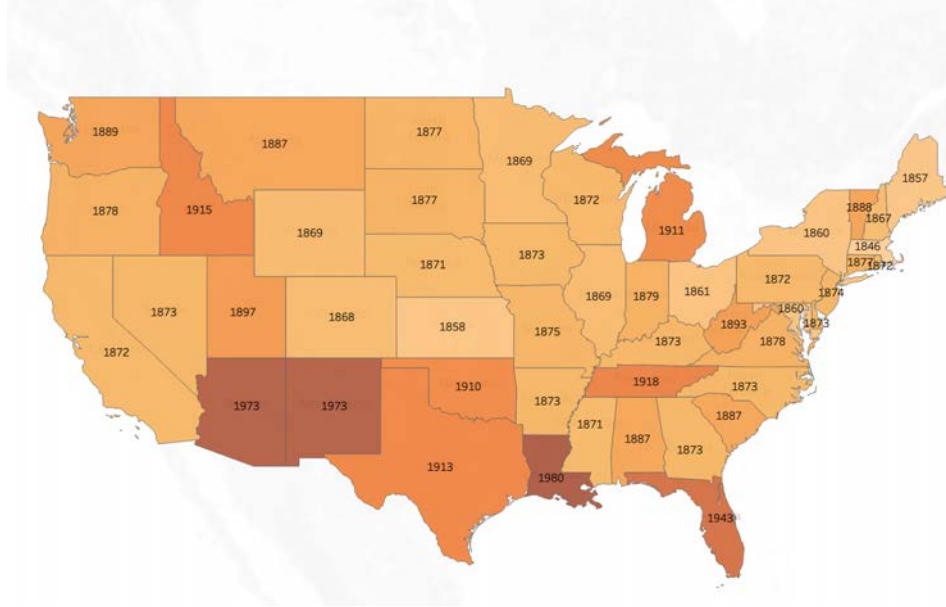
**Figure A.2: Frontier Proximity Gradients: Semiparametric Estimates**



Notes: These figures plot semiparametric estimates of equation (3) relating proximity to the frontier line to demographic characteristics prominent in historical accounts of the frontier. Graphs (a) and (b) are reproduced from Appendix Figure G.2 in Bazzi et al. (2020). See the notes to Appendix Figure A.1 for further details on the specification and outcomes.

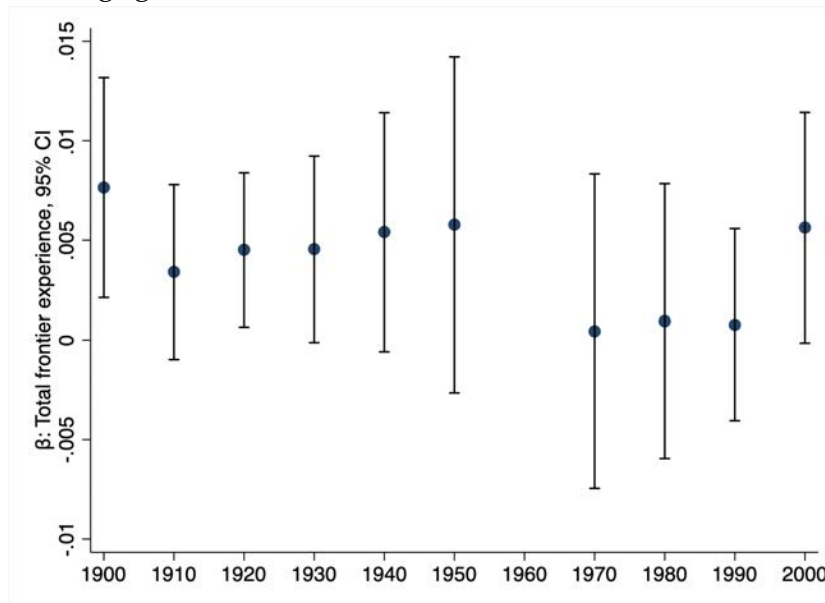


**Figure A.3: Women’s Economic Rights, Year Granted by State**



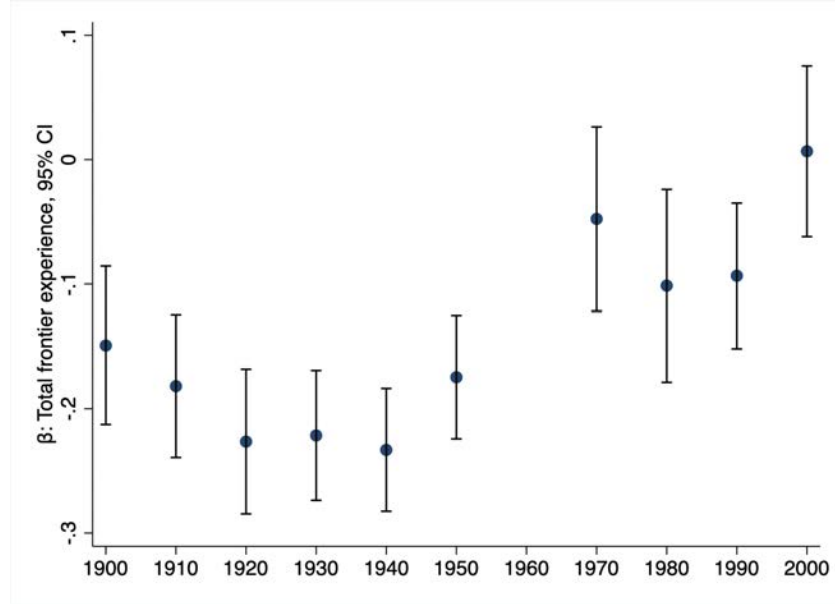
Notes: This map plots the year in which each U.S. state granted women full rights to retain property and labor earnings. The data are collected from Table 1 in Hazan et al. (2019).

**Figure A.4: Negligible Male-to-Female Sex Ratio Imbalance in the Long Run**



Notes: This figure adopts the same specification as in Figure 6 with the dependent variable being the sex ratio. The point estimates are quite small relative to the mean sex ratios, which go from 1.085 in 1900 to 0.982 in 2000. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with  $60 \times 60$  square-mile cells. Bars show 95% confidence intervals.

**Figure A.5: The Frontier Legacy for the Gender Gap in LFP**



*Notes:* This figure adopts the same specification as in Figure 6 with the dependent variable being the gender gap in labor force participation computed as the ratio of female over male labor force participation rates. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Bars show 95% confidence intervals.

**Table A.1: Marriage Dissolution on the Frontier, 1870–1880**

	Married Spouse Present (1)	Married Spouse Absent (2)	Divorced (3)	Widower (4)
Frontier	-0.060*** (0.009)	0.043*** (0.007)	0.002** (0.001)	0.015*** (0.004)
Dep. Var. Mean	0.91	0.02	0.00	0.06
Dep. Var. Std. Dev.	0.29	0.14	0.06	0.25
Number of Observations	1,068,954	1,068,954	1,068,954	1,068,954
Division FE	Yes	Yes	Yes	Yes
Individual-level Controls	Yes	Yes	Yes	Yes

*Notes:* Estimates based on a linked sample of married men in 1870 (with spouse present in the household) from the Census Linking Project (Abramitzky et al., 2020). The dependent variables are binary indicators that take the value of one if the man is (1) married with a spouse present in the household in 1880, (2) married and the spouse is absent in 1880, (3) if the man is divorced in 1880, and (4) if the man is a widower in 1880, respectively, and zero otherwise. Individual-level controls include age, age squared, race, and literacy. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with  $60 \times 60$  square-mile cells.

Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.2: Selection Patterns**

	Number of Children		Spouse's Age Gap		Female Employment		Female Occ. Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) All Linked Couples								
Frontier Migrant	-0.131*** (0.021)	-0.109*** (0.021)	-0.292*** (0.056)	-0.287*** (0.057)	-0.004*** (0.001)	-0.005*** (0.001)	-0.033 (0.022)	-0.044** (0.022)
Dep. Var. Mean (non-frontier migrant)	2.84	2.84	4.89	4.89	0.02	0.02	0.29	0.29
Dep. Var. Std. Dev. (non-frontier migrant)	2.20	2.20	5.87	5.87	0.15	0.15	2.18	2.18
Number of Observations	1,024,495	1,024,495	1,024,495	1,024,495	1,023,707	1,023,707	1,024,495	1,024,495
(B) Linked Couples with Husband Employed in Agriculture								
Frontier Migrant	-0.145*** (0.029)	-0.137*** (0.029)	-0.332*** (0.073)	-0.324*** (0.073)	-0.006*** (0.002)	-0.007*** (0.002)	-0.059*** (0.019)	-0.069*** (0.019)
Dep. Var. Mean (non-frontier migrant)	3.02	3.02	4.87	4.87	0.02	0.02	0.27	0.27
Dep. Var. Std. Dev. (non-frontier migrant)	2.28	2.28	5.96	5.96	0.16	0.16	1.77	1.77
Number of Observations	646,909	646,909	646,909	646,909	646,293	646,293	646,909	646,909
State of residence in 1870 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational Score Husband	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Estimates based on a linked sample of married men in 1870 (with spouse present in the household) from the Census Linking Project (Abramitzky et al., 2020). The dependent variables are : the total number of children in columns (1) and (2); the age gap between male and female spouses in columns (3) and (4); binary indicator for female gainful employment status in columns (5) and (6); and female occupational score in columns (7) and (8). All dependent variables are measured in 1870. Frontier Migrant is a binary indicator that takes the value of one if the couple migrated to the frontier and zero otherwise. Panel (B) restricts to farming couples, i.e., husbands in agriculture in 1870. Regressions include state fixed effects for the place of residence in 1870. Even columns include husband's occupational score in 1870. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with 60 × 60 square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.3: The Role of Women’s Economic Rights**

	Share of Women Ever Married (1)	Fertility: Child-Women Ratio (2)	Female Gainful Employment (3)	Women’s Occupational Scores (4)
Frontier	0.048*** (0.005)	86.36*** (12.24)	-0.038*** (0.008)	0.996*** (0.379)
Women’s Economic Rights	-0.019*** (0.003)	-35.62*** (8.05)	-0.000 (0.007)	0.234* (0.138)
Frontier × Women’s Economic Rights	0.006 (0.011)	-57.34*** (21.00)	0.034*** (0.011)	0.143 (0.543)
Dep. Var. Mean (non-frontier)	0.70	671	0.12	12.6
Dep. Var. Std. Dev. (non-frontier)	0.04	119	0.13	2.92
Number of County-Years	6,048	6,048	4,905	4,795

*Notes:* The unit of observation is a county. The sample includes U.S. counties from 1850–1880 censuses in columns (1)–(2) and 1860–1880 in columns (2)–(3). See the notes to Tables 1 and 2 for details on the outcomes. *Women’s Economic Rights* is a binary indicator equal to one whenever the county’s state law at time  $t$  affords women the right both to own property and retain labor earnings. *Frontier* is county frontier status at time  $t$ . Regressions include Census division and year fixed effects. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.4: The Frontier Legacy for FLFP and Fertility**

	1900	1910	1920	1930	1940	1950	1970	1980	1990	2000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(A) Female Labor Force Participation										
total frontier experience	-0.016*** (0.003)	-0.021*** (0.004)	-0.018*** (0.002)	-0.016*** (0.002)	-0.015*** (0.002)	-0.011*** (0.002)	-0.006*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)	-0.008*** (0.002)
Dep. Var. Mean	0.15	0.23	0.17	0.18	0.17	0.21	0.35	0.44	0.51	0.54
Dep. Var. Std. Dev.	0.10	0.12	0.08	0.07	0.06	0.06	0.06	0.06	0.07	0.06
Number of Counties	1,906	1,934	1,967	1,986	2,033	2,034	2,034	2,035	2,035	2,035
(B) Fertility										
total frontier experience	18.67*** (3.434)	20.41*** (3.243)	16.06*** (2.668)	12.63*** (2.215)	13.13*** (2.019)	9.62*** (2.265)	2.45 (1.656)	5.35*** (1.154)	3.26*** (0.971)	2.49*** (0.881)
Dep. Var. Mean	546.5	521.3	470.8	413.0	375.7	485.6	375.3	289.5	294.7	269.3
Dep. Var. Std. Dev.	125.0	124.0	97.1	84.5	79.2	70.6	53.9	41.9	41.7	34.6
Number of Counties	1,949	1,978	2,011	2,032	2,032	2,033	2,034	2,034	2,034	2,034
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the year-specific estimates with non-standardized outcomes from Figure 6. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.5: The Frontier Legacy for the Gender Gap in LFP**

	1900	1910	1920	1930	1940	1950	1970	1980	1990	2000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
total frontier experience	-0.018*** (0.004)	-0.023*** (0.004)	-0.020*** (0.003)	-0.019*** (0.002)	-0.019*** (0.002)	-0.014*** (0.002)	-0.004 (0.003)	-0.009** (0.003)	-0.008*** (0.002)	0.001 (0.003)
Dep. Var. Mean	0.17	0.25	0.19	0.21	0.22	0.27	0.50	0.62	0.73	0.81
Dep. Var. Std. Dev.	0.11	0.12	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.09
Number of Counties	1,906	1,934	1,967	1,984	2,033	2,034	2,034	2,035	2,035	2,035
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the year-specific estimates of the relationship between total frontier experience and the gender gap in LFP measured as the ratio of female over male LFP. The specification is identical to those in Table 4. Standard errors are clustered based on Bester et al. (2011) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.



**Table A.6: Accounting for Additional Confounders of TFE and FLFP in 2000**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
total frontier experience	-0.009*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)	-0.008*** (0.002)	-0.008*** (0.002)	-0.006*** (0.002)	-0.009*** (0.002)	-0.006*** (0.002)
Baseline controlling for . . .													
ruggedness		✓											✓
rainfall risk			✓										✓
distance to nearest portage site				✓									✓
distance to nearest mine					✓								✓
distance to nearest Indian battle						✓							✓
slave population share, 1860							✓						✓
immigrant share, 1890								✓					✓
Scottish and Irish immigrant share, 1890									✓				✓
birthplace diversity, 1890										✓			✓
years connected to railroad by 1890											✓		✓
manufacturing employment share, 1890												✓	✓
Dep. Var. Mean	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Dep. Var. Std. Dev.	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Number of Counties	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815	1,815
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table adds further controls to the baseline specification in for FLFP in 2000 in column 4 of Panel B in Table 4. The sample size is slightly reduced due to missing data for some of the variables. Detailed descriptions of these controls can be found in [Bazzi et al. \(2020\)](#). Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.7: Accounting for Additional Confounders of TFE and FLFP in the 20th Century**

	1900	1910	1920	1930	1940	1950	1970	1980	1990
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
total frontier experience	-0.003 (0.003)	-0.006** (0.003)	-0.008*** (0.002)	-0.009*** (0.002)	-0.009*** (0.001)	-0.007*** (0.001)	-0.004** (0.002)	-0.009*** (0.002)	-0.008*** (0.002)
Dep. Var. Mean	0.16	0.23	0.17	0.18	0.18	0.22	0.36	0.44	0.51
Dep. Var. Std. Dev.	0.10	0.12	0.08	0.07	0.06	0.06	0.06	0.06	0.07
Number of Counties	1,700	1,726	1,757	1,772	1,814	1,814	1,814	1,815	1,815
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table repeats the specification in column 13 of Appendix Table A.6 for other years 1900 to 1990. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.8: Alternative Measures of TFE and FLFP in 1940**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
TFE: 100 km, $\leq 6/\text{mi}^2$ , no inner or outer islands	-0.015*** (0.002)													
TFE: 50 km, $\leq 6/\text{mi}^2$ , no inner or outer islands		-0.015*** (0.002)												
TFE: 100 km, $\leq 18/\text{mi}^2$ , no inner island lines			-0.012*** (0.002)											
TFE: 50 km, $\leq 18/\text{mi}^2$ , no inner island lines				-0.011*** (0.002)										
TFE: 100 km, 2-6/ $\text{mi}^2$ , no inner island lines					-0.013*** (0.003)									
TFE: 50 km, 2-6/ $\text{mi}^2$ , no inner island lines						-0.012*** (0.003)								
TFE: 100 km, no density restriction, no inner island lines							-0.007*** (0.002)							
TFE: 50 km, no density restriction, no inner island lines								-0.008*** (0.002)						
TFE: 100 km, $\leq 6/\text{mi}^2$ , including inner island lines									-0.015*** (0.001)					
TFE: 50 km, $\leq 6/\text{mi}^2$ , including inner island lines										-0.016*** (0.002)				
TFE: 100 km, $\leq 6/\text{mi}^2$ , main single contour line											-0.013*** (0.002)			
TFE: 50 km, $\leq 6/\text{mi}^2$ , main single contour line												-0.014*** (0.002)		
TFE: 50 km, $\leq 6/\text{mi}^2$ , no inner or outer island lines													-0.015*** (0.002)	
TFE: 50 km, $\leq 6/\text{mi}^2$ , no inner or outer island lines														-0.016*** (0.002)
Dep. Var. Mean	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Dep. Var. Std. Dev.	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Number of Counties	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports estimates of column 4 in Table 4 using alternative measures of total frontier experience, each of which are described at length in [Bazzi et al. \(2020\)](#). Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.9: Adding West Coast and Regional Heterogeneity, FLFP in 1940**

	Plus West Coast (1)	Midwest Only (2)	South Only (3)	West Only (4)
(A) Measurement of TFE from 1790 to 1890				
total frontier experience	-0.008*** (0.002)	-0.011*** (0.003)	-0.008*** (0.002)	-0.005 (0.005)
Dep. Var. Mean	0.54	0.58	0.50	0.56
Dep. Var. Std. Dev.	0.06	0.05	0.06	0.06
Number of Counties	2,140	987	935	152
(B) Measurement of TFE from 1790 to 1950				
total frontier experience	-0.007*** (0.001)	-0.011*** (0.003)	-0.007*** (0.002)	-0.005 (0.003)
Dep. Var. Mean	0.54	0.57	0.50	0.55
Dep. Var. Std. Dev.	0.06	0.05	0.05	0.06
Number of Counties	2,498	1,038	1,073	321
State Fixed Effects	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes

*Notes:* This table extends our baseline sample of counties and examines FLFP in 1940 with region-by-region sample splits. Column (1) adds 105 counties along the secondary West Coast frontier (see Appendix Figure 2). Column (2) restricts to counties in the Midwest Census region, column (3) restricts to the South region, and column (4) restricts to the West, which includes the 105 counties added in column (1) plus 47 others in states in the West region but falling inside the 1890 main east-to-west frontier line. Panel (A) uses our baseline measure of TFE. Panel (B) expands the column 1 sample to include counties beyond the (main and secondary) 1890 frontier lines but inside the eventual frontier line realized by 1950, using a new measure of TFE computed over that longer time horizon. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.10: Disentangling Population Density, FLFP in 1940**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
total frontier experience, years	-0.0015*** (0.0002)	-0.0014*** (0.0002)	-0.0009*** (0.0001)	-0.0009*** (0.0002)	-0.0009*** (0.0003)	-0.0011*** (0.0002)	-0.0011*** (0.0002)
low density experience, years							-0.0063*** (0.0011)
Contemporaneous Population Density		✓					
... Decile Within-State			✓				
Population Density-Neighbor Matching Within-State				✓			
Sample Restriction	None	None	None	None	> 90th percentile urban pop. share	≤ 90th	None
Dep. Var. Mean	0.17	0.17	0.17	0.17	0.26	0.16	0.17
Dep. Var. Std. Dev.	0.06	0.06	0.06	0.06	0.05	0.05	0.06
Number of Counties	2,033	2,033	2,019	2,033	241	1,792	2,033
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table explores robustness of the FLFP results for 1940 (column 4, Table 4) to the population density confound. Column (2) controls for contemporaneous population density. Column (3) includes indicators for the decile of within-state population density. Column (4) implements a nearest-neighbor matching specification, including fixed effects within-state for pairs of counties that have the most similar population density. Columns (5) and (6) split the sample into counties above and below the 90th percentile of contemporaneous urban population shares. Column (7) controls for the total number of years that the country had population density less than 6 people/mi<sup>2</sup> from 1790–1890. This is one of the aspects of total frontier experience, the other being the total number of years that the county was within 100 km of the frontier line during that period. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.11: Instrumental Variables (IV) Strategy**

	Fertility Child-Women Ratio (1)	Female Gainful Employment (2)	LSS Mean Summary Index (3)
(A) IV = Log Average Actual National Migration Inflows Over 30 Years			
total frontier experience	11.56*** (3.413)	-0.016*** (0.003)	0.008** (0.004)
Dep. Var. Mean	375.70	0.18	0.30
First-Stage F Statistic	188.6	188.2	31.5
Number of Observations	2,032	2,033	25,763
(B) IV = Log Average Predicted National Migration Inflows Over 30 Years			
total frontier experience	14.28*** (3.941)	-0.016*** (0.003)	0.007* (0.004)
Dep. Var. Mean	375.7	0.18	0.30
First-Stage F Statistic	184.3	183.8	36.8
Number of Observations	2,032	2,033	25,763
State Fixed Effects	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes
Survey Wave Fixed Effects			Yes
Individual Demographic Controls			Yes

Notes: IV estimates for three core outcomes: fertility, female labor force participation, and a mean index of conservative gender attitudes from the Lifestyle Survey (LSS) (see Table 8 for details). Outcome variables in columns (1)–(2) are measured using 1940 Census data. Panel (A) reports the IV estimates for the baseline sample and specification using the log of the average national annual actual migration inflows over the 30 years subsequent to the frontier line arriving within 110 km from the given county centroid. Panel (B) reports the estimates using the IV constructed based on annual migration inflows to the United States predicted by weather shocks in Europe. Further details on the construction of both instrumental variables can be found in [Bazzi et al. \(2020\)](#). Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.

**Table A.12: Excess Voting Turnout: Pre- and Post- Equal Rights Amendment**

	1916–1912 (1)	1920–1916 (2)	1924–1916 (3)	1924–1920 (4)
total frontier experience	0.262 (0.200)	-0.471** (0.224)	-0.532** (0.239)	-0.069 (0.207)
Number of Observations	1,902	1,902	1,907	1,902
Dep. Var. Mean	3.82	-9.59	-11.28	-1.70
Dep. Var. Std. Dev.	7.50	10.27	11.46	-1.70
State Fixed Effects	Yes	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes
Share Male and Female	Yes	Yes	Yes	Yes

Notes: The unit of observation is a county. The dependent variable is the excess voter turnout measured as the difference in turnout from two presidential elections. We rely on ICPSR county level data on presidential election turnout computed on the basis of estimated eligible voters. We report robust standard errors clustered based on grid-cell clustering. Baseline geographic controls are included throughout. We also control for the share of male and female population aged 21 and over in 1910 and 1920. Standard errors are clustered based on [Bester et al. \(2011\)](#) grid-cell clustering with  $60 \times 60$  square-mile cells. Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%.