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THE LEGACY OF THE MISSING MEN

THE LONG-RUN IMPACT OF WORLD WAR I ON FEMALE LABOR FORCE PARTICIPATION

Victor Gay*

April 2019

Abstract

This paper explores the pathways that underlie the diffusion of women's participation in the labor force across generations. I exploit a severe exogenous shock to the sex ratio, World War I in France, which generated a large inflow of women in the labor force after the war. I show that this shock to female labor transmitted to subsequent generations until today. Three mechanisms of intergenerational transmission account for this result: parental transmission, transmission through marriage, and transmission through local social interactions. Beyond behaviors, the war also permanently altered beliefs toward the role of women in the labor force. (*JEL* J16, J22, N34, Z13)

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1. Introduction

Women’s involvement in labor markets increased dramatically across industrialized economies after World War II, fundamentally altering the role of women in these societies (Olivetti and Petrongolo, 2016). In France, labor force participation rates of women aged 30 to 49 rose from 40 percent in the early 1960s to 90 percent today. Traditional explanations for this “quiet” revolution have emphasized the role of technological change in increasing both the demand and supply of female labor (Goldin, 2006).¹ More recently, intergenerational transmission mechanisms have been pointed out as instrumental to this secular transformation. For instance, to account for the endogenous evolution of women’s working behaviors and attitudes toward female labor throughout the twentieth century, Fernández (2013) develops a framework of intergenerational learning in which women update their prior beliefs about the payoffs from working by observing women of the previous generation.² Alternatively, in Fernández, Fogli and Olivetti’s (2004) model, men who grow up with a working mother form more progressive attitudes toward gender roles. This makes them less averse to having a working wife, thereby providing incentives for women to enter the labor force.

Despite growing consensus that intergenerational transmission mechanisms constitute an important explanation for the revolution of female labor, there is still little empirical evidence that these channels were simultaneously at work throughout the revolutionary period. The main reason concerns challenges to identification. First, most factors that initially induced women to enter the labor force (such as technological change) are strongly persistent. As a result, the working behaviors of women across generations is largely codetermined. Moreover, the massive entrance of women in the labor force might have altered local labor markets permanently,

¹Technological explanations include greater availability and declining prices of labor-saving consumer durable goods (Greenwood, Seshadri and Yorukoglu, 2005), oral contraceptives (Bailey, 2006), the fall in child care cost induced by the marketization of home production (Attanasio, Low and Sánchez-Marcos, 2008), improvements to maternal health (Albanesi and Olivetti, 2016), and the structural transformation (Ngai and Petrongolo, 2017). Goldin (1990; 2006; 2014) provides comprehensive accounts of the mechanisms underlying long-run trends in female labor force participation in the United States. For a historical perspective on France, see Maruani and Meron (2012).

²Hazan and Maoz (2002), Fogli and Veldkamp (2011), and Hiller and Baudin (2016) construct related models.

making it challenging to identify intergenerational transmission channels independent from confounding changes to institutional structures.

In this paper, I explore the pathways that underlie the diffusion of women's working behaviors across three generations in twentieth-century France. I provide direct empirical evidence that three mechanisms of intergenerational transmission were simultaneously at work : parental transmission, transmission through marriage, and transmission through local social interactions. My empirical strategy exploits a severe exogenous shock to the adult sex ratio: World War I in France. Of 8 million French men drafted during the conflict, 1.3 million died because of the war; a military death rate of 16 percent. As a result, it was not until the 1950s that the adult sex ratio recovered its balance (Figure 1).³ This disruption induced many women to enter the labor force after the war (Boehnke and Gay, 2019).⁴

I explore the channels of intergenerational transmission of this exogenous shock to female labor throughout the second half of the twentieth century, long after the reversion of sex ratios to balance. To identify intergenerational transmission independent from confounding changes to local labor market structures, I use an empirical strategy that mirrors the epidemiological approach to culture (Fernández, 2011). This approach implies comparing women born in locations that experienced different military death rates but who reside in the same location and therefore face similar local institutional constraints when making decisions. Using all the censuses for which microdata exist (thirteen censuses starting in 1962), I find that women born in *départements* that experienced high (20 percent) rather than low (10 percent) military death rates were 5 percentage points more likely to be working.⁵ Estimates are stable throughout the period, though their magnitude declines

³World War II affected the adult sex ratio in France only marginally, as 115 thousand French soldiers died because of the war; a military death rate of 1.5 percent (Lagrou, 2002). I show in Appendix C that military fatalities and war destruction from WWII had no role in the processes highlighted in this paper.

⁴Boehnke and Gay (2019) analyze the short-run impact of WWI military fatalities on female labor force participation. They use an array of historical evidence to examine the mechanisms through which sex ratio imbalances induced women to enter the labor force during the interwar period. While the current study is related to Boehnke and Gay (2019), it analyzes mechanisms that are of a different nature and that affected labor decisions of women born after sex ratios had reverted to balance.

⁵Départements represent the second level of subnational government, between *régions* and *arrondissements*. Metropolitan France was divided into 87 départements before the war, and 90 after the war. These were further subdivided into 95 départements later on.

over time relative to rising trends in female labor force participation rates. Using an “inverted” epidemiological approach and comparing women with identical origins *across* rather than within residence locations, I find that intergenerational transmission mechanisms explain half of the long-run impact of WWI military fatalities on female labor force participation.

To account for these findings, I explore three channels of intergenerational transmission: parental transmission, transmission through marriage, and transmission through local social interactions. To identify vertical parental transmission, I use the extended annual labor force surveys 2005–2012, which provide origins of respondents’ parents. I focus on the sample of second-generation internal migrants and compare women born and residing in the same *département* but whose parents were born in *départements* that experienced different military death rates. I find evidence for a strong mother-to-daughter transmission channel: women with mothers born in *départements* that experienced high (20 percent) rather than low (10 percent) military death rates were 11 percentage points more likely to be working. A 2SLS approach reveals that war-induced changes to mothers’ working behaviors drive this maternal transmission. I also find evidence for a father-to-daughter transmission channel, though its magnitude is smaller. Next, I explore transmission through marriage and show that women with husbands born in *départements* that experienced high rather than low military death rates were 2 to 5 percentage points more likely to be working. Consistent with this result, I provide evidence for a strong mother-in-law to daughter-in-law transmission channel. Finally, using municipality-level variation in the exposure to WWI military fatalities among local populations’ lineage, I find that this historical shock to female labor transmitted locally and persisted through social interactions. A comparison of these results suggests that mothers and mothers-in-law were of primary importance in the transmission of the legacy of the missing men relative to local social interactions.

To provide a rationale for the long-run impact of WWI military fatalities on female labor force participation, I argue that women induced to enter the labor force during the interwar period altered preferences and beliefs toward female labor of their daughters, sons, and entourage, and that these changes translated into the working behaviors of women in subsequent generations. Since individuals form preferences and beliefs early in life from learning and socializing with their parents,

peers, and neighbors (Hauk and Saez-Marti, 2002; Bisin and Verdier, 2011; Fogli and Veldkamp, 2011; Fernández, 2013; Olivetti, Patacchini and Zenou, 2018), men and women who grew up with a working mother, or in an environment in which many women worked, should form more progressive attitudes toward female labor.⁶ Consistent with this argument, I find that men and women born in départements that experienced greater military death rates hold more progressive attitudes toward the role of women in the labor force today.

Related Literature and Contributions. To account for the revolution of female labor, models of intergenerational transmission typically highlight one specific mechanism—e.g. transmission from mothers to daughters (Fernández, 2011), from mothers-in-law to daughters-in-law (Fernández, Fogli and Olivetti, 2004), through local information diffusion (Fogli and Veldkamp, 2011). This paper is the first to provide comprehensive empirical evidence that these mechanisms were simultaneously at work throughout the revolutionary period, over three generations. For instance, Fernández, Fogli and Olivetti (2004) argue that one explanation for the revolution of female labor is the increasing number of men who grew up with a working mother. They show that women’s wartime employment during WWII in the United States (proxied by wartime mobilization) propagated to their daughters-in-law after the war—though Rose (2018) largely nuances these findings.⁷ Consistent with this study, I find evidence for a mother-in-law to daughter-in-law transmis-

⁶Many studies find a correlation between both beliefs toward female labor and the working behaviors of mothers and their daughters’, of mothers-in-law and their daughters-in-laws’, and of mothers and their daughters’ peers. Farre and Vella (2013) show that US mothers’ attitudes toward gender roles and their working behaviors are correlated with their daughters’ attitudes when young and working behaviors when adults, a phenomenon corroborated for Great Britain (Johnston, Schurer and Shields, 2014) and Mexico (Campos-Vazquez and Velez-Grajales, 2014). Olivetti, Patacchini and Zenou (2018) show that the working behaviors of mothers of a woman’s friends when growing up affect her own working behavior later in life. Transmission from mothers-in-laws’ labor choices to their daughters-in-laws’ has been found for Japan (Kawaguchi and Miyazaki, 2009), Switzerland (Bütikofer, 2013), the United States (Morrill and Morrill, 2013), and China (Chen and Ge, 2018; Li and Liu, 2018).

⁷A comprehensive empirical literature suggests that wartime mobilization in WWII U.S. generated an increase in female labor supply after the war (Acemoglu, Autor and Lyle, 2004; Goldin and Olivetti, 2013; Doepke, Hazan and Maoz, 2015). Using more accurate measurement, Rose (2018) shows that neither manpower mobilization nor WWII military fatalities affected post-war female labor force participation. Instead, female wartime employment marginally affected the intensive margin of post-war female employment in the durable manufacturing sector.

sion channel. But this mechanism constitutes only one among those I am able to identify.⁸ Importantly, in contrast to this study and the broader literature, the empirical strategy I use enables to identify intergenerational transmission independent from confounding changes to local labor market structures. Further, using WWI rather than WWII as a source of variation provides the opportunity to investigate the diffusion dynamics of women’s working behaviors across three generations, from the beginning to the end of the revolution of female labor.

This paper also uncovers mechanisms of historical persistence for which the evidence is still scarce. Due to the methodological focus of the literature on a location-based aspect of history—how historical events in a location shape long-run outcomes in that location—domestic institutions have been pointed out as primary channels of historical persistence (Acemoglu, Johnson and Robinson, 2005; Nunn, 2014; Michalopoulos and Papaioannou, 2017). Partly because of a lack of appropriate data, a crucial vehicle of historical persistence has received less attention: individuals. Understanding how individuals transmit legacies of history across generations requires moving from a location-based approach to a lineage-based approach. Applying this methodology, Michalopoulos, Putterman and Weil (2018) show that pre-modern economic lifeways in Africa still affect individuals’ economic outcomes today.⁹ Alesina, Giuliano and Nunn (2013, p. 524) find that half of the overall impact of historical plough use on contemporaneous gender-role attitudes is due to the transmission of cultural norms from ancestors to descendants rather than to long-run changes to institutional structures. Using a more systematic approach, I also show that lineage aspects account for half of the long-run impact of WWI military fatalities on female labor force participation. This implies an important role for individuals relative to local institutional structures in generating historical persistence. My results further suggest that local social interactions are not to be neglected to understand how history transmits through individuals. Additionally, another novelty of this paper is the use of a lineage approach *within* a country’s *regions* to study the transmission of a historical shock. For instance, some specifications compare second-generation internal migrants that originate from neighboring locations. This reduces potential biases that might arise

⁸For instance, Fernández, Fogli and Olivetti (2004, pp. 1266–1267) find no evidence for a mother-to-daughter transmission channel.

⁹Nunn and Wantchekon (2011) and Teso (2019, pp. 26–28) use a similar approach.

when comparing movers to stayers, which is oftentimes an issue for studies using a lineage approach.

Finally, this paper complements the literature that investigates how cultural norms emerge and change over time (Giuliano and Nunn, 2017). Various studies show that historical shocks alter the economic roles of women in subsequent generations, particularly shocks to sex ratios (Giuliano, 2017, pp. 20–23). Teso (2019) finds that sex ratio imbalances generated by the transatlantic slave trade (slaves were predominantly male) induced current generations of women to enter the labor force. Grosjean and Khattar (2019) show that the scarcity of women in nineteenth-century Australia due to the arrival of predominantly male British convicts had adverse long-run consequences for women’s position in the labor force and for attitudes toward gender roles today. I similarly find that sex ratio imbalances resulting from WWI had a permanent impact on the economic roles of women. In contrast to these studies, the historical shock I consider is sharper—it was generated over a period of four years—which enables to rule out alternative channels through which it might have translated over the long run. Moreover, by examining its continuous impact over time from the initial shock to the present, the long-run exclusion restriction necessary for this type of analysis is much more likely to be satisfied.

In the remainder of the paper, I describe the short-run impact of WWI on female labor (section 2) and show that this shock persisted (section 3) through mechanisms of intergenerational transmission (section 4). In section 5, I show that it also altered attitudes toward female labor. Section 6 concludes.

2. The Missing Men and Interwar Female Labor Force Participation

2.1. World War I Military Fatalities

To construct a local measure of military death rates, I collected individual military records for all 1.3 million French soldiers who died because of the war and extracted their dates and départements of birth.¹⁰ The military death rate in a département is the ratio of deceased soldiers born in the département to the size of its drafted population, which is captured by the male population aged 15 to 44 in

¹⁰ Military records are from the *Mémoire des Hommes* (MDH) archive. The Data Appendix provides more details. This dataset is also used in Boehnke and Gay (2019). Prost (2008) provides a historical account of the assessment of WWI military fatalities in France.

1911—conscription concerned all men aged 20 to 48. The distribution of military death rates is displayed in Figure 2. Military death rates range from 6 percent in Belfort to 29 percent in Lozère. The average is 15 percent, the 25th percentile 10 percent, and the 75th percentile 20 percent.¹¹

Two elements explain the systematic part of the variation in military death rates across départements: the territorial organization of military recruitment and the industrial war effort. The territorial organization of the military structured both recruitment and army corps, which initially comprised soldiers from the same military region.¹² Soldiers from the same region were therefore sent to the same battlefields at the beginning of the war.¹³ However, as military fatalities soon accumulated, the military command changed its allocation policy; after five months into the war, soldiers were allocated to depleted army corps by priority, effectively pooling soldiers from different regions (Boulanger, 2001, p. 253). As a result, military death rates varied greatly across départements, even within regions—military region fixed effects explain only 16 percent of the variation in military death rates across départements.¹⁴

As the war lingered, the military command’s plan to supply troops with war matériel proved dramatically insufficient (Porte, 2005; Bostrom, 2016).¹⁵ To cope with the ongoing war effort, the Ministry of War recalled soldiers with manufacturing skills so that up to 12 percent of soldiers were employed in war factories during the conflict. An additional 8 percent were employed in military administration (Figure A.1).¹⁶ As a result, soldiers from industrial and urban areas—the less rural

¹¹I show in Table A.1 that military fatalities had a dramatic impact on adult sex ratios. Figures and Tables indexed by a letter are available in the Online Appendix.

¹²This territorial structure was inherited from the reorganization of the army after the Franco-Prussian War of 1870. The structure in place in 1914 was defined by the law of December 22, 1913 (Boulanger, 2001, pp. 16–24).

¹³The mobilization plan (*Plan XVII*), designed in 1912, assigned each army corps to a specific area after invasion by German troops. The structure of this plan was predetermined by the railway network (Gonzalez-Feliu and Parent, 2016).

¹⁴This measure of military death rates improves upon previous measures used in Abramitzky, Delavande and Vasconcelos (2011) and Vandembroucke (2014), which are based on Huber (1931) and vary at the level of these 21 military regions.

¹⁵For example, the Plan XVII procured 13,600 75mm shells per day. Nearly 40,000 were used daily during the Race to the Sea in October 1914. By then, half of the stock of 75mm shells had been depleted (Bostrom, 2016, p. 264). See also Porte (2005, pp. 73–82).

¹⁶This allocation policy was enacted by the Dalbiez bill of August 17, 1915. Soldiers were also allocated to steel production and harvesting from 1917 onward.

areas—were less likely to die in combat. This pattern clearly emerges when regressing military death rates on pre-war characteristics (Table 1): rural départements experienced greater military death rates, where rurality is captured by the share of rural population and the share of population born in the département.¹⁷ Rurality explains 74 percent of the variation in military death rates (column 1). Determinants of subsequent female labor force participation—pre-war female labor force participation, female education, total fertility, personal wealth per inhabitant—as well as additional characteristics are not correlated with military death rates and only explain an additional 6 percent of their variation (column 2). Including 21 military region fixed effects explains an additional 2 percent (column 3). Throughout the analysis, I rely on the residual variation in military death rates following the specification in column 3. I interpret this residual variation as non-systematic and related to the randomness at which soldiers encountered violence on the battlefield.

2.2. Female Labor Force Participation during the Interwar Period

To assess the short-run impact of WWI military fatalities on women’s working behaviors, Boehnke and Gay (2019) exploit differential changes in female labor force participation rates before and after the war across départements that experienced different military death rates. Their results imply that in départements that experienced high (20 percent) rather than low (10 percent) military death rates, female labor force participation rates were 4 percentage points higher after the war, an increase of 12 percent relative to pre-war levels. This upward shift was driven by single women who entered the labor force because of the tightness of the post-war marriage market and by war widows who entered the labor force to compensate for the loss of their husbands’ incomes (Boehnke and Gay, 2019, pp. 16–20).

3. The Legacy of the Missing Men

3.1. An Epidemiological Approach

To explore whether this short-run shock to female labor transmitted to later generations, I use an empirical strategy that mirrors the epidemiological approach to

¹⁷The census of 1911 defines the share of rural population as the share of population that resides in municipalities with fewer than 2,000 inhabitants.

culture (Fernández, 2011). Given that the relationship between inherited beliefs and behaviors might be codetermined by institutional factors, this approach captures the role of cultural transmission through the behaviors of individuals with different geographical origins but who reside within the same environment, thereby facing similar institutional constraints when making decisions.¹⁸

Interwar changes in female labor force participation were driven by increased female labor supply, which slightly depressed female wages in locations that were relatively more affected by the war (Boehnke and Gay, 2019, pp. 20–22). Lower female wages might have incentivized firms to specialize in female labor-intensive activities. Had these changes persisted, the incentive structure faced by women would differ systematically across locations that experienced different military death rates. To identify the portable component of the legacy of the missing men and disentangle intergenerational transmission from confounding institutional factors, I exploit variations in the working behaviors of women who make decisions under similar local labor market conditions but whose geographical origins differ in their exposure to the war.

3.2. The Censuses (1962–2012)

I combine all the censuses for which microdata exist until 2012; thirteen censuses starting in 1962.¹⁹ They are 20 to 25 percent samples of the population (except those of 1962 and 1999, which are 5 percent samples). The regression sample consists of internal migrant married women aged 30 to 49 born and residing in metropolitan France. It comprises 6.5 million women. I focus on this age group to ensure that human capital investments are completed and to abstract from retirement decisions. I further restrict the sample to married women because their entrance in the labor force constituted the revolution of female labor; the share of working women in this sample increased from 30 percent in the early 1960s to 80 percent in the late 2000s.²⁰ Internal migrants are individuals who reside in a département that is different from their département of birth. Under this definition, half of the French population

¹⁸This approach has been used to identify the role of culture for labor choices of immigrant women to the U.S. (Fernández and Fogli, 2009; Blau, Kahn and Papps, 2011; Gay et al., 2018).

¹⁹Census years are 1962, 1968, 1975, 1982, 1990, 1999, and 2006 to 2012.

²⁰Figure A.2 displays sample means for labor, fertility, and education outcomes. Further summary statistics are available in the Supplementary Appendix.

of married women aged 30 to 49 were internal migrants in 2012 (Figure A.3).²¹ Migrant and non-migrant women are broadly alike along observable characteristics: although they are slightly more educated, internal migrants are equally likely to be working, were born in départements with similar military death rates, and have the same number of children (Figure A.4). This suggests that sample selection through migration is unlikely to drive the correlation between military death rates and labor market outcomes. Robustness checks in Section 3.4.1 support this assertion.

3.3. Empirical Strategy

I estimate the following specification separately for each census t :

$$(1) \quad \text{employed}_{ibr t} = \beta \text{death_rate}_b + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,b} + \mu_{1914,b} + \delta_r + \varepsilon_{ibr t},$$

where $\text{employed}_{ibr t}$ denotes whether woman i born in département b and residing in département r is employed. \mathbf{X}_i is a set of year of birth indicators and $\widetilde{\mathbf{X}}_{1911,b}$ a set of pre-war controls that capture the systematic determinants of military death rates and subsequent female labor force participation.²² Consistent with the epidemiological approach, I include département of residence fixed effects δ_r . To further reinforce the credibility of the conditional independence assumption, I include military region of birth fixed effects $\mu_{1914,b}$.²³ I use two-way clustering and cluster standard errors at the levels of départements of birth and residence. β is identified from variations in the working behaviors of internal migrant married women of the same cohort, residing in the same département, but who were born in neighboring départements that experienced different military death rates.

²¹Départements are relatively small: their median radius is 43 kilometers. The median migration distance is 150 kilometers. The *Geographical Mobility and Urban Concentration* study of 1961 reports that among married women aged 30 to 49, the primary migration motive is family related for two-fifths of them and work related for another two-fifths (Girard, Bastide and Pourcher, 1964).

²² $\widetilde{\mathbf{X}}_{1911,b}$ contains the share of rural population, the share of population born in the département, female labor force participation, a measure of female education, total fertility, and personal wealth per inhabitant, all measured in 1911.

²³Soldiers from the same military region were initially sent to similar battlefields, making the distribution of military death rates more likely to be idiosyncratic within military regions.

3.4. Results

Estimates are reported in panel A of Figure 3. They imply that women born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 5 percentage points more likely to be working between 1962 and 2012. They are significant at the 1 percent level and stable across time. Since base rates increased from 30 percent in the early 1960s to 80 percent in the late 2000s, their magnitude declines from 16 percent of the mean in 1962 to 6 percent in 2012 (panel B).²⁴

In the short-run, female labor force participation rates increased by 4 percentage points after the war in départements that experienced high (20 percent) rather than low (10 percent) military death rates (Boehnke and Gay, 2019). The ratio 5/4 can therefore be interpreted as an estimate for the intergenerational transmission of working behaviors from women in the interwar period to women in the post-WWII era. This ratio implies that a 1 percentage point initial increase in female labor force participation due to WWI was associated with a 1.25 percentage point increase in the likelihood of a woman working between 1962 and 2012.²⁵

Epidemiological approach vs location-based approach. What was the role of changes to local institutional structures relative to intergenerational transmission in the persistence of this historical shock? First, consider non-migrants. Their behaviors cumulate implications of both transmission of cultural norms and changes to local labor market structures. I repeat the analysis on the sample of non-migrant married women aged 30 to 49 and estimate:²⁶

$$(2) \quad \text{employed}_{irt} = \beta \text{death_rate}_r + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,r} + \mu_{1914,r} + \varepsilon_{irt}.$$

In contrast to the epidemiological approach, this specification does not include resi-

²⁴Their magnitude is nevertheless stable relative to the outcome standard deviation, of which they explain 10 to 15 percent (Figure A.5).

²⁵This relationship holds when regressing post-WWII female labor force participation rates on the post-WWI increase in female labor force participation instrumented by military death rates (Figure A.6).

²⁶Similar to specification 1, employed_{irt} indicates whether woman i residing in département r is employed, \mathbf{X}_i is set of year of birth indicators, $\widetilde{\mathbf{X}}_{1911,r}$ a set of pre-war controls, and $\mu_{1914,r}$ military region fixed effects. Standard errors are clustered at the level of départements of residence.

dence location fixed effects. As a result, β is identified from variations in the working behaviors of women *across* rather than within départements. I report estimates in panel A of Figure 4. They imply that women born and residing in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 7 to 11 percentage points more likely to be working between 1962 and 2012. A comparison with estimates in Figure 3 suggests that 45 to 59 percent of the legacy of the missing men operated through intergenerational transmission rather than through changes to local institutional structures.

Second, consider the sample of first-generation internal migrant married women aged 30 to 49 and the following “inverted” epidemiological approach:

$$(3) \quad \text{employed}_{ibrt} = \beta \text{ death_rate}_r + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,r} + \mu_{1914,r} + \omega_b + \varepsilon_{ibrt},$$

where ω_b are département of birth fixed effects. Here, β is identified from variations in the working behaviors of women *across* départements but *within* geographical origins. By fixing variations due to départements of birth, the coefficient solely captures the role of changes to local institutional structures. I report estimates in panel B of Figure 4. They imply that women born in the same département but residing in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 3 to 7 percentage points more likely to be working between 1962 and 2012. These estimates suggest that 42 to 63 percent of the legacy of the missing men operated through intergenerational transmission rather than through changes to local institutional structures.²⁷

Although both analyses use alternative samples and sources of identifying variation, they provide similar answers. These magnitudes are also consistent with results of Alesina, Giuliano and Nunn (2013, p. 524), who find that 35 to 50 percent of the impact of historical plough use on contemporaneous gender-role attitudes is due to the transmission of cultural norms.

²⁷I build the denominator by summing coefficients from the epidemiological approach and the inverted epidemiological approach in panel B of Figure 4.

3.4.1. Robustness

I perform a series of robustness checks that support the credibility of baseline estimates. The full set of results is reported in Appendix B. I also show in Appendix C that World War II military fatalities and destruction do not affect the results.

Alternative Specifications. Estimates are robust to the choice of regression model: marginal coefficients from Probit and Logit models are similar to OLS coefficients. They are also similar when the outcome is a labor force participant indicator, when widening age bounds to 25 to 59, and when including women of all marital statuses.

Selective Migration Patterns. Because coefficients are identified from behaviors of internal migrants (though originating from neighboring départements), selective migration might be an important mechanism if migration patterns were correlated with both military death rates and labor market outcomes. Reassuringly, both variables are constant across migration status (Figure A.4). Still, residents in a département might not all experience the same labor market opportunities. If those born in départements that experienced greater military death rates sorted systematically into the more dynamic local labor markets in their destination département, at least part of the effect would be attributable to selective in-migration. Performing within-municipality comparisons through up to 23 thousand fixed effects leaves baseline estimates unchanged, which implies that this type of selective migration should not affect the interpretation.²⁸ To alleviate potential issues of out-migration sorting, I control for the relative attractiveness of origin and destination départements through dyadic measures that capture pull and push forces between each pair of départements. I also restrict the sample to individuals who migrated at least one decade earlier—the one-and-a-half generation—since they might be subject to less biases due to recent migration. Both strategies only slightly decrease baseline estimates, suggesting that selective out-migration does not constitute an important explanation for the results.

²⁸Baseline estimates are similarly unchanged when removing urban départements.

Inaccurate Assignment of Military Death Rates. The epidemiological approach requires regressors to be assigned at the level of cultural origin (i.e., the département in which internal migrants' ancestors were residing during the interwar period). However, censuses do not provide parental origins. I am therefore constrained to assume that départements of birth and origin are identical. I relax this assumption by replicating the analysis on the extended labor force surveys 2005–2012, which provide parental origins. I restrict the sample to internal migrants whose parents were born in the same département as themselves. Parents of typical respondents in the sample were born during the 1930s, so that départements of birth likely trace to the war.²⁹ Estimates are slightly inflated compared to the baseline, which suggests that inaccurate assignment of military death rates generates some small attenuation bias.³⁰

Education and Fertility. Labor market outcomes are endogenous to human capital investment and fertility choices. As a result, these decisions might mediate the relationship between women's working behaviors and WWI military death rates. Controlling for educational attainment and number of children leaves results unchanged, suggesting that the long-run impact of WWI military fatalities was direct rather than mediated by education and fertility choices.

3.4.2. Further Results

Further results are reported in Appendix D. Herein, I show that women born in départements that experienced greater military death rates do not make different fertility or education choices, corroborating that these decisions are not mediators.³¹ These women do not marry at different rates, and when they marry, their husbands do not differ along observable characteristics. This suggests that marriage market disequilibria due to the war highlighted by Abramitzky, Delavande and Vasconcelos (2011) remained circumscribed to the interwar period. I also find little heterogeneity

²⁹The share of French men born in France that remained in their département of birth was 76.0 percent in 1921, 75.2 percent in 1931, and 74.3 percent in 1936 according to the censuses, suggesting limited migration movements between the end of the war and the mid-1930s.

³⁰A related concern is that départements of birth and childhood might differ. Comparing women with similar migration histories generates results identical to the baseline.

³¹I also ran analyses showing that women born in départements that experienced greater military death rates do not choose more technical curricula or more male-biased occupations.

across women with different characteristics (number of children, education, age, marital status). In particular, life-cycle patterns in labor force participation are not affected by WWI military fatalities. I further provide cohort-specific estimates and a placebo test using the male sample.

Next, I combine all thirty-two annual labor force surveys from 1982 to 2013 and run a replication that corroborates results obtained with the censuses.³² The analysis of labor force surveys further reveals that women born in départements that experienced greater military death rates are more attached to the labor force, but that this influence on the extensive margin does not translate to the intensive margin as they work shorter hours. A final concern is that although there is no evidence of a mediating role of observable educational attainment, results might be driven by *unobserved* heterogeneity in human capital. Should this be the case, it would be reflected in wages. Reassuringly, I find that women born in départements that experienced greater military death rates do not earn higher wages.

4. Intergenerational Transmission Mechanisms

To account for these results, I explore three mechanisms of intergenerational transmission: parental transmission (Section 4.1), transmission through marriage (Section 4.2), and transmission through local social interactions (Section 4.3). Overall, mothers and mothers-in-law appear as the primary agents of transmission of the legacy of the missing men.

4.1. Parental Transmission

I first explore vertical transmission from parents to daughters. I find that women with parents (especially mothers) born in départements that experienced greater military death rates are more likely to work. 2SLS estimates reveal that war-induced changes to mothers' working behaviors drive this maternal transmission.

³²I run the same specification as the baseline on a different sample of the same underlying population. In that sense, this is a reproduction test (Clemens, 2017, p. 327).

4.1.1. Empirical Strategy

I again rely on an empirical strategy that mirrors the epidemiological approach to culture. Using the extended labor force surveys 2005–2012, which provide parental origins, I focus on the sample of second-generation internal migrant married women aged 30 to 59 with parents born in metropolitan France. I first restrict second-generation internal migrants to women who reside in their département of birth but whose mothers and fathers were both born in another département.³³

Focusing on second- rather than first-generation internal migrants improves the credibility of identification. A typical respondent in the sample has parents born during the 1930s. Their départements of birth therefore plausibly trace to the war (see footnote 29). Moreover, since the location of second-generation internal migrants was determined prior to their births, results are further less likely to be driven by selective migration.³⁴ To determine the role of mothers’ origins, I estimate:

$$(4) \quad \text{employed}_{imflr} = \beta \text{death_rate}_m + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,m} \\ + \mu_{1914,m} + \delta_r + \omega_f + \varepsilon_{imflr},$$

where m indexes mothers and f fathers. Historical controls $\widetilde{\mathbf{X}}_{1911,m}$ are assigned at the level of mothers’ départements of birth and $\mu_{1914,m}$ are mothers’ military region of birth fixed effects. Following the epidemiological approach, I include département of residence fixed effects δ_r (départements of residence and birth are identical as the sample consists of second-generation internal migrants). I also include a set of year of birth indicators \mathbf{X}_i and survey-year fixed effects. To neutralize the influence of fathers’ origins, I include fathers’ département of birth fixed effects ω_f . This enables to compare women whose fathers were born in the same départements. I cluster standard errors at the levels of départements of residence and mothers’ départements of birth.

³³In the extended labor force surveys, among the 168 thousand married women aged 30 to 59 who reside in their département of birth, 32 thousand (19 percent) have mothers born outside their département of birth, 33 thousand (20 percent) have fathers born outside their département of birth, and 15 thousand (9 percent) have both parents born outside their département of birth.

³⁴Second-generation migrants and natives are broadly alike: they are equally likely to be employed and have the same number of children. As with first-generation migrants, second-generation migrants are slightly more educated than natives (Table A.3).

4.1.2. Results

I report results in Table 2.³⁵ In column 1, β is identified from variations in the working behaviors of second-generation internal migrant married women of the same cohort, born and residing in the same département, but whose mothers were born in départements that experienced different military death rates. The estimate is significant at the 1 percent level and implies that women whose mothers were born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 11 percentage points more likely to be working. This represents 13 percent of the outcome mean and 27 percent of its standard deviation. Including fathers' département of birth fixed effects to further isolate the role of mothers' origins decreases the estimate only slightly, suggesting a primary role of maternal relative to paternal transmission (column 2). Restricting the identifying variation to mothers born in neighboring départements through mothers' military region of birth fixed effects similarly has little impact on the estimate (column 3). Finally, I include controls for husband and household characteristics, parental characteristics, as well as respondents' education and number of children (column 4).³⁶ Again, the estimate changes little, which increases the credibility that economic factors potentially correlated with mothers' origins are not driving the results.

I then replicate the estimate of column 3 using an alternative definition of second-generation internal migrants—I include women whose mothers were born in another département but not necessarily fathers (column 5). The resulting estimate is slightly lower than the baseline. Given that more than half of women in this sample had fathers born in their own département of birth, these “half-natives” probably assimilated the local culture of their département, making the impact of their mothers' origins less influential.

Next, I replicate the analysis with paternal origins (Table A.5). The baseline estimate is significant at the 5 percent level and implies that women whose fathers were born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 8 percentage points more likely to be working.

³⁵Results are similar when the outcome is a labor force participant indicator (Table A.4).

³⁶Husband and household characteristics consist of husbands' incomes, age, age squared, education, an indicator for home ownership, and the number of rooms in the home; parental characteristics include indicators for parents' occupational status and mothers' labor status; education controls consist of indicators for educational attainment.

Once fixed effects for maternal origins are included, the estimate is still positive but declines and is rather imprecise. Two explanations might account for the less influential role of paternal origins. Fathers were affected by the war indirectly through their own mothers (Section 4.2.1), so their role might be of second-order. Moreover, while fathers are primary role models for their sons, they are less so for their daughters, especially relative to gender roles (Farre and Vella, 2013).

The role of fathers nevertheless obtains once both parental origins are simultaneously considered. I modify specification 4 and include military death rates of both parental origins, distinguishing between women whose parents were born in the same département from those whose parents were born in different départements. I also include historical controls and military region of birth fixed effects relative to both parental origins and cluster standard errors at the levels of départements of residence, mothers', and fathers' départements of birth. Results are reported in Table A.6. Estimates in column 1 imply that women with parents born in the same département that experienced high (20 percent) rather than low (10 percent) military death rates were 12 percentage points more likely to be working. Coefficients on mothers' and fathers' independent origins add up to the coefficient when both were born in the same département, suggesting that the impact of each parental origin cumulates linearly, with maternal origins being more important. Including parental regions of birth fixed effects along with various controls does not alter the results (columns 2 and 3).

4.1.3. The Mother-to-Daughter Channel

The previous section provides evidence for the primary role of maternal origins. The working hypothesis is that the war altered mothers' behaviors and beliefs, which they transmitted to their daughters. Using 2SLS, I now explore directly whether war-induced changes to mothers' working behaviors transmitted to their daughters.³⁷

I first show that WWI military fatalities induced many mothers to enter the labor force, the first stage. I use the sample of second-generation internal migrant

³⁷Unfortunately, no dataset contains both parental origins and a measure of parental beliefs about gender roles. As a result, the transmission from mothers' beliefs to their daughters' beliefs and behaviors cannot be explored directly.

married women aged 30 to 59 from the extended labor force surveys 2005–2012 and estimate specification 4 with the following outcome: whether a respondent’s mother was working while she was growing up. I report results in panel A of Table 3. The estimate in column 1 is significant at the 1 percent level and implies that mothers born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 20 percentage points more likely to have been working when their daughters were growing up. Comparing women whose fathers have identical origins and including controls for husband and household characteristics, parental characteristics, as well as respondents’ education and number of children increases the estimate a little (columns 2 and 3).

Next, I instrument mothers’ working behaviors with military death rates of their départements of birth. Second-stage estimates are reported in panel B of Table 3.³⁸ These represent estimates of intergenerational transmission from mothers’ working behaviors to their daughters’. Estimates controlling for paternal origins imply that a 10 percentage points increase in mothers’ labor force participation induced by WWI military fatalities generated a 4 percentage points increase in the likelihood of their daughters to be working (columns 5 and 6).³⁹ The interpretation arguably relies on the validity of the exclusion restriction as the reduced-form impact of WWI military fatalities might have transmitted from mothers to daughters through channels beyond changes to the working behaviors of mothers. This specification isolates the role of mothers from that of fathers, but other factors might be at work such as changes in mothers’ beliefs toward female labor (see Section 5). Second-stage estimates therefore provide an upper bound for the role of changes to mothers’ working behaviors.

4.2. Transmission Through Marriage

Fernández, Fogli and Olivetti (2004) argue that sons of working mothers hold more progressive attitudes toward female labor than sons of stay-at-home mothers, making these men less averse to having a working wife, thereby incentivizing women to enter the labor force. Following this line of reasoning, since men born in

³⁸Results are similar when the outcome is a labor force participant indicator (Table A.7).

³⁹These results are slightly smaller than general intergenerational transmission estimates obtained in Section 3.4 for 2006–2012, which range from 0.5 to 0.6 (Figure A.6).

départements that experienced greater military death rates are more likely to have grown up with a working mother, they should be more likely to have a working wife. Women whose mothers-in-law were born in départements that experienced greater military death rates should therefore be more likely to work. I show that this mechanism played an important role in the persistence of the legacy of the missing men: by generating a new type of men—those with working mothers—the war established and perpetuated a more progressive social norm toward female labor.

4.2.1. *Transmission from Husbands to Wives*

To assess the role of husbands' origins, I regress women's working behaviors on the military death rates exposure of their husbands' départements of birth. I isolate the role of husbands' origins from that of their wives' by including wives département of birth fixed effects. This enables to compare women born in the same département but whose husbands were born in different départements. Using the censuses 1962–2012, I restrict the sample to first-generation internal migrant women aged 30 to 49 who are married with first-generation internal migrant men. I estimate:

$$(5) \quad \text{employed}_{ihbvt} = \beta \text{death_rate}_h + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,h} + \delta_r + \omega_b + \varepsilon_{ihbvt},$$

where death_rate_h denotes the military death rates exposure of the département of birth of husband h with wife i . ω_b are wives département of birth fixed effects and δ_r département of residence fixed effects.

I report estimates in Figure 5.⁴⁰ In panel A, I do not include wives département of birth fixed effects. Coefficients are identified from variations in the working behaviors of first-generation internal migrant married women of the same cohort who reside in the same département but whose husbands were born in départements that experienced different military death rates. Estimates are significant at the 1 percent level and imply that women whose husbands were born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 4 to 8 percentage points more likely to be working between 1962 and 2012. Including wives département of birth fixed effects to compare women with identical

⁴⁰Results are similar when the outcome is a labor force participant indicator (Figure A.7).

origins decreases estimates by 1.5 percentage point on average, which suggests a (limited) role for homogamy in military death rates.⁴¹

Next, I explore the relative role of a woman’s origins vis-à-vis her husband’s. I distinguish women whose husbands were born in the same département from those whose husbands were born in a different département through indicators \mathbf{same}_{bh} and $\mathbf{different}_{bh}$ and estimate:

$$\begin{aligned}
 \text{employed}_{ihbrt} &= \beta_1 \mathbf{same}_{bh} \times \text{death_rate}_{bh} + \beta_2 \mathbf{different}_{bh} \times \text{death_rate}_b \\
 (6) \quad &+ \beta_3 \mathbf{different}_{bh} \times \text{death_rate}_h \\
 &+ \gamma_1 \mathbf{X}'_i + \gamma_2 \tilde{\mathbf{X}}'_{1911,b} + \gamma_3 \tilde{\mathbf{X}}'_{1911,h} + \delta_r + \varepsilon_{ihbrt}.
 \end{aligned}$$

I use three-way clustering and cluster standard errors at the levels of départements of residence and each spouse’s département of birth. I report estimates in Figure A.10. Focusing on estimates when spouses’ origins are different reveals that women’s own origins are quantitatively twice as important than their husbands’— $\hat{\beta}_3$ represents 63 percent of $\hat{\beta}_2$ on average. Moreover, similar to parental origins, the impact of spouses’ origins linearly cumulates— $\hat{\beta}_1$ about equals the sum of $\hat{\beta}_2$ and $\hat{\beta}_3$.

Three mechanisms could account for these results. First, husbands from départements that experienced greater military death rates might marry with women that have a higher propensity to work in the first place because they were born in départements that experienced greater military death rates as well. Second, being a working woman might become a more valuable trait on the marriage market, providing incentives for wives to work in general. And third, these men might assume a larger share of household production, thereby freeing some time for their wives to enter the labor force. The first mechanism plays a (limited) role, as eliminating homogamy in military death rates in panel B of Figure 5 only partially decreases the estimates (see also Appendix E). I further show in Appendix F that men from départements that experienced greater military death rates do not assume more household tasks, leaving the second channel as the more likely.

⁴¹I provide direct evidence for homogamy in military death rates in Appendix E. Including husband and household controls as well as fertility and education barely affects the results (Figure A.8). Moreover, estimating the impact of husbands’ origins on non-migrant women generates estimates that are in the same direction. They are however of smaller magnitude, probably because local culture is more relevant to these women than their husbands’ (Figure A.9).

4.2.2. Transmission from Mothers-In-Law to Daughters-In-Law

I now explore directly the role of mothers-in-law by replicating the analysis of Section 4.1. To isolate the role of mothers-in-law from that of own parents and husbands, I augment specification 4 with fixed effects for both parents' and husbands' départements of birth. This enables to compare women whose parents and husbands have identical origins. I report results in Table 4. In column 1, the coefficient is identified from variations in the working behaviors of second-generation internal migrant married women of the same cohort, born and residing in the same département, with husbands born in the same département, but whose mothers-in-law were born in départements that experienced different military death rates. The coefficient implies that women whose mothers-in-law were born in départements that experienced high (20 percent) rather than low (10 percent) military death rates were 13 percentage points more likely to be working. Including own parents' départements of birth fixed effects and restricting the identifying variation to mothers-in-law born in neighboring départements slightly increases the estimate to 1.5 (columns 2 and 3). Including controls for husband and household characteristics, parental characteristics, as well as respondents' education and number of children further increases the estimate to 1.6 (column 4).

Estimates in Tables 2 and 4 suggest that mothers and mothers-in-law are equally important agents of transmission. Comparing their relative roles directly by including military death rates of mothers' and mothers-in-law's origins together confirms this interpretation (Table A.8). Estimates in column 1 imply that women with mothers and mothers-in-law born in the same département that experienced high (20 percent) rather than low (10 percent) military death rates were 23 percentage points more likely to be working. Coefficients on mothers' and mothers-in-law's independent origins add up to the coefficient when both come from the same département, suggesting again that the impact of each parental origin cumulates linearly. While both maternal origins appear important, estimates for mothers-in-law are slightly larger than those for own mothers, although they are not significantly different.⁴² This result complements those of Fernández, Fogli and Olivetti (2004), who find that mothers-in-law rather than own mothers explain the impact of WWII

⁴²The difference between both coefficients in column 1 is 0.25 with a standard error of 0.84; the difference in column 3 is 0.58 with a standard error of 0.78.

mobilization rates on female labor force participation in the United States—though Rose (2018), using more accurate measurement, finds no relationship between manpower mobilization, WWII military death rates, and post-war female employment.

4.3. Local Social Interactions

The third set of mechanisms I explore is horizontal and oblique transmission through local social interactions. Culture is a locally embedded process and social interactions in culture might materialize in two ways: first, the cultural composition of a neighborhood might affect the relative importance of an individual’s own culture as individuals surrounded by many with identical origins might find it easier—or feel pressured—to preserve their culture of origin. Conversely, the cultural composition of a neighborhood might affect individuals’ beliefs through a process of cultural assimilation.

I first explore whether the legacy of the war diffused through cultural assimilation at the local level. For each census and municipality, I construct a measure of cultural composition in military death rates.⁴³ It is the weighted average military death rates exposure of départements of birth among residents in a municipality: $\text{death_rate}_m = \sum_o \text{sh_res}_{o,m} \times \text{death_rate}_o$, where $\text{sh_res}_{o,m}$ denotes the share of residents in municipality m born in département o . Then, I estimate the following specification on the sample of first-generation internal migrant married women aged 30 to 49:

$$(7) \quad \text{employed}_{ibmlt} = \beta \text{death_rate}_m + \gamma_1 \mathbf{X}'_i + \gamma_2 \widetilde{\mathbf{X}}'_{1911,m} + \delta_l + \omega_b + \varepsilon_{ibmlt},$$

where $\widetilde{\mathbf{X}}'_{1911,m}$ contains pre-war characteristics and is constructed in the same way as death_rate_m . To compare individuals across neighboring municipalities and alleviate potential issues of spatial sorting, I include local labor market fixed effects δ_l .⁴⁴ I also include département of birth fixed effects ω_b and cluster standard

⁴³Censuses contain information on individuals in up to 26 thousand municipalities—there are 36 thousand municipalities in France but the remaining 10 thousand municipalities are too small to be sampled in the censuses as they contain less than 200 residents.

⁴⁴Because the dependent variable varies at the municipality level, I can use a narrow definition of local labor markets, with the identifying variation restricted to neighboring municipalities. Specifically, I use *canton* fixed effects. Cantons represent the fourth level of subnational government, between *arrondissements* and *communes*. There were about four thousand cantons before

errors at the levels of départements of birth and residence. Estimates are identified from variations in the working behaviors of first-generation internal migrant married women of the same cohort, born in the same département, but residing in neighboring municipalities with different cultural compositions in military death rates. I report results in panel A of Figure 6. Estimates imply that women who reside in a municipality in which the average military death rates composition was one percentage point higher were 1 to 3 percentage points more likely to be working between 1968 and 2012.⁴⁵ Including controls for husband and household characteristics as well as respondents' education and number of children has little effect on the estimates (Figure A.11, panel A).

Next, I analyze whether the legacy of the war was culturally preserved because of geographical clustering of individuals with similar origins. I again restrict the identifying variation to neighboring municipalities and estimate:

$$(8) \quad \text{employed}_{ibmlt} = \beta \text{sh_res}_{b,m} \times \text{death_rate}_b + \gamma_1 \mathbf{X}'_i + \gamma_2 \text{sh_res}_{b,m} + \delta_l + \omega_b + \varepsilon_{ibmlt},$$

where $\text{sh_res}_{b,m}$ denotes the share of residents in municipality m born in département b , the same as the respondent's. This specification includes département of birth fixed effects ω_b so that the coefficient on the interaction term is identified from variations in the working behaviors of first-generation internal migrant married women of the same cohort, born in the same département, but residing in neighboring municipalities. It indicates whether the impact of WWI military fatalities was relatively stronger among women surrounded by more people from their départements. I report results in panel B of Figure 6. Estimates imply that women born in the same département who reside in a municipality in which the share of residents from their départements was one percentage point higher were 1 to 2 percentage points more likely to be working. Again, including controls has little effect on the estimates (Figure A.11, panel B).

2013, containing nine municipalities on average.

⁴⁵The coefficient is close to zero and not significant for the census of 1999, the census that contains the least observations in the sample. Because preferences and beliefs are formed while growing up, I assign the cultural composition using the previous census, so the census of 1962 is not part of the analysis. Using contemporaneous measures or a lag of two censuses generates similar results.

Results in this section highlight the role of local social interactions for long-run historical processes. While cultural assimilation affects the diffusion aspect of history, cultural preservation affects its persistence. Both channels empirically work toward the manifestation of the legacy of the war in contemporaneous France. These channels need not oppose each other however: merging specifications 7 and 8 results in estimates that change little, suggesting some degree of orthogonality between the two processes (Figure A.12). These results shed a new light on the dichotomy between culture and institutions. Given the local embeddedness of culture and mechanisms of horizontal transmission through local social interactions, estimates from a location-based approach—or an “inverted” epidemiological approach (Section 3.4)—might partly capture implications of the local embeddedness of culture rather than solely differences in inherited institutional structures.

Among the three mechanisms of intergenerational transmission highlighted in this section, which is the strongest? Finding a common ground for comparison is challenging as samples and sources of identification differ. One possibility is to compare estimates in terms of standard deviation. Estimates from Tables 2 and 4 and Figure 6 imply magnitudes of 1.3 for mother channel, 1.7 for the mother-in-law channel, and 0.1 for the local interactions channel.⁴⁶ Echoing previous results, these magnitudes imply that mothers and mothers-in-law were of primary importance in the transmission of the legacy of the missing men relative to local social interactions.

5. Changes to Preferences and Beliefs Toward Female Labor

To account for results on working behaviors, I argue that women induced to enter the labor force during the interwar period because of WWI altered preferences and beliefs toward female labor of their daughters, sons, and entourage, and that these changes translated into the working behaviors of women in subsequent generations. Since individuals form preferences and beliefs early in life from learning and socializing with their parents, peers, and neighbors (Bisin and Verdier, 2011; Fogli and Veldkamp, 2011; Fernández, 2013; Olivetti, Patacchini and Zenou, 2018), men and women who grew up with a working mother, or in an environment in which

⁴⁶The mother channel corresponds to the estimate in column 4 of Table 2; the mother-in-law channel, to the estimate in column 4 of Table 4; and the local interactions channel, to the estimate of 2006 in panel A of Figure 6.

many women worked, should form more progressive attitudes toward female labor.

To explore the validity of this argument, I analyze the long-run implications of WWI military fatalities for attitudes toward gender roles.⁴⁷ Because it contains respondents' départements of birth and residence, the Generation and Gender Survey (GGS) of 2005 enables the implementation of the epidemiological approach.⁴⁸ Since I study preferences and beliefs rather than behaviors, I do not place age restrictions on the regression sample. I focus on internal migrants born in metropolitan France who grew up with their parents. The regression sample contains 1,140 men and 1,660 women.⁴⁹

Respondents were proposed three statements related to the role of women in the labor force and asked whether they “agree,” “somewhat agree,” “do not agree nor disagree,” “somewhat disagree,” or “disagree.” Statements were (1) If a woman earns more than her partner, it is bad for their relationship, (2) Women should not be able to decide how to spend the money they earned without asking their partners, and (3) In an economic crisis, men should keep their jobs in priority. I assign 0 to “agree” and 1 to “disagree,” and use 0.25-point increments for responses in between; higher values indicate more progressive attitudes toward gender roles. Then, I aggregate statements using a three-point scale, which I standardize to a one-point scale.⁵⁰ I report average responses for men and women separately in Table 5. Three-quarter of respondents disagree with the statements, with no difference between men and women. The survey also contains questions related to preferences and beliefs about religion, marriage, and family. I report average responses relative to these statements in Tables A.9 to A.11.

I pool men and women and add an interaction term to assess differential influ-

⁴⁷Using rough proxies of attitudes toward gender roles, I show in Appendix G that there were no pre-war differences in attitudes across départements that experienced varying military death rates.

⁴⁸See Régnier-Loilier (2016) for a presentation of the survey. Two other datasets with information on cultural beliefs are the opinion barometer of the DRESS and the International Social Survey (ISSP), but they do not provide respondents' départements of birth.

⁴⁹Summary statistics are available in the Supplementary Appendix. As with the censuses, there is no correlation between migration status and origin département military death rates or employment status. However, internal migrants generally hold slightly more progressive attitudes, which is driven by the fact that they are more educated than non-migrants.

⁵⁰The survey contains a related question: “Taking care of one’s home or family is as fulfilling as working for pay.” 27 percent of men and 36 percent of women disagree with this statement. Results are similar when this question is integrated into the analysis (Table A.13).

ences on women’s beliefs:

$$(9) \quad \begin{aligned} \text{values}_{ihmfbr} &= \beta_1 \text{death_rate}_b + \beta_2 \text{female}_i + \gamma_1 \mathbf{X}'_i + \gamma_2 \mathbf{X}'_h + \gamma_3 \mathbf{X}'_{fm} \\ &+ \beta_3 \text{death_rate}_b \times \text{female}_i + \gamma_4 \widetilde{\mathbf{X}}'_{1911,b} + \delta_r + \varepsilon_{ihmfbr}, \end{aligned}$$

where values_{ihmfbr} denotes the one-point scale cultural index for individual i in household h with mother m and father f , born in département b and residing in département r . \mathbf{X}_i is a set of year of birth indicators, \mathbf{X}_h a set of household controls, and \mathbf{X}_{fm} a set of parental education and employment status indicators.⁵¹ Historical controls $\mathbf{X}_{1911,b}$ are assigned at the level of départements of birth. Consistent with the epidemiological approach, I include département of residence fixed effects δ_r . I cluster standard errors at the levels of départements of birth and residence.

I report results in Table 6. β_1 is identified from variations in attitudes held by respondents of the same cohort who reside in the same département but were born in départements that experienced different military death rates. When the interaction term is not included, $\widehat{\beta}_1$ is significant at the 1 percent level and implies that respondents born in départements that experienced high (20 percent) rather than low (10 percent) military death rates hold more progressive attitudes toward female labor (column 1); the index is 11 percentage points higher in this case, which corresponds to 15 percent of the mean. Adding the interaction term reveals a slightly stronger response of women’s attitudes, but the coefficient is not significant (column 2). Adding parental and household controls and controlling for respondents’ employment status, education, and fertility, does not change results substantially (columns 3–5).⁵² To assess whether these results reflect more progressive attitudes in general, I replicate the analysis for attitudes related to religion, marriage, and family (Table A.15). Consistent with the original interpretation, WWI military fatalities did not impact attitudes beyond those related to the role of women in the labor force.

⁵¹ \mathbf{X}_h contains indicators for respondents’ homes being a house, whether they own their homes, whether they have a partner, and the number of rooms in their homes.

⁵²Restricting the sample to individuals who are a couple (70 percent of the sample) does not alter the results (Table A.12). There is no heterogeneity across marital status (Table A.14).

6. Conclusion

One century after WWI, the legacy of the missing men is still vivid. Comparing women who reside under similar institutional conditions but were born in départements that experienced different military death rates, I provide empirical evidence for a persistent impact of WWI on women's working behaviors. I uncover three channels of intergenerational transmission: parental transmission, transmission through marriage, and transmission through local social interactions. Mothers and mothers-in-law appear of primary importance in the transmission of this legacy. Consistent with formal models of intergenerational transmission, I find that men and women born in départements that experienced greater military death rates hold more progressive attitudes toward the role of women in the labor force today.

These findings elucidate intergenerational diffusion pathways of women's market involvement. They suggest that the entrance of women in the labor force during early phases of the revolution of female labor paved the way for subsequent generations of women, and especially their daughters and daughters-in-law. I interpret results in this paper as evidence for a process of cultural diffusion and change by which women induced to enter the labor force during the interwar period because of WWI military fatalities altered preferences and beliefs about female labor of their daughters, sons, and entourage, and that these changes translated into the working behaviors of women in subsequent generations. Fernández (2013) models such a mechanism of cultural change through a framework in which women endogenously learn about the long-run payoffs of working by observing women of the previous generation. This gives rise to a sigmoid-shaped process for behaviors and beliefs about female labor.⁵³ Providing direct empirical evidence for this feedback process is challenging as no survey traces to the interwar period. Finding innovative ways to build measures of preferences and beliefs toward female labor far back in the past to explore further this process of cultural change is a promising avenue of research.

⁵³See also Hazan and Maoz (2002), Fogli and Veldkamp (2011), and Hiller and Baudin (2016) for related models.

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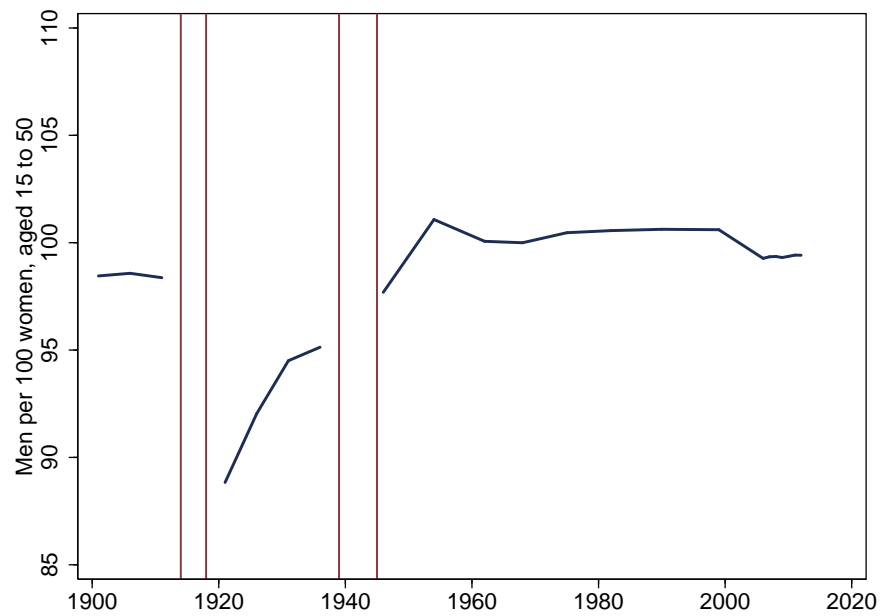


Figure 1. Adult Sex Ratio (1900–2012)

Notes: This figure displays the adult sex ratio among the French population aged 15 to 50. Data are from the censuses 1901–2012. Vertical lines indicate WWI (1914–1918) and WWII (1939–1945).

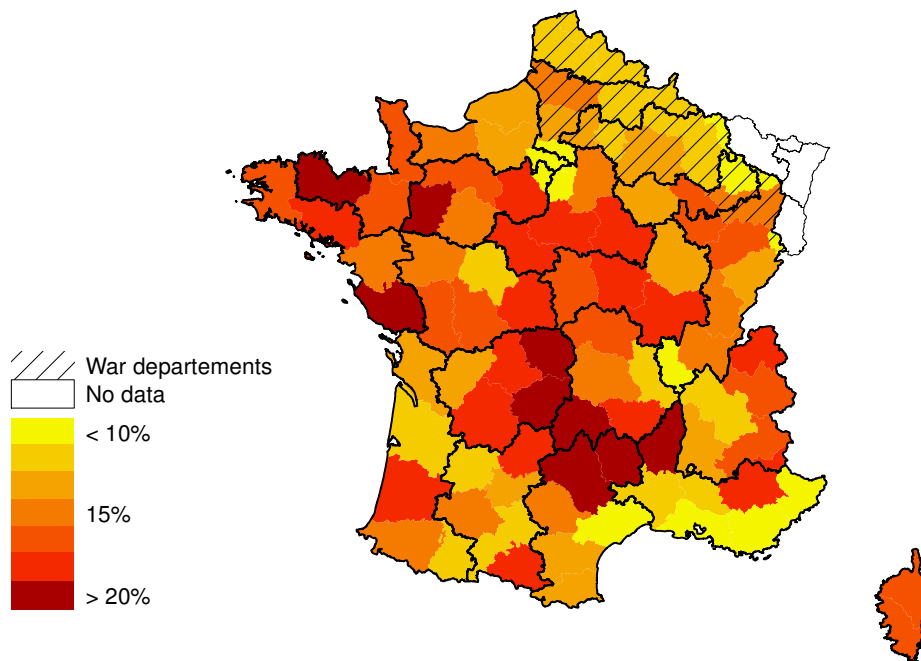
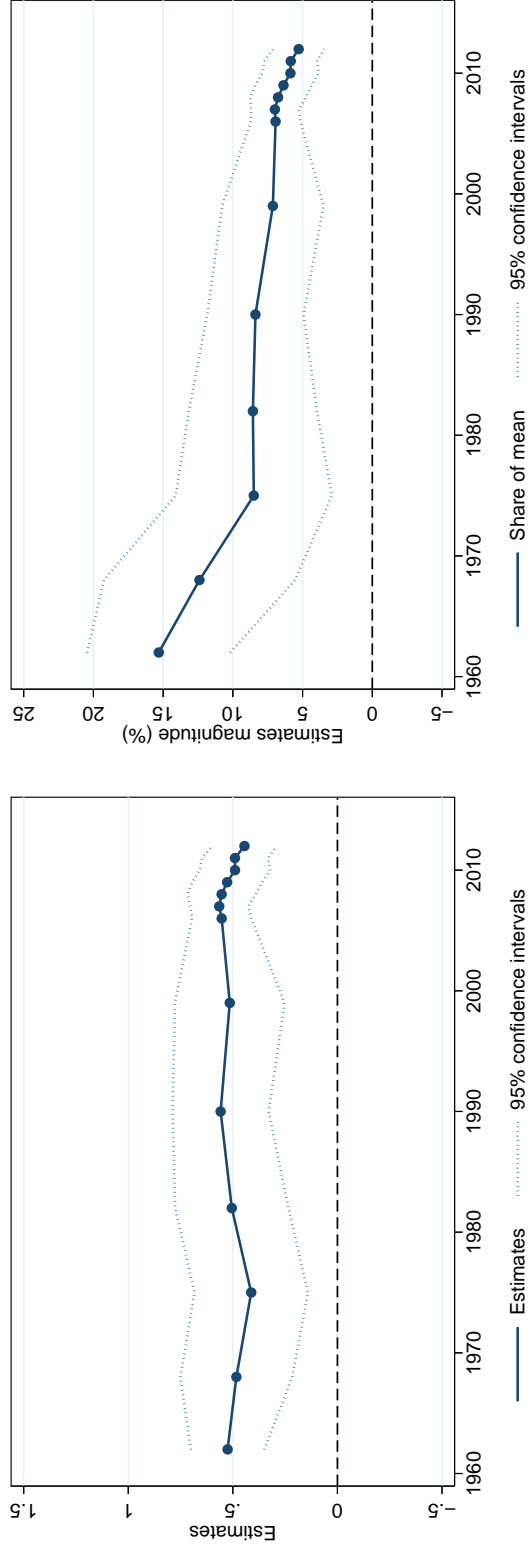


Figure 2. Military Death Rates Across 87 Départements

Notes: Data are missing for the three départements that belonged to Germany before WWI—Bas-Rhin, Haut-Rhin, and Moselle. Shaded areas indicates départements in which war combats occurred. Darker lines indicate military region boundaries. The composition of each military region is from the *Journal Officiel de la République Française, Lois et Décrets*, 45(261), pp. 8546–8547, September 26, 1913.

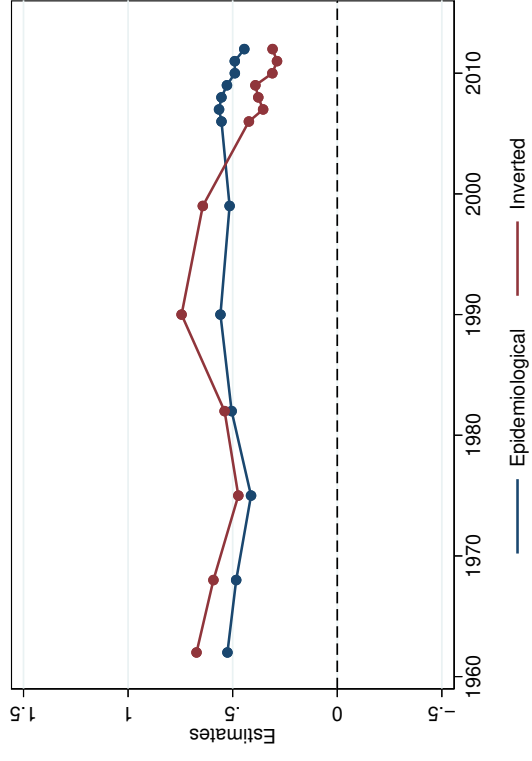


(a) Baseline Estimates

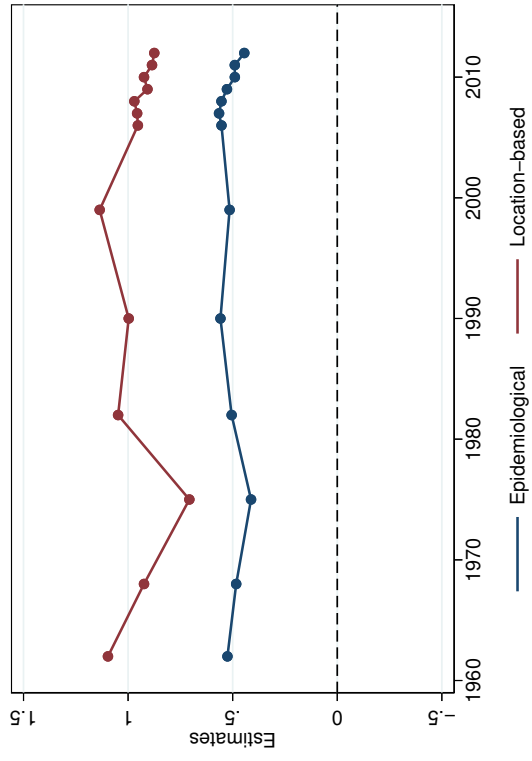
(b) Magnitude Relative to the Mean

Figure 3. The Impact of WWI Military Fatalities on FLFP
Dependent Variable: Employed

Notes: Panel A reports OLS coefficients from estimating specification 1. The dependent variable is an indicator for whether the individual is employed. All regressions contain cohort, département of residence, and military region of birth fixed effects, as well as the set of historical controls measured at the level of individuals' départements' départements of birth in 1911. They consist of the share of rural population, the share of population born in the département, the female labor force participation rate, total fertility, the share of girls aged 5 to 19 who go to primary or secondary school, and personal wealth per inhabitants in Francs. Standard errors are clustered both at the level of individuals' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. See Table B.1 for details about sample sizes for each census year. Panel B reports the magnitude of the coefficients from panel A with respect to the outcome mean. It is the share of the mean in the dependent variable explained by switching from being born in a département that experienced low (10 percent) rather than high (20 percent) military death rates. Estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012).



(a) Location-Based Approach

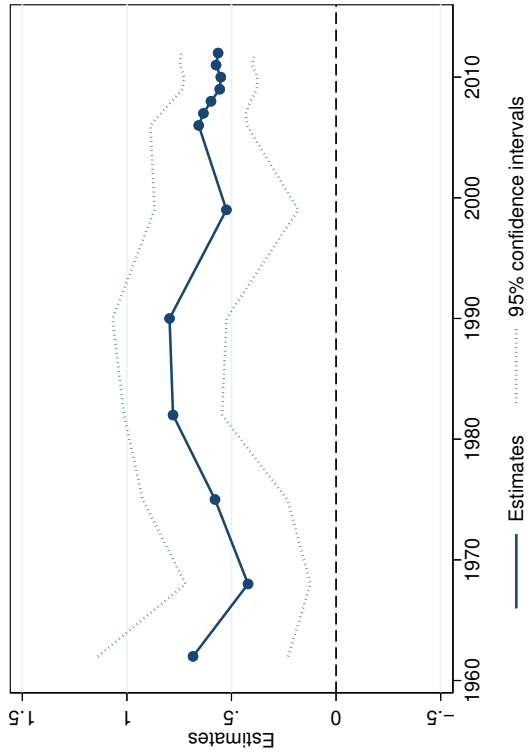


(b) Inverted Epidemiological Approach

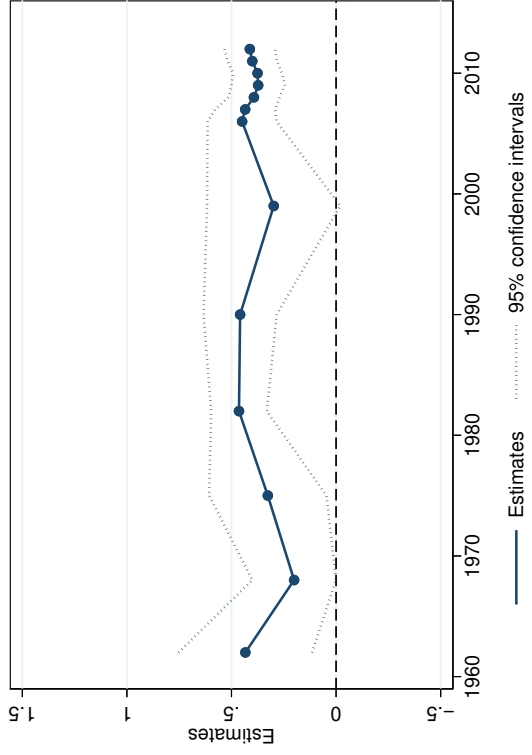
Figure 4. Epidemiological versus Location-Based Approach
Dependent Variable: Employed

Notes: This figure reports OLS coefficients from estimating specifications 2 and 3. All regressions contain cohort and military region of residence fixed effects, as well as the set of historical controls measured at the level of individuals' départements of residence in 1911. Standard errors are clustered at the level of individuals' départements of residence. The sample consists of non-migrant married women aged 30 to 49 in panel A, and first-generation internal migrant married women aged 30 to 49 in panel B. Estimates are computed using the sample weights provided in the censuses. This figure also reports estimates from Figure 3 for comparison. Data from the censuses (1962–2012).

● significant at the 1 percent level.



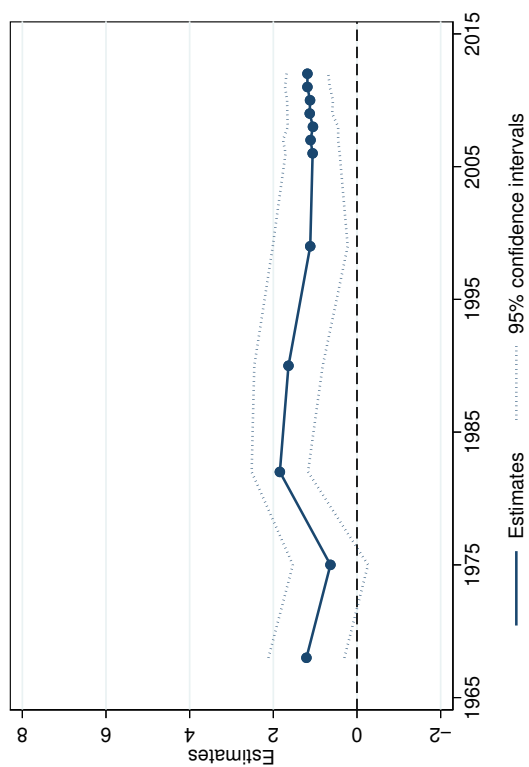
(a) No Wife Birth Département FE



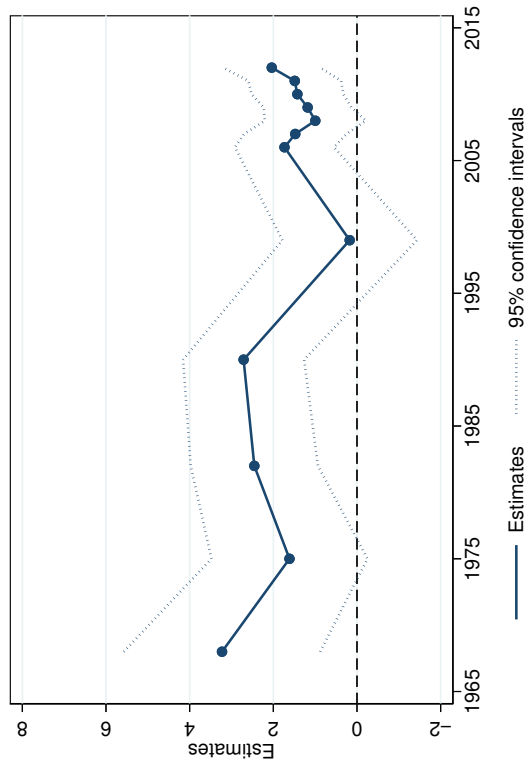
(b) Wife Birth Département FE

Figure 5. Transmission from Husbands to Wives
Dependent Variable: Employed

Notes: This figure reports OLS coefficients from estimating specification 5. Standard errors are clustered at the level of individuals' départements of residence and their husbands' départements of birth. The sample consists of internal migrant women aged 30 to 49 who are married with internal migrant men. Estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012).



(a) Assimilation



(b) Preservation

Figure 6. Local Social Interactions
Dependent Variable: Employed

Notes: Panel A reports OLS coefficients on death_rate_c from estimating specification 7, and panel B, OLS coefficients on the interaction $\text{sh_res}_{b,c} \times \text{death_rate}_b$ from estimating specification 8. Standard errors are clustered at the level of individuals' départements of birth and residence. The sample consists of first-generation internal migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1968-2012).

Table 1. Military Death Rates and Pre-War Characteristics

Dependent variable	Military death rate		
	(1)	(2)	(3)
Share rural population	0.12*** [0.01]	0.12*** [0.02]	0.14*** [0.03]
Share born in département	0.12*** [0.03]	0.13*** [0.03]	0.16*** [0.04]
Female labor force participation		-0.02 [0.04]	0.04 [0.04]
Share girls aged 5–19 in school		0.09 [0.07]	0.10 [0.08]
Total fertility rate		0.00* [0.00]	0.00* [0.00]
Personal wealth (thousand francs)		0.00** [0.00]	0.00 [0.00]
Other characteristics	No	Yes	Yes
Military region FE	No	No	Yes
Départements	87	87	87
R ²	0.739	0.800	0.819

Notes: This table reports OLS coefficients from regressing military death rates on various pre-war département characteristics measured in 1911. *Other characteristics* include average height, population, the share of men working in industry, in agriculture, the share of the literate population, and the average direct taxes per inhabitant. The coefficient on total fertility rate is a precise zero (0.00002, standard error of 0.00001). Robust standard errors are in brackets.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 2. Transmission from Mothers to Daughters
Extended Labor Force Surveys 2005–2012

Dependent variable	Employed				
	(1)	(2)	(3)	(4)	(5)
Military death rate, mother origin	1.05*** [0.37]	0.93** [0.40]	1.11*** [0.40]	1.24*** [0.35]	0.94*** [0.34]
Birth year FE	Yes	Yes	Yes	Yes	Yes
Birth-residence département FE	Yes	Yes	Yes	Yes	Yes
Parental controls					
Mother pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes
Father birth département FE	No	Yes	Yes	Yes	Yes
Mother birth region FE	No	No	Yes	Yes	Yes
Parental characteristics	No	No	No	Yes	No
Husband and household characteristics					
Education, number of children	No	No	No	Yes	No
Clusters					
Birth-residence département	95	95	95	95	95
Mother département of birth	95	95	95	95	95
Observations	15,095	15,095	15,095	15,095	32,099
Outcome mean	0.81	0.81	0.81	0.81	0.79
Outcome s.d.	0.39	0.39	0.39	0.39	0.40

Notes: This table reports OLS coefficients from estimating specification 4. All regressions include survey-year indicators. Husbands and household characteristics include husbands' incomes, age, age squared, educational attainment, an indicator for home ownership, and the number of rooms in the home. Parental characteristics include indicators for parents' occupational status and mothers' labor status. Standard errors are clustered at the level of départements of residence and mothers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers and fathers were born in another département in columns 1–4, and whose mothers (but not necessarily fathers) were born in another département in column 5. Estimates are computed using the sample weights provided in the extended labor force surveys.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

Table 3. Transmission from Mothers to Daughters, 2SLS
Extended Labor Force Surveys 2005–2012

Dependent variable	Mother worked			Employed		
	A. First Stage			B. Second Stage		
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate, mother origin	2.04*** [0.59]	2.92*** [0.66]	2.67*** [0.65]			
Mother worked				0.71** [0.33]	0.42*** [0.16]	0.40** [0.16]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth-residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls						
Mother pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Father birth département FE	No	Yes	Yes	No	Yes	Yes
Parental characteristics	No	No	Yes	No	No	Yes
Husband and household characteristics	No	No	Yes	No	No	Yes
Education, number of children	No	No	Yes	No	No	Yes
Clusters						
Birth-residence département	94	94	94	94	94	94
Mother département of birth	94	94	94	94	94	94
Observations	12,181	12,181	12,181	12,181	12,181	12,181
Outcome mean	0.58	0.58	0.58	0.81	0.81	0.81
Outcome s.d.	0.49	0.49	0.49	0.39	0.39	0.39
Cragg-Donald Wald F	48.56	74.77	62.58			
Kleibergen-Paap Wald rk F	13.55	20.76	17.69			

Notes: All regressions include survey-year indicators. Standard errors are clustered at the level of the départements of birth and mothers départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers and fathers were born in another département. The estimates are computed using the sample weights provided in the extended labor force surveys.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

Table 4. Transmission from Mothers-In-Law to Daughters-In-Law
Extended Labor Force Surveys 2005–2012

Dependent variable	Employed			
	(1)	(2)	(3)	(4)
Military death rate, mother-in-law origin	1.28* [0.75]	1.20* [0.61]	1.48** [0.67]	1.64** [0.66]
Birth year FE	Yes	Yes	Yes	Yes
Birth-residence département FE	Yes	Yes	Yes	Yes
Husband birth département FE	Yes	Yes	Yes	Yes
Parental controls				
Mother-in-law pre-war controls (1911)	Yes	Yes	Yes	Yes
Parents birth départements FE	No	Yes	Yes	Yes
Mother-in-law birth region FE	No	No	Yes	Yes
Parental characteristics	No	No	No	Yes
Husband and household characteristics				
Education, number of children	No	No	No	Yes
Clusters				
Birth-residence département	94	94	94	94
Mother-in-law département of birth	94	94	94	94
Observations	13,389	13,389	13,389	13,389
Outcome mean	0.81	0.81	0.81	0.81
Outcome s.d.	0.39	0.39	0.39	0.39

Notes: This table reports OLS coefficients from estimating a modified version of specification 4. All regressions include survey-year indicators. Husbands and household characteristics include husbands' incomes, age, age squared, educational attainment, an indicator for home ownership, and the number of rooms in the home. Parental characteristics include indicators for parents' and parents-in-law's occupational status and mothers' and mothers-in-law's labor status. Standard errors are clustered at the level of départements of residence and mothers-in-law's départements of birth. The sample consists of second-generation internal migrant married women aged 30 to 59. Estimates are computed using the sample weights provided in the extended labor force surveys.

** Significant at the 5 percent level. * significant at the 10 percent level.

Table 5. Preferences and Beliefs About Female Labor

INTERPRETATION: HIGHER VALUES INDICATE DISAGREEMENT WITH THE STATEMENT

Statement	Men	Women
1 If a woman earns more than her partner, it is bad for their relationship	0.80 (0.28)	0.76 (0.31)
2 Women should not be able to decide how to spend the money they earned without asking their partners	0.70 (0.35)	0.76 (0.34)
3 In an economic crisis, men should keep their jobs in priority	0.71 (0.35)	0.76 (0.35)
Cultural values index (four-points scale)	2.21 (0.64)	2.27 (0.65)
Cultural values index (one-point scale)	0.74 (0.21)	0.76 (0.22)
Observations	1,144	1,652

Notes: This table presents summary statistics for the cultural beliefs variables constructed using the GGS dataset. Disagreement with the statement implies higher values. Standard deviations are in parentheses. The sample consists of French internal migrants born in metropolitan France. Data from the GGS (2005).

Table 6. The Impact of WWI Military Fatalities on Beliefs

Dependent variable	Cultural values index (one-point scale)				
	(1)	(2)	(3)	(4)	(5)
Military death rate	1.13*** [0.21]	1.01*** [0.32]	0.94*** [0.33]	0.95*** [0.33]	0.96*** [0.34]
Female	0.02 [0.01]	-0.01 [0.03]	-0.01 [0.03]	-0.01 [0.03]	-0.02 [0.03]
Military death rate \times Female		0.18 [0.21]	0.21 [0.20]	0.20 [0.20]	0.24 [0.21]
Birth year, residence département FE	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes
Household controls	No	No	No	Yes	Yes
Employment, education, fertility controls	No	No	No	No	Yes
Parental controls					
Mother active	No	No	Yes	Yes	Yes
Parents education	No	No	Yes	Yes	Yes
Clusters					
Residence département	95	95	95	95	95
Birth département	88	88	88	88	88
Observations	2,816	2,816	2,816	2,816	2,816
Outcome mean	0.75	0.75	0.75	0.75	0.75

Notes: This table presents OLS coefficients from estimating specification 9. Household controls contain an indicator for whether the respondent's home is a house rather than an apartment, the number of rooms in the home, an indicator for whether the respondent owns her housing, and an indicator for whether the respondent has a partner present in the household. Standard errors are clustered at the level of départements of birth and of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GGS. Data from the GGS (2005).

*** Significant at the 1 percent level.