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THE LEGACY OF THE MISSING MEN:
WORLD WAR I AND FEMALE LABOR IN FRANCE OVER A CENTURY

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To my parents, Sylvie and Paul

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ABSTRACT

In this dissertation, I provide a comprehensive analysis of the short and long-run impact of World War I military fatalities on female labor force participation in France. In chapter 1, I describe the measure of military death rates used throughout the dissertation and explore its sources of systematic variation. In chapter 2, I show that the scarcity of men resulting from the war generated an upward shift in female labor force participation that persisted throughout the interwar period. Increased female labor supply accounts for this result: deteriorated marriage market conditions for single women and negative income shocks to war widows induced many of these women to enter the labor force after the war. In contrast, firms did not increase their demand for female labor to compensate for the scarcity of men. I further show in chapter 3 that this initial shock to female labor transmitted across generations up until today. Three primary mechanisms account for this historical persistence: vertical intergenerational transmission (from mothers and fathers to daughters), transmission through marriage (from husbands to wives, and from mothers in-law to daughters in-law), and oblique intergenerational transmission (from migrants to non-migrants). Consistent with theories of intergenerational transmission, I also provide evidence that World War I military fatalities permanently altered preferences and beliefs toward female labor.

INTRODUCTION

The Great War was one of the most dramatic events in France's history. While the war ravaged continental Europe between 1914 and 1918, France suffered an especially high death toll relative to other belligerent countries. Because of a universal conscription system, most French male citizens were drafted throughout the war: out of 10 million men aged 15 to 50 before the war, 8 million were drafted in the army. 1.3 million of them died in combat, a military death rate of 16%. As a result, the adult sex ratio dropped from 98 men for every 100 women at the onset of the war to 88 men for every 100 women by the end of the war. It was not until after World War II that the pre-WWI adult sex ratio was restored (Figure 1).

Figure 1: Adult Sex Ratio (1900–2012)

Notes. This figure displays the adult sex ratio for the age group 15–50 among the French population. The data are from all the French censuses from 1901 to 2012. The first vertical rays (1914–1918) indicate WWI. The second vertical rays (1939–1945) indicate WWII.

In this dissertation, I provide a comprehensive analysis of the short and long-run impact of WWI military fatalities on female labor force participation. In chapter 1, I first describe how I use the military records of all 1.3 million French soldiers who died because of the war—which I collected from archival sources—to build a measure of military death rates at the *département* level.[1] I then analyze the sources of systematic variation in military death rates across départements: the territorial organization of the army and the policies implemented by the Ministry of War to sustain the industrial war effort.

The rest of the dissertation explores the impact of WWI military fatalities on female labor force participation separately in the short run (chapter 2) and in the long run (chapter 3), where I use WWII as a temporal frontier. I operate this division for methodological purposes, as the research questions, data, and empirical strategies differ widely across both chapters.

The Missing Men (1901–1936)

In chapter 2, *The Missing Men*, I ask whether sex ratio imbalances resulting from the war affected female labor force participation in the interwar period. Economic theories of marriage highlight that the scarcity of one gender should impact women's working behavior through its effects on marriage market conditions. For instance, Grossbard's (2014) demand and supply model of marriage implies that the scarcity of men should decrease the implicit market price of women's work in the household, thereby increasing their supply of labor through an income effect.[2] These theoretical predictions have been tested using a variety of sources of variation in sex ratios such as natural fluctuations of cohort sizes or immigration shocks (Amuedo-Dorantes and Grossbard, 2007; Angrist, 2002). Using WWI military fatalities as a source of sex ratio imbalances offers a unique opportunity to put this theory to a direct test and improve upon identification: this source of variation is sharp—military fatalities were concentrated within a period of about 4 years—, large in magnitude, and exogenous to the outcome under scrutiny.

Exploiting differential changes in female labor force participation rates before and after

1. French départements are one of the three levels of local government. There were 87 départements before the war, and 90 after the war. These three "new" départements (Bas-Rhin, Haut-Rhin, and Moselle) belonged to Germany before the war, and are excluded throughout the analysis.

2. Collective models of household labor supply lead to similar conclusions (Chiappori, 1992).

the war across départements with varying levels of military death rates, I find that military fatalities shifted female labor force participation upward, an effect that persisted throughout the interwar period. In départements that experienced military death rates of 20% rather than 10%—equivalent to switching from the 25th to the 75th percentile of the distribution—female labor force participation was 4 percentage points higher throughout the interwar period, compared to an average participation rate of 31% before the war. That is, these départements experienced an increase in female labor force participation of 12% compared to pre-war levels. At the mean of the data, it implies that losing 10 men during the war induced 2 women to enter the labor force.

Consistent with economic theories of marriage, I find that this upward shift was driven by women who entered the labor force after the war because of changes in marriage market conditions. On the one hand, many single women entered the labor force while searching longer for a husband because of the tightness of the post-war marriage market, and, on the other hand, many war widows entered the labor force to compensate for the loss of their husbands' incomes. In contrast, demand factors did not play a significant role as firms instead increased their stock of physical capital to compensate for the scarcity of men.

The Legacy of the Missing Men (1962–2012)

In chapter 3, *The Legacy of the Missing Men*, I ask whether this shock to female labor transmitted to later generations. Here, the analysis is guided by models of intergenerational transmission. For instance, to account for the endogenous evolution of social norms and women's working behavior, Fernández (2013) develops an intergenerational learning framework in which women update their prior beliefs about the long-run payoffs from working upon observing women from the previous generation.[3] Alternatively, in Fernández, Fogli and Olivetti's (2004) model, the men who grow up with a working mother form more pro-

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

gressive views toward female labor, making them less averse toward marrying a working woman. This, in turn, provides incentives for women to enter the labor force.

Direct empirical evidence for these intergenerational transmission mechanisms is nonetheless scarce. Indeed, the very factors that induced women to enter the labor force in the first place may well still be at play decades later, making the working behavior of women across generations largely codetermined. Further, the entrance of early generations of women in the labor force may have altered local labor market structures in the long run, making it all the more challenging to identify intergenerational transmission mechanisms independent from confounding changes in the local institutional environment. Again, using WWI military fatalities as an exogenous source of variation in female labor force participation in previous generations offers a unique opportunity to test these theories in context and explore the pathways underlying the diffusion of women's working behavior across generations.

I find that the entrance of women in the labor force resulting from World War I had long-run implications for later generations of women. In particular, women residing under the same institutional conditions but born in locations exposed to higher military death rates were more likely to be in the labor force from 1962 to 2012. Estimates relying on variations in the working behavior of women *across*—rather than *within*—départements suggest that individual-level transmission mechanisms account for half of the overall long-run impact of WWI military fatalities.

The strongest mechanism behind these findings is vertical intergenerational transmission from mothers to daughters: comparing second-generation internal migrant women born and residing in the same location but with different parental origins, I find that those with mothers born in départements exposed to higher military death rates are more likely to be in the labor force today. I also show that transmission through marriage (from husbands to wives and from mothers in-law to daughters in-law) and oblique intergenerational transmission (from migrants to non-migrants) contributed to the historical persistence of the impact of WWI military fatalities on women's working behavior. Finally, consistent with theories of intergenerational transmission, I find that WWI military fatalities permanently altered preferences and beliefs toward female labor for both men and women.

In the conclusion, *Perspectives*, I discuss how this dissertation may contribute to the economic history literature and provide some insights for the future of the discipline.

CHAPTER 1

WORLD WAR I MILITARY FATALITIES

In this first chapter, I provide details about the measure of military death rates used throughout the dissertation (section 1.1) and explore its sources of systematic variation (section 1.2). I show that the distribution of military death rates was determined by the territorial organization of military recruitment and by the policies implemented by the Ministry of War to sustain the industrial war effort.

1.1 The Measure of Military Death Rates

To build a precise measure of military death rates at the département level, I collected individual military records of all 1.3 million French soldiers who died as a result of the war. These records are from the *Mémoire des Hommes* archive maintained by the French Ministry of Defense.[1] For each deceased soldier, I extracted his first name, last name, date of birth, département of birth, and département of recruitment.

The military death rate in a département is defined as the ratio of the number of deceased soldiers born in the département to the size of its drafted population, which is captured by its male population aged 15 to 44 in the census of 1911, the last census before the war. This approximation is reasonable because, at the onset of the war, the organization of the army relied on an egalitarian and universal conscription system for all French citizens aged 20 to 48. While it was not until 1905 that this system was adopted, it applied retroactively to

1. The archive is accessible at memoiredeshommes.sga.defense.gouv.fr. Appendix A.3 provides more details about this database. The exact number of soldiers who ultimately died as a result of the war is not known with certainty as some soldiers died a few years after the war from injuries or illnesses contracted during the conflict. Nevertheless, the figure of 1.3 million is the consensus among historians. Prost (2008) provides a detailed historical account of the assessment of WWI military fatalities. It is similarly difficult to assess the number of civilian fatalities. Adding up the number of pension requests resulting from civilian fatalities, the civilian victims of the commercial fleet, and the number of victims during the bombings of Paris and cities near the front—Dunkerque, Calais, Béthunes, Arras, Lens, Reims, Pont-à-Mousson, and Nancy—gives a figure of 40,000 (Huber, 1931, pp. 310–314).

all French citizens.[2] Figure 1.1 displays the distribution of military death rates across 87 départements. Military death rates range from 6% in Belfort to 29% in Lozère, with an average of 15% and a standard deviation of 4%.

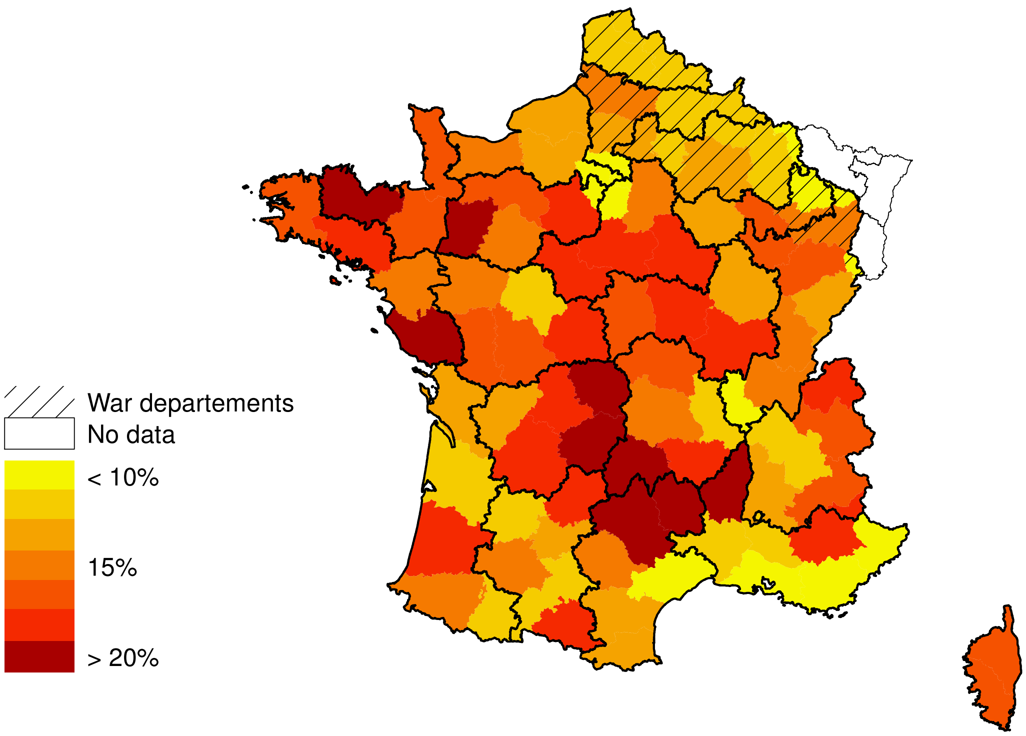


Figure 1.1: The Distribution of Military Death Rates

Notes. Distribution across 87 départements. 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, dated September 26th, 1913.

Measurement inaccuracies could potentially affect this measure of military death rates. First, the number of military fatalities in a département is determined using soldiers' départements of birth. This measure is not perfectly accurate as a soldier's département of birth may differ from his département of residence, and internal migration flows were not

2. The text of the conscription law is available in the *Journal Officiel de la République Française, Lois et Décrets, 35* (81), pp. 1869–1890, dated March 23rd, 1905. Appendix Table A.1 provides the length of military service for each conscription law until WWI.

negligible in France at the beginning of the twentieth century—19% of men aged 15 to 44 were residing outside of their département of birth in 1911. This could be problematic for the analysis if internal migration flows were correlated with pre-war trends in female labor force participation. In Appendix A.4, I build a measure of military death rates that corrects for these pre-war migration patterns by using information on bilateral migration flows of the male population between each pair of départements in 1911. I show in chapter 2 that the results of the analysis are similar when using either measure. I also show that a measure based on soldiers' départements of recruitment is contaminated with measurement error because the geography of military recruitment did not overlap département boundaries.

A second potential concern regards the approximation for the pool of drafted men. I implicitly assume that all men subject to the conscription during the war were recruited by the army, or, equivalently, that recruitment rates were similar across départements. This is not perfectly accurate as some men were exempted from the conscription due to poor health conditions—78.5% of all men subject to the conscription were recruited by the army at the onset of the war (Huber, 1931, p. 93).[3] Using military recruitment data by cohort together with pre-war health measures, I show in Appendix A.5 that differences in recruitment rates across départements are fully captured by measures of rurality.

To illustrate the dramatic impact of military fatalities on sex ratios, I estimate the following first-difference specification:

$$\Delta\texttt{sex\_ratio}_{a,d} = \alpha + \beta\, \texttt{death\_rate}_d + \varepsilon_{a,d}, \tag{1.1}$$

where $\Delta\texttt{sex\_ratio}_{a,d}$ denotes the change in sex ratio between 1911 and 1921 for age group

3. Recruitment rates nonetheless increased as military casualties accumulated throughout the conflict: many men that were previously deemed "unfit" were eventually recalled into the armed forces. For instance, 92% of the cohort aged 20 in 1914 was eventually recruited (Boulanger, 2001, pp. 118–128). Another potential concern may be that men under the age of 20 and over the age of 48 could voluntarily enlist in the army. These were relatively rare cases. For instance, while 26,000 men out of 188,000 conscripts voluntarily enlisted in the army in 1914, they were only 11,000 out of 211,000 to do so in 1915 (Boulanger, 2001, pp. 128–136).

a in département d, and $\texttt{death\_rate}_d$ the military death rate in département d. Table 1.1 reports the results. Because drafted men were 20 to 48 during the war, these age groups experienced the strongest declines in sex ratios. For instance, a 10 percentage point increase in military death rates is associated with a 6 percentage points decrease in the sex ratio of the age group 30–34. As a result, the sex ratio among this age group dropped 18 percentage points, from 100 in 1911 to 82 in 1921.

TABLE 1.1
THE IMPACT OF MILITARY FATALITIES ON SEX RATIOS

Dependent variable	Change in sex ratio, 1911–1921						
Age group	20–24	25–29	30–34	35–39	40–44	45–49	50–54
Military death rate	0.61	-0.46**	-0.58***	-0.37***	-0.32**	-0.09	0.00
	[0.95]	[0.19]	[0.13]	[0.13]	[0.13]	[0.14]	[0.12]
Départements	87	87	87	87	87	87	87
R^2	0.006	0.061	0.170	0.089	0.101	0.008	0.000
Mean sex ratio 1911	107	99	100	100	99	99	97
Mean sex ratio 1921	86	80	82	84	91	96	95

Notes. This table reports the OLS coefficients from estimating specification 1.1. The dependent variable is the change in sex ratio between 1911 and 1921 for a given age group in percentage points. Sex ratios are defined as the ratio of the male population to the female population in percents. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level.

1.2 Sources of Variations in Military Death Rates

In this section, I explore the sources of variation in military death rates across départements. I show that military death rates were not randomly distributed, but instead determined by the territorial the organization of the army and by the policies implemented by the Ministry of War to sustain the industrial war effort. Overall, more rural départements experienced more military fatalities. Nevertheless, the distribution of military death rates was not correlated with pre-war trends in female labor force participation.

1.2.1 The Territorial Organization of Military Recruitment

The first source of variation in military death rates stems from the territorial organization of military recruitment.[4] In 1914, the army was organized in 21 military regions and 2 specific bureaus for Paris and Lyon. Both the recruitment of soldiers and the constitution of military units were structured by this territorial organization: at the beginning of the war, military units were constituted by soldiers from the same military region. As a result, soldiers from the same military regions were initially sent to the same battlefields along the lines of the French mobilization plan designed in 1912, the *Plan XVII* (Joffre, 1932). This mobilization plan assigned each military unit to a predetermined area in the case of an invasion by German troops. Gonzalez-Feliu and Parent (2016) show that the allocation logic of the troops at the beginning of the war was the outcome of an optimization problem in which the objective of the military command was to minimize travel time of military units between their military region of origin and the front, with the railroad network as the main constraint.[5] However, as military fatalities soon accumulated, the military command changed its affectation policy: after only 5 months into the war in January 1915, soldiers were allocated to any military unit based on each unit's needs, thereby effectively pooling together soldiers from different military regions.[6]

This territorial organization has two implications. On the one hand, départements that did not belong to the same military region could have had different military death rates because their military units were assigned to different battlefields at the beginning of the war, with presumably different fatality rates. On the other hand, départements that belonged

4. The basis of this organization was laid out by the law of general organization of the army of July 24th, 1873. This organization was then only marginally readjusted until WWI. The exact geography that prevailed in August 1914 was fixed by the law of December 22nd, 1913. See the *Journal Officiel de la République Française, Lois et Décrets, 45* (349), pp. 11009–11010, dated December 24th, 1913.

5. See Le Hénaff (1922) and Joffre (1932) for a historical account of the preparation and application of the transportation plan of the troops along the lines of the Plan XVII.

6. This change in affectation policy was allowed by the *circulaire* of December 6th, 1913 (Boulanger, 2001, p. 253).

to the same military region could have had similar military death rates precisely for the same reason. The latter might reduce the extent of the variation in military death rates across départements that were within the same military region. However, the correlation of military death rates across départements within the same military region is small (0.12), presumably because soldiers from different military regions were pooled into the same military units soon after the beginning of the war.

1.2.2 The Industrial War Effort

As the war lasted longer than anticipated, the military command's plan to supply troops with war matériel—especially artillery—proved dramatically insufficient (Porte, 2005, pp. 73–82). For instance, the Plan XVII only provided for the production of 13,600 75mm shells per day, while the French army fired nearly 40,000 of these shells per day during the "Race to the Sea" in October 1914. By then, half of the stocks of 75mm shells had been depleted (Bostrom, 2016, p. 264). To cope with the ongoing war effort in conjunction with the lack of available civilian labor and the loss of the Northern industrial départements to the German invasion, the Ministry of War soon recalled soldiers with manufacturing skills into war factories.[7] As a result, up to 12% of mobilized soldiers were working in war factories instead of fighting on the front lines during the conflict. An additional 8% were working in the military administration. Appendix Figure A.1 and Appendix Table A.2 provide a detailed account of the soldiers mobilized outside of armed services throughout the war. As a result of this affectation policy, soldiers from more industrial and urban areas, or,

7. This allocation policy was allowed by the Dalbiez bill of August 17th, 1915, which stipulated the following: "The Ministry of War is authorized to allocate to corporations, factories, and mines working for the national defense men belonging to a mobilized or mobilizable age class, industrial managers, engineers, production managers, foremen, workers, and who will justify to have practiced their job for at least a year in those corporations, firms and mines, or in comparable corporations, firms, and mines" (art. 6, *Journal Officiel de la République Française, Lois et Décrets*, *47* (223), pp. 5785–5787, dated August 19th, 1915). From 1916 onwards, the military command also allocated soldiers into mines to increase steel production. Horne (1989) nevertheless argues that the recall of soldiers with manufacturing skills had started several months before the Dalbiez bill was enacted.

equivalently, from less rural ones, were less likely to die in combats.[8]

This pattern clearly emerges when comparing départements with varying levels of military death rates. First, I divide départements into three groups of 29 départements with low, medium, and high levels of military death rates, and regress pre-war characteristics on group membership indicators.[9] I report the results in Table 1.2. Column 1 provides means of pre-war characteristics, and columns 2 and 3, the coefficients on the medium and high group membership indicators. By construction, they represent the difference between the relevant group mean and the low group mean. Column 4 reports differences in means between the high and the medium groups. This table reveals that more rural départements experienced more military fatalities, where the rurality of a département is captured by two characteristics: the *share of rural population* and the *share of the residing population born in the département*.[10] Moreover, départements with higher military death rates had lower female labor force participation rates before the war.

To explore this pattern in more details, I regress military death rates on pre-war characteristics. Selected estimates are reported in Table 1.3.[11] Rurality explains most of the variation in military death rates, as each measure explains over 62% of its variance (columns 1 and 2). In column 3, I regress military death rates on the likely determinants of later female labor force participation rates: contemporaneous female labor force participation rates,

8. This was eventually mitigated by the mobilization of soldiers into harvesting from 1917 onwards, as provisioned by the Mourier bill of February 20th, 1917 (*Journal Officiel de la République Française, Lois et Décrets*, *49* (51), p. 1408, dated February 21st, 1917).

9. I estimate the following specification: $\mathbf{X}_{d,1911} = \alpha + \beta_m \, \texttt{medium}_d + \beta_h \, \texttt{high}_d + \varepsilon_d$, where $\mathbf{X}_{d,1911}$ corresponds to characteristic $\mathbf{X}$ of département d in 1911, $\texttt{medium}_d$ is an indicator for département d being in the medium group, and $\texttt{high}_d$ an indicator for département d being in the high group. The low military death rates group is the excluded category.

10. The *share of rural population* is defined in the censuses as the share of population that resides in cities with less 2,000 inhabitants. The *average personal wealth*, the *share of active population working in agriculture*, or the *share of cultivated land* also capture some aspects of rurality, but all the variation in these variables is captured by the *share of rural population* and the *share of the residing population born in the département*. While a higher share of the residing population born in the département may mean either more immigration or more emigration, the later is the case. See Tugault (1970) and White (1989) for more details on internal migrations in France in the early twentieth century.

11. The full set of estimates is available in Appendix Table A.3.

Table 1.2
Département Characteristics by Level of Military Death Rate

Military death rate	All (1)	Relative to low: Medium (2)	Relative to low: High (3)	Difference (3) - (2) (4)
Military death rate (%)	15.6	4.2***	7.7***	3.4***
	(3.8)	[0.5]	[0.7]	[0.5]
Female labor force participation rate (%)	31.4	-1.9	8.8***	-5.0**
	(8.9)	[2.3]	[2.2]	[2.2]
<u>Demographic characteristics</u>				
Population (thousands)	450	-293.44**	-334.14**	-40.70
	(468)	[142.35]	[142.00]	[36.02]
Population density (per km^2)	166	-335	-343	-7
	(908)	[291]	[291]	[5]
Share rural population (%)	66.9	21.5***	30.2***	8.8***
	(17.7)	[3.8]	[3.8]	[1.7]
Share born in département (%)	79.8	11.4***	17.2***	5.8***
	(11.6)	[2.8]	[2.8]	[1.4]
Age	32.4	0.5	-0.4	-0.9*
	(2.0)	[0.5]	[0.5]	[0.5]
Height (cm)	166.2	-0.30	-1.13***	-0.83***
	(1.2)	[0.26]	[0.29]	[0.29]
<u>Economic characteristics</u>				
Share in industry (%)	31.5	-10.5***	-17.1***	-6.6***
	(11.2)	[2.7]	[2.5]	[1.7]
Share in agriculture (%)	48.8	16.6***	26.9***	10.3***
	(15.5)	[3.3]	[3.1]	[1.9]
Road density (km per km^2)	1,283	-102	-193**	-91
	(342)	[94]	[89]	[81]
Rail density (km per km^2)	1.5	-1.1	-1.3*	-0.2**
	(2.3)	[0.7]	[0.7]	[0.1]
Share cultivated land (%)	44.3	3.7	1.3	-2.4
	(17.0)	[4.4]	[4.7]	[4.4]
Personal wealth (francs per inhabitant)	3,639	-1,006	-2,235***	-1,229***
	(2,384)	[652]	[648]	[424]
Banking deposits (francs per inhabitant)	12.7	-2.5	-2.1	0.4
	(5.8)	[1.7]	[1.7]	[1.1]
Direct taxes (francs per inhabitant)	23.7	-4.6**	-9.9***	-5.3***
	(8.1)	[1.9]	[1.9]	[1.8]
Share read and write (%)	84.7	-1.8	-7.2***	-5.4**
	(7.7)	[1.7]	[1.8]	[2.1]
Share primary education (%)	61.1	1.6	-9.0**	-10.7***
	(14.6)	[3.3]	[3.7]	[4.0]
<u>Other characteristics</u>				
Distance to war (km)	322	30	106**	76
	(205)	[60]	[53]	[46]
Share students in religious schools (%)	3.0	-0.8	0.2	1.0
	(3.4)	[0.7]	[1.0]	[1.0]
Vote in 1905 (%)	61.4	-5.9	-2.6	3.3
	(32.5)	[8.9]	[7.9]	[9.0]
Turnout in 1914 (%)	76.9	0.4	-0.0	-0.4
	(5.6)	[1.3]	[1.6]	[1.5]

Notes. Column 1 reports mean values for 87 départements. Standard deviations are in parenthesis. Columns 2 and 3 report the OLS estimates from regressing pre-war characteristics on indicators for being a medium ($\widehat{\beta}_m$) and a high ($\widehat{\beta}_h$) military death rates département following the specification in footnote 9. Column 4 displays the difference between estimates in columns 3 and 2. Robust standard errors are in brackets. Each group contains 29 départements. See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

a measure of female education, total fertility rates, and the personal wealth per inhabitant. None of these four variables is correlated with military death rates. They together explain only 35% of the variance in military death rates. When adding measures of rurality together with additional characteristics in column 4, only the measures of rurality are correlated with military death rates.[12] Regressing military death rates on these two measures alone in column 5 barely affects the coefficients. Importantly, they together explain 74% of the variation in military death rates, and 80% when including eleven additional variables as in column 4.

Table 1.3
Military Death Rates and Département Characteristics

Dependent variable	Military death rate				
	(1)	(2)	(3)	(4)	(5)
Share rural population	0.18***			0.12***	0.12***
	[0.02]			[0.02]	[0.01]
Share born in département		0.26***		0.13***	0.12***
		[0.03]		[0.03]	[0.03]
Female labor force participation rate			-0.09	-0.02	
			[0.06]	[0.04]	
Share girls aged 5–19 in school			0.13	0.09	
			[0.08]	[0.07]	
Total fertility rate			0.00***	0.00*	
			[0.00]	[0.00]	
Personal wealth (thousand francs)			-0.00	0.00**	
			[0.00]	[0.00]	
Other demographic characteristics	No	No	No	Yes	No
Other economic characteristics	No	No	No	Yes	No
Départements	87	87	87	87	87
R^2	0.686	0.624	0.350	0.800	0.739

Notes. This table reports the OLS coefficients from regressing military death rates on various pre-war département characteristics. The *other demographic* and *economic* characteristics are 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. See Appendix D for details about variables sources and definitions. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Military death rates and migration patterns were also correlated, as captured by the share of the residing population born in the département. To explore this pattern in more details,

12. These additional characteristics are average height, population, the share of men working in industry and in agriculture, the share of the literate population, and the average direct taxes per inhabitant.

I build a more direct measure of migration flows at the département level by computing the share of population that was "in excess" in 1911 based on yearly flows of births and deaths since 1901.[13] When regressing military death rates on this measure, I find that départements that experienced more migration outflows before the war had higher military death rates. Moreover, the share of the residing population born in the département is a strong predictor of these migration outflows: regressing the population in excess on the share of the residing population born in the département yields a coefficient of -0.36, with a standard error of 0.04, and an R^2 of 79%. This confirms the interpretation that emigration départements had more military fatalities.

Additionally, the distribution of military death rates was not correlated with pre-war trends in female labor force participation. Regressing military death rates on pre-war changes in female labor force participation reveals that départements exposed to higher military death rates had a slight relative decline in female labor force participation before the war, but the coefficients are not significant (columns 1 and 4 of Table 1.4). Départements with higher military death rates were experiencing migration outflows before the war. Labor market structures of these départements was slowly changing as well: the size of their industrial sector was slowly decreasing, explaining the relative decline in female labor force participation in these areas. As a result, controlling for changes in the share of rural population and changes in migration flows, the correlation between pre-war trends in female labor force participation and military death rate becomes even weaker (columns 3 and 6).

To make these changes more apparent, Figure 1.2 displays relative trends in female labor force participation across the three groups of départements between 1901 and 1936, where female labor force participation rates are normalized to 100 in 1911. This figure reveals that départements with higher military death rates experienced a relative increase in female labor force participation after the war. It also confirms that there were no clear differential trends

13. The share of population in excess in département d in 1911 is calculated as $\left[\texttt{population}_{d,1911} - \left(\texttt{population}_{d,1901} + \sum_{t=1901}^{1911} \texttt{births}_{d,t} - \sum_{t=1901}^{1911} \texttt{deaths}_{d,t}\right)\right] / \texttt{population}_{d,1911}$.

Table 1.4
Military Death Rates and Pre-War Trends

Dependent variable	Military death rate					
	A. 1901–1911			B. 1906–1911		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in FLFP	-0.27		-0.20	-0.36		-0.32
	[0.17]		[0.14]	[0.30]		[0.27]
Change in Rural		0.43**	0.41**		0.61***	0.59***
		[0.19]	[0.19]		[0.22]	[0.22]
Change in Born in dép.		0.74***	0.72***		0.92***	0.92***
		[0.20]	[0.21]		[0.22]	[0.21]
Départements	87	87	87	87	87	87
R^2	0.025	0.201	0.214	0.014	0.203	0.213

Notes. This table reports the OLS estimates from regressing military death rates on pre-war trends. All the variables are first-differenced between 1911 and 1901 (columns 1–3), or between 1911 and 1906 (columns 4–6). *FLFP* is the female labor force participation rate in percents. *Rural* is the share of rural population in percents. *Born in dép* is the share of the residing population born in the département in percent. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level.

in female labor force participation across départements with varying levels of military death rates in the pre-war period.

Overall, the relationship between military death rates and rurality can be thought of as the result of the policies implemented by the Ministry of War to sustain the industrial war effort. I interpret the residual variation in military death rates as non-systematic, related to the randomness at which soldiers encountered violence on the battlefield. Many war novels describe this phenomenon. For instance, Erich Maria Remarque writes: "It is simply a matter of chance whether I am hit or whether I go on living. I can be squashed flat in a bomb-proof dugout, and I can survive ten hours in the open under heavy barrage without a scratch. Every soldier owes the fact that he is still alive to a thousand lucky chances and nothing else" (Remarque, 1994, p.72).

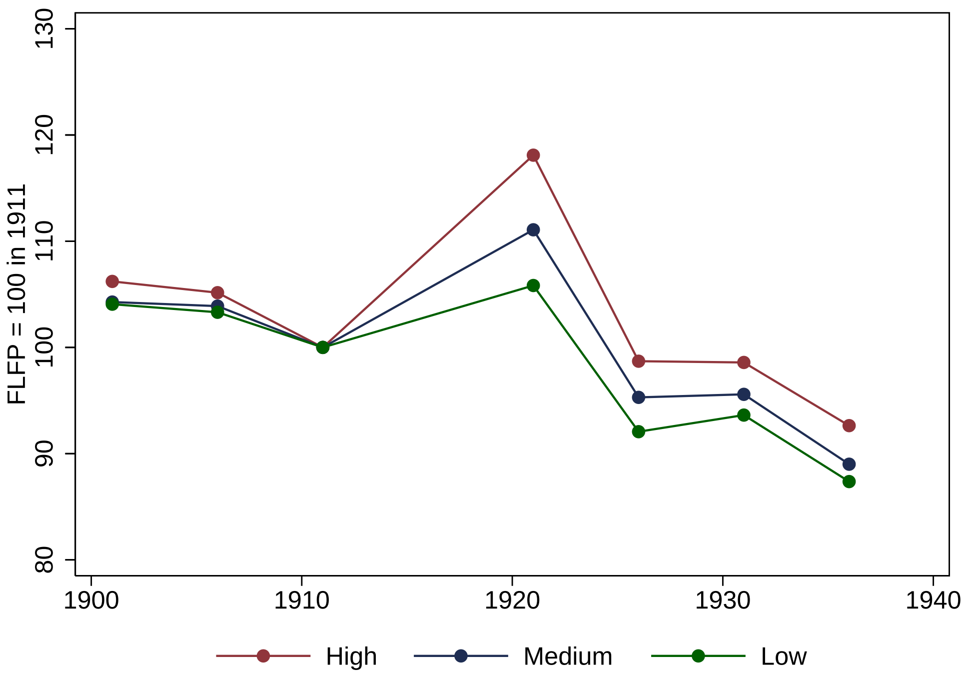


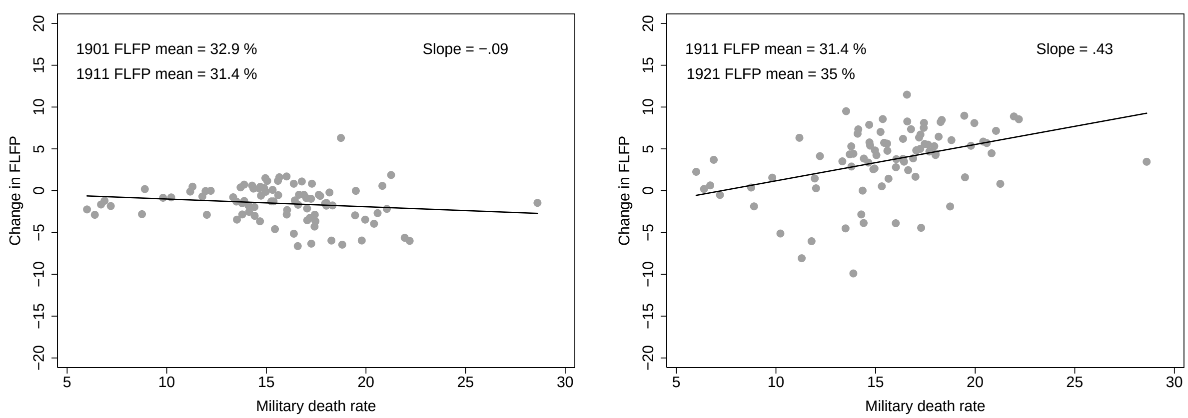
FIGURE 1.2: RELATIVE TRENDS IN FEMALE LABOR FORCE PARTICIPATION

Notes. This figure displays relative trends in female labor force participation between 1901 and 1936 across groups of 29 départements with high, medium, and low military death rates. Female labor force participation (*FLFP*) is normalized to 100 in 1911.

CHAPTER 2

THE MISSING MEN (1901–1936)

Did sex ratio imbalances generated by World War I affect female labor force participation in the interwar period? The empirical strategy in this chapter exploits differential changes in female labor force participation before and after the war across départements with varying levels of military death rates. I find that military fatalities shifted female labor force participation upward, an effect that persisted throughout the interwar period. Figure 2.1 displays the raw relationship between military death rates and changes in female labor force participation rates across départements. While there is no relationship between military fatalities and pre-war changes in female labor force participation between 1901 and 1911 (panel A), each additional percentage point in military death rate is associated with an increase of half a percentage point in female labor force participation rates between 1911 and 1921 (panel B).



(A) Changes in FLFP (1901–1911) (B) Changes in FLFP (1911–1921)

Figure 2.1: WWI Military Death Rates and Changes in Female Labor Force Participation

Notes. FLFP denotes female labor force participation rates in percents. Changes are in percentage points. Each dot represents on of 87 départements.

Baseline difference-in-differences estimates confirm this relationship: in départements that experienced military death rates of 20% rather than 10%—equivalent to switching from the 25th to the 75th percentile of the distribution—female labor force participation was 4 percentage points higher throughout the interwar period, compared to an average participation rate of 31% before the war. That is, these départements experienced an increase in female labor force participation of 12% compared to pre-war levels. At the mean of the data, this implies that losing 10 men during the war induced 2 women to enter the labor force.

I subsequently explore the validity of the identifying assumption that counterfactual trends in female labor force participation would have been the same across all départements had they experienced similar military death rates. I described in chapter 1 that military death rates were not randomly distributed across départements as more rural départements experienced more military fatalities, a correlation that was generated by the policies implemented by the Ministry of War to sustain the industrial war effort. Importantly, this correlation does not invalidate the identification as military death rates were not correlated with pre-war trends in female labor force participation. Nonetheless, to increase the credibility of the identification strategy, I relax the parallel trend assumption in three ways. First, I control for département-specific time trends in female labor force participation. Second, using Bonhomme and Manresa's (2015) grouped fixed effects methodology, I allow for time-varying heterogeneity across groups of départements, where I do not impose any *a priori* structure on group membership. Third, exploiting the fact that the recruitment process of the army led to randomness in military death rates, I use an instrumental variables approach combined with the difference-in-differences strategy. All empirical strategies lead to comparable results, which are in line with the baseline estimates.

I also show that the results are robust to alternative measurements of female labor force participation and military death rates, to spatial correlation across départements, to differential pre-war health conditions and enlistment rates, and to pre- and post-war migration patterns. Moreover, historical data on war destructions and the post-war reconstruction reveal that départements in which war combats occurred do not display a heterogeneous response to military fatalities.

Compared to the well-documented effect of WWII mobilization on female labor force participation in the U.S. (Goldin, 1991; Acemoglu, Autor and Lyle, 2004; Goldin and Olivetti, 2013), the effect I identify is driven by a different mechanism and is larger in magnitude.[1] The increase in female labor force participation in the U.S. after WWII was driven by women who entered the labor force *during* the war and continued working afterwards. In contrast, the increase in female labor force participation in France after WWI was driven by women who entered the labor force *after* the war. Supply factors related to changes in marriage market conditions are largely responsible for this pattern. On the one hand, many single women entered the labor force while searching longer for a husband because of the tightness of the post-war marriage market, and, on the other hand, many war widows entered the labor force to compensate for the loss of their husbands' incomes. In contrast, demand factors did not play a significant role. Analyzing changes in female wages before and after the war, I find that female wages strongly declined across all occupations, even in occupations in which men and women are close substitutes. This suggests that firms did not increase their demand for women by substituting male labor for female labor in départements that had high military death rates. Instead, firms increased their stock of physical capital to compensate for the scarcity of men. Finally, using female labor force participation data from 1914 to 1921, I find no evidence that the women who entered the labor force during the war continued working after the war. Using voting patterns in the French *Assemblée Nationale* on female-related bills, I also find that female labor during the war did not change men's beliefs about gender roles in the short run.

The remainder of this chapter is organized as follows. Section 2.1 discusses the related literature, section 2.2 describes the measure of female labor force participation and presents the main results, and section 2.3 explores the mechanisms.

1. For instance, Acemoglu, Autor and Lyle (2004, p. 528) find that "a 10 percentage point increase in the mobilization rate in the U.S. during WWII is associated with one to three percentage points of additional growth in female labor force participation over [the 1950s]."

2.1 Sex Ratio Imbalances and Female Labor Force Participation

This chapter contributes to the literature exploring the effect of sex ratio imbalances on female labor force participation. Economic theories of marriage imply that the scarcity of one gender impacts women's working behavior through its effect on marriage market conditions. For instance, Grossbard's (2014) demand and supply model of marriage implies that the scarcity of men decreases the implicit market price of women's work in the household, thereby increasing their supply of labor through an income effect.[2] These theoretical predictions have been tested using a variety of sources of variation in sex ratios such as natural fluctuations of cohort sizes or immigration shocks. For instance, exploiting sex ratio differences across cohorts in the U.S. between 1965 and 2005, Amuedo-Dorantes and Grossbard (2007) find a negative correlation between sex ratios and women's labor force participation. Alternatively, Angrist (2002) shows that changes in immigrant sex ratios in the U.S. between 1910 and 1940 induced second-generation migrant women to marry more often, thereby decreasing their propensity to participate in the labor force. In a different setting, Charles and Luoh (2010) find that rising male incarceration rates in the U.S. affected women's working behavior through its impact on marriage market conditions. Compared to this literature, the source of variation in sex ratio I use enables to improve upon identification: it is sharper—military fatalities are concentrated within a period of about 4 years—larger in magnitude, and exogenous to the outcome under scrutiny.

Moreover, a broad literature has analyzed the impact of war mobilization and of military fatalities on female labor force participation. It has mostly focused on the impact of WWII mobilization in the U.S., showing that it generated an increase in female labor supply in the 1950s and 1960s (Goldin, 1991; Acemoglu, Autor and Lyle, 2004; Goldin and Olivetti, 2013). In particular, Goldin and Olivetti (2013) find that this effect was primarily driven by higher-educated white married women who were in their twenties during the war. WWII

2. Collective models of household labor supply lead to similar conclusions (Chiappori, 1992).

mobilization further affected the type of occupations held by women after the war with a shift toward blue collar occupations (Bellou and Cardia, 2016). Relative to this literature, this chapter contributes to the understanding of the effect of wars on subsequent female labor force participation in several ways. Besides shedding light on an alternative mechanism, the extent of WWI military fatalities in France enables to focus on the impact of a permanent rather than a temporary shortage of men. While the effect of the war was similar in that female labor force participation increased, it was more persistent as it lasted throughout the interwar period. As a comparison, the direct impact of WWII mobilization on female labor in the U.S. faded out in the 1950s and 1960s.[3] Second, the qualitative nature of the effect I identify is different: while WWII in the U.S. induced women to enter the labor force because of the disruptions generated by the war-production effort, WWI in France induced women to enter the labor force because of the disruptions to the post-war marriage market generated by the missing men.

This chapter also contributes to the historiography of the impact of WWI on female labor in France by clarifying the debate between the popular view that the war "liberated women", and the commonly held academic view that the war was a mere "parenthesis" for female labor. For instance, Françoise Thébaud concludes her seminal study on women during WWI by "[t]he war, which brought hundreds of thousands of women into factories and male sectors, appears at least in part as a parenthesis" (Thébaud, 2013, p. 406). Other historians qualify this idea: "[w]ould the war have been a parenthesis in the long history of female labor? This assessment is also debatable, and one can assert from now on that the war accelerated female labor in the industry and in the offices" (Zancarini-Fournel, 2005, p. 59).[4] Similarly, economists such as Abramitzky, Delavande and Vasconcelos (2011, p. 131) notice that "changes in the female labor market that occurred during the war were

3. Fernández, Fogli and Olivetti (2004) nevertheless provide evidence for an indirect effect of WWII mobilization on the working behavior of the daughters in-law of women working during the war.

4. See Downs (1995), Schweitzer (2002), Battagliola (2010), and Maruani and Meron (2012) for other historical accounts of female labor in France throughout the twentieth century.

reversed upon the end of the war with the return of men to their civilian jobs." My empirical analysis reveals that the inflow of women in the labor force during the war was indeed only temporary. Nevertheless, I find that the war had a long-lasting impact on female labor through its consequences on post-war marriage market conditions.[5]

2.2 The Missing Men and Female Labor Force Participation

2.2.1 The Measure of Female Labor Force Participation

To measure female labor force participation at the département level before and after the war, I use the seven censuses from 1901 to 1936.[6] Starting from 1801, the census was carried out every five years except during war years. It was not until the census of 1901 that female labor was consistently recorded. Still, the census of 1901 is not fully comparable to later censuses: while farmers' wives were supposed to be systematically recorded as labor force participants, not all census agents followed this directive (Daric, 1947; Maruani and Meron, 2012, pp. 33–35). For this reason, the analysis in this chapter focuses on female labor force participation net of farmers' wives. Because these women were systematically classified as farm owners whenever recorded as labor force participants, I avoid a potential measurement concern by subtracting them as nearly all female farm owners were farmers' wives. Moreover, this transformation enables to focus on paid work. I nevertheless show in Appendix B.5 that all the results in this chapter are similar when female farm owners are included in the analysis.

Female labor force participation is defined as the employed share of the female population aged 15 and above. Table 2.1 reports average female labor force participation rates. While

5. My dataset of military fatalities also enables to confirm and extend the results in Abramitzky, Delavande and Vasconcelos (2011), who study the short-run effects of military fatalities on the post-war marriage market in France. Appendix A.3 provides precisions about the value added of this data compared to previously available measures of WWI military death rates in France, such as those in Abramitzky, Delavande and Vasconcelos (2011) and Vandenbroucke (2014).

6. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936.

many women entered the labor force right after the war in 1921, many withdrew later on. Because of the economic crisis in the 1930s, pre-war levels in female labor force participation were not recovered at the onset of WWII (Maruani and Meron, 2012, pp. 39–40).[7] Consistent with this picture, historians and economists alike have described the surge in female labor force participation after the war as a mere "parenthesis" in the progress of female labor in France. Table 2.1 further motivates the focus on female labor force participation net of female farm owners: while the corrected measure remains stable at 33% between 1901 and 1906, the uncorrected measure displays an increase of 7 percentage points between these two censuses. Given that there was no major shock to labor market conditions between 1901 and 1906, this change can be attributed to the aforementioned measurement inaccuracy. After 1906, the two measures display a constant difference of 19–21 percentage points, suggesting that the corrected measure does not introduce any significant bias.

Table 2.1
Average Female Labor Force Participation Rates

	1901	1906	1911	1921	1926	1931	1936
FLFP (net of farm owners)	32.9	32.7	31.4	35.0	29.9	30.1	28.1
FLFP (uncorrected)	45.0	51.9	51.5	55.7	49.6	49.4	47.0
Difference	12.0	19.3	20.1	20.7	19.7	19.3	18.9

Notes. This table reports average female labor force participation rates across 87 départements. *FLFP* denotes female labor force participation rates in percents.

2.2.2 Baseline Difference-in-Differences Estimates

To analyze the effect of military fatalities on female labor force participation in the interwar period, I use a difference-in-differences strategy. Identification stems from relative changes in female labor force participation rates across départements with varying levels of military

7. Appendix Table B.1 reports summary statistics for male and female labor force participation rates by sector. Trends in female labor force participation rates mirrored male's, suggesting that labor market conditions across genders were driven by common national trends.

death rates. I estimate the following specification:

$$\texttt{FLFP}_{d,t} = \beta \, \texttt{death\_rate}_d \times \texttt{post}_t + \boldsymbol{\theta}' \, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_t + \varepsilon_{d,t}, \tag{2.1}$$

where $\texttt{FLFP}_{d,t}$ is the female labor force participation rate in département d in year t, $\texttt{post}_t$ is an indicator variable equal to 1 if $t > 1918$, $\texttt{death\_rate}_d$ is the military death rate in département d, $\boldsymbol{\gamma}_d$ are département fixed effects, and $\boldsymbol{\delta}_t$ are census-year fixed effects. $\mathbf{X}_{d,t}$ is a vector containing the two time-varying characteristics described earlier: the share of rural population and the share of the residing population born in the département.

Département fixed effects $\boldsymbol{\gamma}_d$ control for département-specific unobservable characteristics that are fixed over time and may generate systematic differences in levels of female labor force participation. For instance, some départements may have more traditional views about gender roles than others and therefore display systematically lower female labor force participation rates. Census-year fixed effects $\boldsymbol{\delta}_t$ control for aggregate-level shocks that are common to all départements. For instance, labor markets throughout the country were affected by the Great Depression between 1926 and 1936 (Maruani and Meron, 2012, pp. 39–40). I also include changes in rurality and migration flows as covariates as they could be correlated with changes in female labor force participation.[8]

I report the baseline estimates in Table 2.2. In départements that experienced military death rates of 20% rather than 10%, female labor force participation was 3.7 percentage points higher in the interwar period, compared to an average of 31.4% in 1911 (column 1). This corresponds to an increase of 12% in female labor force participation rates. Put differently, losing 10 men during the war induced 2 women to enter the labor force on

8. Many of the other covariates that are available for this time period are likely to be directly affected by military fatalities, such as changes in local labor market structures or changes in population levels. As a result, I do not include them as controls in the regression because they could confound the post-treatment relationship between military fatalities and female labor force participation. Although that the measures of rurality could also be impacted by military fatalities, the estimates barely change when including these controls.

average.[9] Controlling for changes in the share of rural population and the share of the residing population born in the département barely affects the results (columns 2–4). I also find that military fatalities had no effect on male labor force participation (see Appendix Table B.2).[10]

Table 2.2
The Impact of WWI Military Fatalities on FLFP

Dependent variable	Female Labor Force Participation			
	(1)	(2)	(3)	(4)
Military death rate × post	0.37***	0.35***	0.37***	0.35***
	[0.08]	[0.07]	[0.07]	[0.07]
Rural	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	609	609	609	609
Départements	87	87	87	87
Within R^2	0.578	0.579	0.579	0.581
1911 mean	31.4	31.4	31.4	31.4

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation in percents. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

9. For each département, I compute two quantities: the number of military fatalities corresponding to one percentage point in military death rates, and the number of working women corresponding to a 0.37 percentage point increase in female labor force participation rates. I then use a product rule and average the results across départements.

10. To better understand the extent to which each département contributes to the estimates, I apply Aronow and Samii's (2016) procedure to uncover the "effective sample" used in the regression. This procedure generates regression weights by computing the relative size of the residual variance of the treatment variable for each unit in the sample. I find that all départements contribute broadly equally to construct the estimates, although départements that experienced less migration flows during this period have a slightly larger weight in the regression (see Appendix Table B.3).

Year-Specific Difference-in-Differences Estimates

I now relax the assumption that the effect of military fatalities was constant across time by estimating year-specific difference-in-differences coefficients. The specification includes leads and lags to assess the plausibility of the parallel trends assumption:

$$\texttt{FLFP}_{d,t} = \sum_{\substack{t=1901 \\ t\neq 1911}}^{1936} \beta_t \, \texttt{death\_rate}_d \times \texttt{year}_t + \boldsymbol{\theta}' \, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_t + \varepsilon_{d,t}, \tag{2.2}$$

where the year 1911 is excluded, and where $\texttt{year}_t$ is an indicator variable for each year between 1901 and 1936. I plot the estimates in Figure 2.2.[11] They are stable throughout the interwar period, suggesting that the impact of WWI military fatalities on female labor force participation was persistent. Again, adding the control variables barely affects the results.

The coefficients on pre-war years are not significant, suggesting that differential trends in pre-war female labor force participation do not drive the results. They are nonetheless slightly positive: for instance, the baseline coefficient on the lead of 1906 is 0.04, with a standard error of the same magnitude. This implies that départements that experienced higher military death rates had a relative downward trend in female labor force participation before the war, which could bias the estimates downward. Following the analysis in above, I interpret this potential downward bias as the result of the correlation between unobservable determinants of migration patterns and pre-war trends in female labor force participation. Nevertheless, I show below that the results are similar when using the alternative measure of military death rates that corrects for these pre-war migration patterns.

11. The complete set of results is available in Appendix Table B.4.

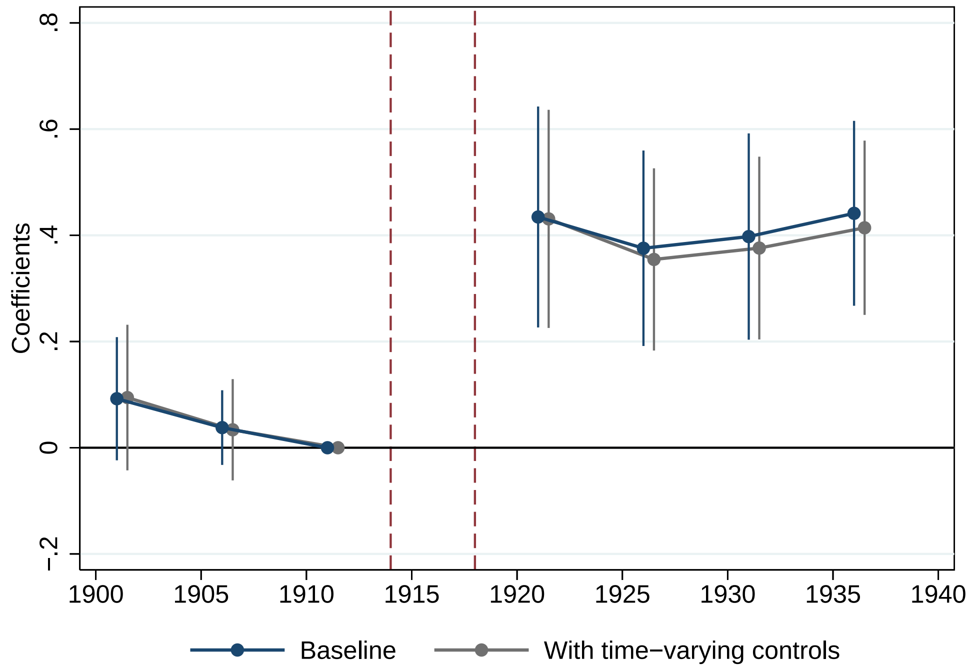


Figure 2.2: The Impact of WWI Military Fatalities on FLFP (Year-Specific Estimates)

Notes. This figure reports the year-specific OLS estimates of columns 1 and 4 of Appendix Table B.4. Time-varying controls include the share of rural population and the share of the residing population born in the département. Vertical lines represent 95% confidence intervals around the estimates.

Estimates by Sector of Activity

Decomposing the response of female labor to military fatalities by sector of activity, I find that most of the effect identified stems from women entering the industrial sector and the domestic services sector. Compared to pre-war levels, the magnitude of the impact is similar across both sectors: in départements that experienced military death rates of 20% rather than 10%, female labor force participation increased by 20% in both sectors compared to pre-war levels. The analysis is reported in Appendix B.3.

2.2.3 Relax the Parallel Trends Assumption

I now present three ways of relaxing the parallel trends assumption—the full set of results from these analyses is reported in Appendix B.4.

Département-Specific Time Trends

First, I verify that differential trends in female labor force participation do not drive the results by controlling for département-specific linear time trends (Appendix B.4.1). Point estimates are significant at the 1% level and larger than the baseline at 0.40 (relative to 0.35), suggesting that pre-war differential trends in female labor force participation generated a slight downward bias. Adding quadratic, cubic, or quartic time trends generates similar insights—the point estimates in these cases are close to 0.47.

Grouped Fixed Effects

Second, I inspect the robustness of the baseline specification to allowing for time-varying heterogeneity across groups of départements (Appendix B.4.2). In particular, I relax the assumption that time fixed effects are common to all départements. Using Bonhomme and Manresa's (2015) grouped fixed effects algorithm, I do not impose any *a priori* structure on the group assignment. Allowing for heterogeneity in the time pattern of female labor force participation across up to 10 groups of départements generates point estimates close to 0.3, suggesting that the parallel trends assumption is reasonable in this context.

Instrumental Variables Strategy

Third, I integrate an instrumental variables strategy within the difference-in-differences framework. In particular, I leverage on some exogenous variation in military death rates that results from idiosyncrasies in the recruitment process of the army (Appendix B.4.3). At the onset of the war, the active army was constituted by four age cohorts: the men aged 20 to 23.[12] I designate an age cohort by the year in which it was recruited by the army, i.e., the year that cohort attained age 20. For instance, I designate the cohort that was born in 1894 as the *class of 1914*. In 1914, the active army was constituted by the classes of 1911 to 1914: while the class of 1914 had just been recruited, the class of 1911 had just finished its three years of military training and was about to be transfered to the reserve of the active army. As a result, men that belonged to the classes of 1911 to 1914 had different levels of military training at the onset of the war. They were nevertheless sent to the same battlefields, within the same military units. Intuitively, men with more military training should be more efficient on the battlefield and die at lower rates. This is reflected in the data: the contribution of each class to military fatalities is monotonically increasing from the class of 1911 to the class of 1914.[13] I argue that these differences are essentially due to differences in military training. I build on these discontinuities and create three instruments, each instrument representing the relative size of a cohort relative to the following cohort in 1911. These instruments are uncorrelated with pre-war trends in female labor force participation but strongly correlated with military death rates. Overall, instrumenting military death rates in equation 2.1 with the relative size of consecutive cohorts results in point estimates that are larger than the baseline at 0.54 (relative to 0.35), again revealing that pre-war differential trends in female labor force participation created a slight downward bias.

2.2.4 Other Robustness Checks

In this section, I perform additional robustness checks. When appropriate, I compare the results of these robustness checks against the main result, the estimate of 0.35 reported in column 4 of Table 2.2.

12. Following the military conscription law of 1913, the general army was divided into four armies: the active army, composed by the age classes currently doing their military service, the reserve of the active army, the territorial army, and the reserve of the territorial army. Appendix Table A.1 provides for the length of service in each of these armies.

13. More precisely, the class of 1911 contributed 5.7% to overall military fatalities, the class of 1912 contributed 6.2%, the class of 1913 contributed 6.5%, and the class of 1914 contributed 6.7%.

Alternative Measure of Female Labor Force Participation

Wives of farmers were inconsistently recorded as labor force participants across départements in the census of 1901. Moreover, they accounted for almost all female farm owners. I therefore systematically exclude female farm owners from the data in order to properly examine pre-war trends in female labor force participation. In Appendix B.5, I replicate the main analyses of this chapter when including these women in the measure of female labor force participation. I find slightly larger estimates due to some women entering the agricultural sector upon becoming farm owners following the death of their husbands or their sons—the point estimate increases from 0.39 with the standard measure of female labor force participation (when excluding the year 1901) to 0.45 when including female farm owners.

War Départements

War combats occurred on the territory of eleven départements in the industrial North-East (see Figure 1.1). These départements suffered from minor destructions to total devastation. The French State, through the *Ministère des Régions Libérées*, provided a large amount of funds to help the reconstruction effort throughout the interwar period (Michel, 1932, pp. 549–558). It could be problematic if military fatalities were correlated with war destructions or with the intensity of the reconstruction effort. On the one hand, the loss of physical capital entailed by war destructions could imply a decline in the demand for labor relative to other départements. A positive correlation between military fatalities and war destructions could therefore bias the estimates downward. On the other hand, the reconstruction effort financed by the State could imply an increase in the demand for labor relative to other départements. A positive correlation between military fatalities and the intensity of the reconstruction effort could therefore bias the estimates upward. The net impact of this process would then depend on the relative intensity of war destructions vis-à-vis the reconstruction effort, and the extent of the correlations with military fatalities.

In Appendix B.6, I propose two strategies to cope with this potential problem. First, I replicate the analysis when excluding these eleven départements. Second, I collect data about the intensity of war destructions and the reconstruction effort in these départements from Michel (1932) and directly check whether military fatalities are correlated with these measures. The results for both strategies imply that war départements are not driving the results. First, excluding these départements from the analysis only marginally affects the estimates: they decrease from 0.35 to 0.28, mostly because the effect of military fatalities on female labor force participation disproportionately affected the industrial sector (see Appendix B.3), and these départements were predominantly industrial.[14] Second, I find no correlation between military death rates and war destructions or the intensity of the reconstruction effort.

Correct Military Death Rates for Pre-War Migration Patterns

I determine the number of military fatalities in a département by using soldiers' départements of birth. Pre-war migration patterns could introduce some bias in this measure as 19% of the men subject to conscription during the war were living outside of their département of birth in 1911. This could be problematic if men born in rural départements systematically migrated to urban départements. In this case, military death rates in urban départements would be understated, and those in rural départements, overstated. Given that female labor force participation was more responsive in areas with larger pre-war industrial and domestic services sectors, unobserved pre-war migration patterns could introduce downward bias in the baseline estimates.

To assess the robustness of the results in this chapter to unobserved pre-war migration patterns, I replicate the baseline estimates when using the measure of military death rates that takes into account bilateral migration flows across départements in the census of 1911

14. 29% of the male active population worked in the industrial sector in départements not directly affected by war combats in 1911 compared to 49% in the départements directly affected by war combats.

(see Appendix A.4). I find slightly larger estimates, suggesting that unobserved pre-war migration patterns did introduce a downward bias—the point estimate increases from 0.35 with the standard measure of military death rates to 0.55 with the measure correcting for bilateral migration flows (see Appendix Table B.5).

Pre-War Health Conditions and Differential Enlistment Rates

Using the male population aged 15 to 44 in 1911 may not adequately capture the pool of drafted men as not all men subject to military conscription were enlisted in the army—78.5% of the men aged 20 to 48 were enlisted at the beginning of the war (Huber, 1931, p. 93). The reminder of this age group was not enlisted, mostly due to poor health conditions. Given that health conditions partially determine a soldier's ability on the battlefield, départements with worse pre-war health conditions could have experienced higher military death rates. If this were the case, and if these differences in pre-war health conditions could not be controlled for, part of the effect identified could be attributable to pre-war health rather than to military death rates per se.

To deal with this issue, I explore in Appendix A.5 the sources of variation in enlistment rates across départements, and analyze whether they are correlated with military death rates. I find that départements with lower enlistment rates were the ones with adverse pre-war health conditions. Nevertheless, I show that controlling for rurality fully captures variations in pre-war health conditions that might affect the rate of military fatalities.

Adjust Standard Errors for Spatial Correlation

As apparent on Figure 1.1, military death rates seem spatially clustered. In chapter 1, I discussed how the territorial organization of the army as well as the policies implemented by the Ministry of War to support the industrial war effort both generated this spatial distribution. Throughout the analysis in this chapter, I cluster standard errors at the département level and implicitly assume that départements are independent from one another.

In Appendix Table B.6, I show that the results are robust to other forms of spatial correlation. First, I replicate the analysis when using larger clusters: administrative regions and military regions. There were 21 administrative regions and 22 military regions.[15] In both cases, standard errors are similar to the ones obtained when clustering at the département level. Moreover, although the degrees-of-freedom adjustment is more strict, all the results are significant at similar levels. Second, I follow Conley (1999) and adjust standard errors to account for spatial correlation, allowing for a linearly decaying correlation up to a distance cutoff around each département. I use 250, 500, and 750 kilometers cutoffs. Given the average size of French départements, the 500 kilometers cutoff corresponds approximately to allowing a correlation between each département and its twenty neighboring départements. In all cases, standard errors corrected for spatial correlations are smaller than clustered standard errors, and significance levels are similar.

Population-Weighted Regressions

French départements exhibit large disparities in population levels. Throughout the analysis, I provide an equal weight to each unit. However, population-weighted estimates may be more relevant quantities for understanding the overall impact of WWI on female labor force participation. In Appendix Table B.7, I replicate the main results of this chapter when using pre-war département populations as weights in the regressions. The point estimate increases from 0.35 to 0.48. This is because population-weighted regressions give more weight to départements with larger industrial sectors, which benefited the most from the inflow of women in the labor force during the interwar period.

Post-War Migration Patterns

A final concern is related to post-war migration patterns of women seeking employment. Suppose that wages were higher in départements with higher military fatalities, reflecting

15. The composition of each military region is from Boulanger (2001, pp. 335–337).

the relative loss of male labor input. This could increase the relative wage of female labor that it is substitutable with male labor. If women were mobile, the overall effect of military fatalities on female labor force participation could partially be attributed to some women leaving low military death rate départements for high military death rate départements. Appendix Figure B.1 displays national trends in female migration patterns. The share of female population born in their département of residence was declining throughout the period, but this trend was not altered by the war, alleviating the concern that labor mobility may confound the results. Nevertheless, to address this potential concern, I run specification 2.1 with the share of the female population born in their département of residence as the dependent variable. I find no correlation with military death rates (a coefficient of 0.08, and a standard error of 0.11).

2.3 Mechanisms

I now investigate the mechanisms underlying the impact of military fatalities on female labor force participation in the interwar period. Both changes in the supply and demand for female labor could account for the pattern in the data. Military fatalities could have induced women to increase their supply of labor for three reasons. First, single women were facing deteriorated marriage prospects after the war due to the shortage of men, decreasing the expected value of marriage (Abramitzky, Delavande and Vasconcelos, 2011). As a result, some women could have preferred to enter the labor market rather than to marry with a lower quality husband. Alternatively, they could have spent more time searching for a valuable husband, thereby entering the labor market for a limited period of time as secondary earners in their families.[16] Second, deteriorated marriage market conditions could have decreased the bargaining position of married women within the household, leaving them with a lower

16. Historical accounts support the idea that the market place was a platform to meet a husband. For instance, a female factory superintendent recounts the following in a survey conducted in factories in 1934: "[...] the young [female workers] prefer working at the factory then in their homes. Young women consider [the factory] as an occasion to get married" (Delagrange, 1934, p. 39).

share of household income (Grossbard, 2014). This negative income shock could in turn have increased their labor supply. Third, some war widows could have entered the labor force to compensate for the loss of their husbands' incomes as subsidies to war widows were relatively small.[17] For instance, the cumulated amount of subsidies to a war widow in 1921 amounted only to a quarter of the average labor income of a working woman—Appendix Figure B.2 simulates real incomes of single working women, single mothers, and war widows in the interwar period to support this point. This negative income shocks could have induced the daughters of war widows to enter the labor force as well. On the other hand, the scarcity of men could have induced firms to demand more female labor, especially in sectors where female labor was a close substitute to male labor.

In this section, I explore whether supply (section 2.3.1) or demand channels (section 2.3.2) can explain the pattern in the data. The empirical evidence unambiguously points towards a supply side explanation: single women entering the labor force while searching for a husband, and war widows working to compensate for the loss of their husbands' incomes. In section 2.3.3, I also show that the rise in female labor force participation *during* the war was orthogonal to the distribution of military fatalities, and further that it cannot explain the post-war entrance of women in the labor force.

2.3.1 Supply Factors: The Marriage Market Channel

In this section, I assess the effect of military fatalities on female labor force participation through labor supply channels. To uncover changes in labor supply conditions, I focus on transmission mechanisms through the marriage market. Summary statistics for the share of women of each marital status before and after the war are provided in Appendix Table B.8. The share of single women sharply increased after the war, especially among women aged 20 to 29: while 39% of women of this age group were single in 1911, 44% of them were single in

17. This was the case at least until the early 1930s—subsidies to war widows sharply increased in 1931 to about 75% of the labor income of an average working women.

1921. The share of widows also sharply increased after the war, especially among the women aged 30 to 39: while 4% of women within this age group were widows in 1911, 10% of them were widows in 1921.

Military Fatalities and the Post-War Marriage Market

I first document how military fatalities tightened the post-war marriage market. Using a different, more aggregated, source of data for military death rates, Abramitzky, Delavande and Vasconcelos (2011) show that the war worsened the position of women in the marriage market as men became more scarce. As a result, women were less likely to marry after the war in départements that had relatively more military fatalities. To analyze the impact of military fatalities on the interwar marriage market, I estimate the following specification for various age groups and marital statuses:[18]

$$\mathtt{Y}_{a,d,t} = \beta\ \mathtt{death\_rate}_d \times \mathtt{post}_t + \theta'\ \mathbf{X}_{d,t} + \gamma_d + \delta_t + \varepsilon_{a,d,t}, \tag{2.3}$$

where $\mathtt{Y}_{a,d,t}$ is the share of women of a particular marital status in age group a, département d, and year t. $\mathtt{post}_t$ is an indicator variable for $t > 1918$. I report the results in Table 2.3. The estimates are very similar to those in Abramitzky, Delavande and Vasconcelos (2011, p. 136), suggesting that their analysis is robust to extending the sample over the entire interwar period and to including more pre-war years.[19] Overall, I find that women in départements that had higher military death rates were more often single (panel A) and widowed (panel B) after the war. In particular, the estimates imply that in départements that experienced military death rates of 20% rather than 10%, the proportion of single women aged 20 to

18. Because the marital statuses "widowed" and "divorced" are not available separately except in the censuses of 1911 and 1921, I group widowed and divorced women into the same category. Moreover, because age groups were defined differently in the census of 1906, I exclude this census from the sample. As a result, the sample consists of the following census years: 1901, 1911, 1921, 1926, 1931, and 1936.

19. I reproduce the results presented in Abramitzky, Delavande and Vasconcelos (2011, Table 2, p. 136) in Appendix Table B.9 when clustering standard errors at the département level.

29 was 2.7 percentage points higher after the war, compared to an average of 39% in 1911 (column 1). The effect is smaller for older women. Moreover, women aged 40 to 49 were most likely to lose their husbands during the war.[20]

Table 2.3
The Impact of WWI Military Fatalities on Female Marital Status

Dependent variable	A. Single (%)			B. Widow (%)		
Age group	20–29	30–39	40–49	20–29	30–39	40–49
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.27***	0.23***	0.14***	-0.00	0.09***	0.17***
	[0.07]	[0.05]	[0.04]	[0.01]	[0.03]	[0.03]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	522	522	522	522	522	522
Départements	87	87	87	87	87	87
Within R^2	0.824	0.258	0.321	0.848	0.928	0.633
1911 mean	38.9	14.6	11.2	1.3	4.7	11.5

Notes. This table reports the OLS coefficients from estimating specification 2.3. The dependent variable is the share of single women in panel A, and the share of widowed women in panel B. *Widows* also includes divorced women. The census years are 1901, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

Data to explore labor supply channels through changes in marriage market conditions directly are scarce. For instance, the censuses do not provide information on female labor force participation by marital status at the département level. This impedes from testing the second labor supply channel directly (increased labor supply by married women). Instead,

20. Knowles and Vandenbroucke (2016) show that the flow of marriages actually increased for both men and women in the intewar period. There are two reasons for this: first, many delayed their marriage during the war, and second, the men who died during the war were the ones with a low propensity to marry, i.e., the youngest men. As a result, the pool of single men left after the war was composed by men with a high propensity to marry. This change in the composition of the pool of single men was strong enough to compensate for the scarcity of single men and generate an increase in the flow of marriages in départements that experienced more military fatalities. Nevertheless, I do not identify a correlation between changes in marriage flows and changes in female labor force participation.

I rely on information relative to changes in the shares of single and widowed women. Nevertheless, the lack of data on labor force participation of married women is not problematic as national-level trends suggest that single and widowed women drove the overall increase in female labor force participation in the interwar period: while labor force participation rates of married women remained roughly constant between 1911 and 1921, those of single and widowed women increased from 67% to 70%, and from 37% to 43%, respectively (see Appendix Figure B.3).

The Marriage Market as a Transmission Channel

To uncover the effect of military fatalities on female labor force participation through changes in marriage market conditions, I use tools from the causal mediation framework (Imai et al., 2011). For each decennial age group (20–29, 30–39, and 40–49), I estimate the following three equations:[21]

$$\begin{cases} \texttt{single}_{d,t} &= \beta_S \, \texttt{death\_rate}_d \times \texttt{post}_t + \theta_S' \, \mathbf{X}_{d,t} + \gamma_{S,d} + \delta_{S,t} + \varepsilon_{S,d,t} \\ \texttt{widow}_{d,t} &= \beta_W \, \texttt{death\_rate}_d \times \texttt{post}_t + \theta_W' \, \mathbf{X}_{d,t} + \gamma_{W,d} + \delta_{W,t} + \varepsilon_{W,d,t} \\ \texttt{FLFP}_{d,t} &= \beta_1 \, \texttt{death\_rate}_d \times \texttt{post}_t + \beta_2 \, \texttt{single}_{d,t} + \beta_3 \, \texttt{widowed}_{d,t} + \theta' \, \mathbf{X}_{d,t} + \gamma_d + \delta_t + \varepsilon_{d,t}. \end{cases} \tag{2.4}$$

Data for female labor force participation by decennial age group before the war are only available for the census of 1901. While dropping two pre-war years could be problematic, this information enables to match labor and marriage market outcomes for women by age group. This is highly valuable as women at different points in their life-cycles may be differentially affected by the war. Moreover, there was little differential pre-war trends in female labor

21. An alternative way would be to add interactions to the third equation and estimate $\texttt{FLP}_{d,t} = \beta_1 \, \texttt{death\_rate}_d \times \texttt{post}_t + \beta_2 \, \texttt{single}_{d,t} + \beta_3 \, \texttt{single}_{d,t} \times \texttt{death\_rate}_d \times \texttt{post} + \beta_4 \, \texttt{widowed}_{d,t} + \beta_5 \, \texttt{widowed}_{d,t} \times \texttt{death\_rate}_d \times \texttt{post} + \theta' \, \mathbf{X}_{d,t} + \gamma_d + \delta_t + \varepsilon_{d,t}$. However, this procedure cannot provide estimates of the size of the mediators along with confidence intervals (Imai et al., 2011, p. 784).

force participation, so that the results are seldom be affected by this omission.[22]

The quantities of interest are $\widehat{\beta}_2 \times \widehat{\beta}_S$ and $\widehat{\beta}_3 \times \widehat{\beta}_W$. They represent the effect of military fatalities on female labor force participation through each channel under a modified version of the "sequential ignorability" assumption (Imai et al., 2011): there are no differential trends in labor and marriage market outcomes across départements with varying levels of military death rates, and, conditionally on military death rates, there are no differential trends in labor market outcomes across départements with varying levels of marriage market outcomes. I show in Appendix B.7 that imposing these assumptions is reasonable in this context.

Table 2.4 reports the estimates of the third equation of specification 2.4 for each decennial age group. Odd columns report the impact of WWI military fatalities on female labor force participation by age group. While women of all age groups were induced to enter the labor force during the interwar period, older women were twice as much affected as younger women: in départements that experienced military death rates of 20% rather than 10%, labor force participation rates of women aged 30 to 39 and 40 to 49 increased by 16–17% relative to their pre-war levels (4.8/30.1 and 4.7/27.7). In contrast, labor force participation rates of women aged 20 to 29 increased by 8% (2.7/34.7).

Even columns contain two quantities of interest: first, they show how the coefficient on military death rates ($\widehat{\beta}_1$) changes onces marriage market outcomes are included, and second, they show the effect of changes in marriage market conditions on female labor market outcomes ($\widehat{\beta}_2$ and $\widehat{\beta}_3$). These results imply that in départements that experienced a military death rate of 20% rather than 10%, labor force participation rates of women aged 30 to 39 were 1.6 percentage point higher because of the rise in singlehood (2.5×0.64), and 0.5 percentage point higher because of the rise of widowhood (0.8×0.62).[23] These two channels

22. This is indeed the case when replicating Table 2.2 while and dropping the years 1906 and 1911 (see Appendix Table B.10). Removing the year 1906 when replicating the marriage market results from Table 2.3 also generates similar estimates (see Appendix Table B.11).

23. For consistency, I use the estimates from Table B.11 instead of those in Table 2.3 as it does not use the year 1906.

Table 2.4
The Marriage Market Channel

Dependent variable	Female Labor Force Participation					
Age group	A. 20–29		B. 30–39		C. 40–49	
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.27***	0.21**	0.48***	0.26***	0.47***	0.30***
	[0.09]	[0.09]	[0.10]	[0.08]	[0.10]	[0.10]
Share single		0.27***		0.64***		0.78***
		[0.07]		[0.12]		[0.14]
Share widows		1.08***		0.62***		0.41***
		[0.41]		[0.14]		[0.15]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	435	435	435	435	435	435
Départements	87	87	87	87	87	87
Within R^2	0.685	0.704	0.685	0.736	0.591	0.664
1901 mean	34.7	34.7	30.1	30.1	27.7	27.7

Notes. This table reports the OLS from estimating specification 2.4. The dependent variable is female labor force participation by decennial age group. The census years are 1901, 1921, 1926, 1931, and 1936. *Share single* is the share of women of the relevant age group that are single. *Share widows* is the share of women of the relevant age group that are widows or divorced. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

together explain 46% of the total effect of military fatalities on labor force participation of women aged 30 to 39 ($1 - 0.26/0.48$). Similarly, they explain 36% of the total effect on women aged 40 to 49, and 22% of the total effect on women aged 20 to 29.

Overall, these results imply that women aged 30 to 39 were most impacted by the war because they were affected through both margins: increased singlehood and increased widowhood. Younger women were mostly affected through one margin (singlehood), and older women through another margin (widowhood).

2.3.2 Demand Factors: The Substitution Channel

The increase in female labor force participation in the interwar period may also be explained by firms substituting male labor with female labor to cope with the scarcity of men. In a partial equilibrium framework, an increase in female wages could uncover this phenomenon. However, I documented that women increased their labor supply after the war due to changes in marriage market conditions. As a result, changes in wages can in principle only provide a partial view: on the one hand, rising female wages would imply that the increase in the demand for female labor was strong enough to overcompensate the depressing effect of increased female labor supply on wages, and, on the other hand, declining female wages would imply that the potential increase in the demand for female labor was not large enough to compensate the depressing effect of increased female labor supply on wages.

To overcome this general equilibrium issue and assess the magnitude of the potential increase in the demand for female labor through substitution, I analyze changes in wages across occupations with different degrees of substitutability. I first consider a set of occupations in the textile manufacturing sector that were mostly occupied by women: ironer, seamstress, and milliner—in 1911, there were about 260 women per man in these occupations.[24] Hourly wage rates for these occupations are available across various cities from 1901 to 1926.[25] Focusing on these occupations enables to fix the demand curve for female labor: because male and female labor are not substitutes in these occupations, the scarcity of men is unlikely to have affected the demand for female labor differentially across departments with varying levels of military death rates.[26] As a result, only shifts in the supply curve of female labor

24. See *Résultats Statistiques du Recensement Général de la Population 1911*, Tome I, Part 3, p. 28.

25. In fact, these are the only female occupations for which wage rates are available throughout this time period. Wage information for other female occupations in the manufacturing sector (laundress, lacemaker, embroiderer, and vest maker) is only available for the 1920s. Wage information at the female occupation level is not available for the 1930s.

26. This reasoning makes two implicit assumptions. First, that income shocks due to the war do not affect labor demand differentially across départements, i.e. that while labor is not perfectly mobile across space, tradable goods are; second, that there are no complementaries between the female labor input and other input factors. More specifically, firms may have compensated for the scarcity of male labor in the

should affect equilibrium female labor force participation rates in these occupations.

I aggregate city-level hourly wage rates for these occupations at the département level and use a differences-in-differences strategy analogous to specification 2.1. I report the results in panel A of Table 2.5. Consistent with my argument, female wages declined across all three occupations in départements that had higher military death rates. While these occupations are not representative of all female occupations, they are representative of a large share of the jobs women held in this time period, especially in the manufacturing sector. Given that the impact of the war was especially salient in that sector of activity, these results suggest that labor supply factors alone are an important explanation for the impact of WWI military fatalities on female labor force participation in the interwar period.

Next, I consider occupations in which male and female labor are close substitutes: domestic services. Two surveys from 1913 and 1921 provide wage information for female cooks and housekeepers across various cities.[27] Focusing on these occupations provides an upper bound for the potential role of changes in labor demand through substitution. Similar to the analysis above, I aggregate city-level hourly wage rates for these occupations at the département level and use a differences-in-differences strategy. I report the results in panel B of Table 2.5. Again, female wages declined across both occupations in départements with higher military death rates. These results suggest that increased female labor supply was the driving force behind the post-war rise in female labor force participation. Nevertheless, increased labor demand through substitution appears to have played a limited role in the domestic services sector as the net magnitude of the negative impact of military fatalities on female wages is smaller than for occupations in the textile manufacturing sector: while

manufacturing sector by investing in physical capital. If physical capital is complementary to female labor, then the scarcity of men could have indirectly affected female labor demand curves. I show in Appendix Table B.12 that although firms did increase their level of physical capital in départements that had higher military death rates, the magnitude of this mechanism is relatively small: point estimates on measures of physical capital represent 2–4% of their pre-war levels. Moreover, firms did not substitute toward foreign labor.

27. The surveys provide yearly wage rates which I transform into hourly wage rates, assuming that women in these occupations worked 2,808 hours per year in 1913 (Bayet, 1997, p. 26).

Table 2.5
The Substitution Channel

Dependent variable	Log Hourly Wage Rate				
	A. Manufacturing			B. Domestic	
Occupation	Ironer	Seamstress	Milliner	Cook	Housekeeper
	(1)	(2)	(3)	(4)	(5)
Military death rate × post	-0.010***	-0.012***	-0.008**	-0.006***	-0.002*
	[0.004]	[0.003]	[0.003]	[0.002]	[0.001]
Rural	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	386	395	366	173	171
Départements	87	87	87	87	87
Within R^2	0.951	0.955	0.951	0.901	0.948
1911 mean (Francs)	0.21	0.23	0.25	0.20	0.16

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is the female log hourly wage in Francs. Survey years for columns 1–3 are 1901, 1906, 1911, 1921, and 1926. Survey years for columns 4–5 are 1913 and 1921. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level. See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

in départements that experienced military death rates of 20% rather than 10%, female wage rates declined by 8–12% in the textile manufacturing sector, they declined by 2–6% in the domestic services sector. Overall, if there were some degree of substitution between male and female labor in the interwar period, it was relatively small compared to the increased labor supply of women. Instead, firms compensated for the scarcity of male labor by substituting toward physical capital, although the magnitude of this mechanism is relatively small (see Appendix Table B.12).

2.3.3 Female Labor During the War

I now examine whether the war affected subsequent female labor force participation through the entrance of women in the labor force *during* the war, as has been analogously documented for the post-WWII period in the U.S. (Goldin, 1991; Acemoglu, Autor and Lyle, 2004; Goldin and Olivetti, 2013). First, the women who entered the labor force during the war could have remained in the labor force after the war because they acquired valuable skills and experience, updated their beliefs about the payoffs from working, or improved their information about labor market conditions. Second, men's beliefs about women's abilities as workers could have changed as women successfully took on typically male responsibilities during the war. I show that the inflow of women in the labor force during the war was not correlated with the distribution of military fatalities, making these potential mechanisms orthogonal to the ones I highlight in this chapter. Further, consistent with the historical literature, I find that the inflow of women in the labor force during the war did not trigger any change in female labor force participation after the war through these mechanisms.

The Inflow of Women in the Labor Force During the War

The period of the war and its direct aftermath can be divided into four phases: a phase of complete industrial disorganization between August 1914 and January 1915, a phase of progressive industrial mobilization between January 1915 and November 1918, a phase of industrial demobilization between November 1918 and November 1919, and a phase of recovery between November 1919 and October 1922. In August 1914, all belligerent nations anticipated a short war: since the middle of the nineteenth century, it was believed that a successful military strategy consisted in an extremely strong initial offensive that would destroy the opponent within a short period of time (Reboul, 1925). For this reason, the French plan of military mobilization of 1912 did not mention any specifics regarding the industrial organization that was supposed to support a potentially long war. As a result, a large part of the French industrial system came close to paralysis in August 1914. I document this phenomenon in Figure 2.3, which displays the evolution of the number of operating firms along with male and female employment levels in the industrial sector throughout the war. To make relative changes more apparent, I standardize levels to 100 in July 1914. Compared to July 1914, 53% of all industrial firms were still operating in August 1914, and male and female employment were respectively down to 32% and 43% of their pre-war levels.

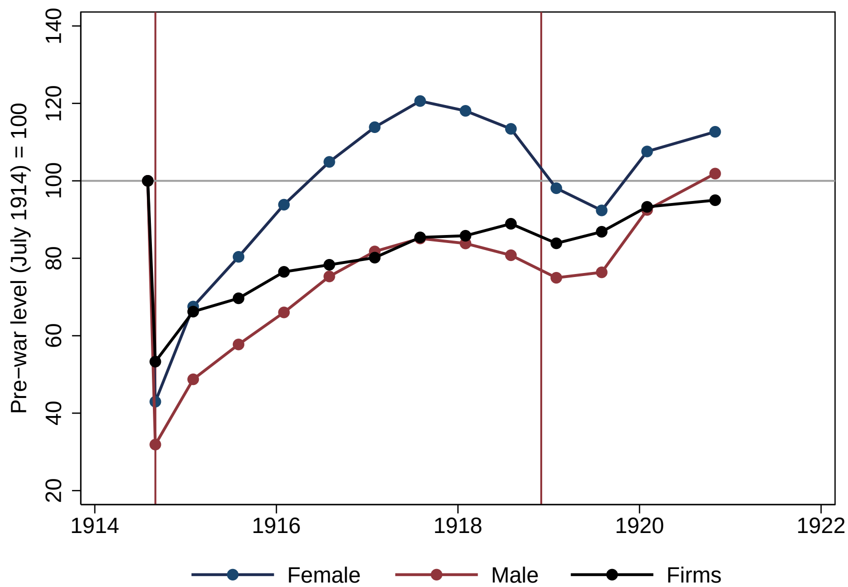


Figure 2.3: Labor During World War I

Notes. Female indicates the number of women working in the industrial sector, *Male* indicates the number of men working in the industrial sector, and *Firms* indicates the number of operating firms in the industrial sector. I normalize pre-war levels to 100 in July 1914. See Appendix D for details about variables sources and definitions.

By the end of August 1914, the French army had already lost about 200,000 men, amounting to 15% of all military fatalities after four years of combats. The military command soon realized that the war would last longer than anticipated and that its industrial plan to support the ongoing war effort was highly insufficient. For instance, while it had planned to produce 13,600 75mm shells per day at the beginning of the war, the troops were using nearly 40,000 of these shells per day during the "Race to the Sea" in October 1914. By then, half of the stocks of 75mm shells had been depleted (Bostrom, 2016, p. 264). To manage the extended needs of the army, the military command centralized the industrial war effort under the State Secretariat of Artillery and Ammunitions in November 1915, and started to coordinate a vast network of public and private industrial firms.[28] Moreover, the government incentivized firms to employ alternative forms of labor such as women, immigrants, and war prisoners.[29] As a result, the number of women working in the industrial sector exceeded its pre-war level by 1916. This phenomenon was especially salient in sectors that directly supplied weapons and machineries to the army. For instance, in the metallurgic sector, the number of working women exceeded its pre-war level as early as January 1915. By July 1917, it exceeded its pre-war level by a factor 7 in this sector.[30] At the end of the war, the need for new equipments vanished. Moreover, the government issued laws to help soldiers return to their pre-war job, and even offered a monetary lump sum equivalent to a month worth of pay to any woman who would quit her job in war industries.[31] As a result, female employment in the industrial sector dropped to below its pre-war level by the end of 1919. Shortly after, however, employment levels rose again, mostly because of the reconstruction effort.

To capture the intensity of inflows of women in the labor force during the war, I use the level of female employment in the industrial sector in July 1917 relative to that in July 1914 as female labor force participation was the highest in that month.[32] I show in panel A of

28. This Secretariat was created by the Order of November 3rd, 1915. See the *Journal Officiel de la République Française, Lois et Décrets*, *47* (306), pp. 8108–8109, dated November 11th, 1915.

29. These incentives are detailed in the *Ciruclaire* of the Ministry of War of November 10th, 1915. See the *Journal Officiel de la République Française, Lois et Décrets*, *47* (306), p. 8110, dated November 11th, 1915.

30. Appendix Table B.13 provides a comprehensive view of the evolution of the number of working women in various industrial sectors throughout the war.

31. The law of November 22nd, 1918, ensured that soldiers could claim their pre-war job: "The administrations, offices, public, or private firms must guarantee to their mobilized personnel [...] the occupation that all had at the moment of its mobilization" (*Journal Officiel de la République Française, Lois et Décrets*, *50* (320), pp. 10120–10121, dated November 24th, 1918). In November 1918, the Ministry of Armament was telling female workers: "[b]y coming back to you previous occupations, you will be useful to your country as you have been by working in war industries in the past four years. [...] Each [female] worker who expresses the will to quit ones firm before December 5th, 1918, will receive the amount of thirty days of salary as a severance pay" (*Bulletin du Ministère du Travail*, 1919, pp. 45*–46*).

32. Results are robust to using alternative dates to measure the spike in female labor during the war.

Appendix Table B.14 that départements that experienced higher spikes in female labor during the war did not experience higher nor lower military death rates. As a result, the potential impact of female labor during the war on subsequent female labor force participation is orthogonal to the mechanisms highlighted in this chapter.

It is nevertheless worth asking whether the women who entered war industries kept working after the war. If true, this should have resulted into a positive relationship between spikes in female labor during the war and changes in female labor before and after the war. Using a difference-in-differences strategy, I show that départements that experienced larger increases in female labor during the war did not experience any post-war increase in female labor (see columns 1 and 2 of Appendix Table B.15). These findings are consistent with contemporaneous accounts of labor inspectors who systematically described in their reports how male managers assigned basic tasks to women by decomposing men's work into smaller, easier tasks. For instance, a report of January 1918 describes: "[t]o make female labor possible and enable them to replace men, industrialists have, in many regions, modified and improved their managing methods. They divide the labor to the extreme, organize the production in series and assign female workers to very delimited tasks" (*Bulletin du Ministère du Travail et de la Prévoyance sociale*, *25* (1), 1918, p. 11). Because of such an extreme division of labor, women could hardly acquire human capital transferable to other sectors after the war.[33]

Changes in Men's Beliefs about Gender Roles

The war could also have increased female labor in the post-war period by changing men's beliefs about gender roles, and thereby their demand for female labor. For instance, men

33. Historians have further pointed out that instead of an inflow of women in the labor force, the women working in war factories were already working before the war. For instance, Downs (1995, p. 48) writes: "In the popular imagination, working women had stepped from domestic obscurity to the center of production, and into the most traditionally male of industries. In truth, the war brought thousands of women from the obscurity of ill-paid and ill-regulated works as domestic servant, weavers and dressmakers into the brief limelight of weapons production", cited in Vandenbroucke (2014, p. 118).

may have updated their beliefs about women's abilities because of their positive role during the war in industries and in farming. To measure how men's beliefs about gender roles changed before and after the war, I use *députés'* support to the extension of the suffrage to women at the Assemblée Nationale.[34] I build on the fact that the extension of the suffrage to women was discussed before and after the war. Women did not have the right to vote prior to the war. However, this matter was the subject of much debates. In fact, a proposal to extend the suffrage to women—the Dussaussoy-Buisson bill—was supposed to be voted on in 1915, but the war interrupted the legislative process. This bill was eventually voted on in May 1919, and adopted by 324 votes against 87 (it was later rejected by the Sénat, France's upper house). This phenomenon is not specific to France: Hicks (2013) finds that wars in the twentieth century doubled the likelihood of a belligerent country to grant women with the right to vote within one year following the conflict.

I collected data on the public support of députés to the extension of the suffrage to women before the war from an open letter written by several women's rights organizations addressed to the Assemblée Nationale. This letter was published in June 1914. The data for the votes on the extension of female suffrage in May 1919 are from the reports of the debates in the Assemblée Nationale.[35] I then constructed an average support for female suffrage at the département level before and after the war by aggregating supports and vote choices of députés from each département. Appendix Table B.16 reports these measures together with the data at the député level. While 32% of députés supported female suffrage in 1914, 79% did so in 1919.

This measure may not adequately capture men's beliefs about gender roles. First, the views of a département's députés may not represent the views of the département's general population. Moreover, it may capture only a subset of men's beliefs about gender roles, such as women's political abilities. To alleviate this concern, I build a measure of religious

34. The Assemblée Nationale is France's lower house. Members of the Assemblée Nationale are the *députés*.

35. See the *Journal Officiel de la République Française, Débats Parlementaires*, 11e Législature, Session ordinaire de 1919, pp. 2365–2366, dated May 20th, 1919.

conservatism before the war at the département level. Presumably, religious conservatism and beliefs about gender roles should be correlated. For instance, Przeworski (2009) finds that countries that are more Catholic adopted female suffrage later in the course of their history. To measure religious conservatism at the local level, I use députés' votes on the *Loi de 1905*, which separated the Church from the State in 1905. This law is particularly relevant because it was one of the most disputed laws in France's political history. I collected the data on the votes of each député from the reports of the debates in the Assemblée Nationale.[36] I show in Appendix Table B.17 the correlation between the votes for the *Loi de 1905* and the support to the extensions of the suffrage to women in June 1914, and the votes in May 1919. Départements in which députés supported the separation of the Church from the State in 1905 also supported the extension of female suffrage before the war more often. No such relationship exists after the war, suggesting that local attitudes changed after the conflict. These findings suggest that the support to the extension of the suffrage to women is a reasonable measure for local conservatism toward gender roles.

A difference-in-differences strategy reveals that changes in the support to the extension of the suffrage to women are uncorrelated with the distribution of military death rates: départements in which députés switched their support for female suffrage did not experience different military death rates (panel B in Appendix Table B.14). Moreover, these changes are uncorrelated with changes in female labor force participation before and after the war (columns 3 and 4 in Appendix Table B.15).

2.4 Conclusion

In this chapter, I showed that the shortage of men induced by World War I increased female labor force participation in the interwar period. In particular, départements with military death rates of 20% rather than 10% experienced an increase in female labor force participa-

36. See *Journal Officiel de la République Française, Débats Parlementaires*, 8e Législature, Session ordinaire de 1905, pp. 2701–2707, dated July 3rd, 1905.

tion of 12% compared to pre-war levels. This effect is stable throughout the interwar period, and robust to alternative empirical strategies. The analysis reveals that labor supply factors (changes in marriage market conditions) rather than labor demand factors (substitution from male to female labor) generated the pattern observed in the data. Further, consistent with the historiography, I find that the inflow of women into the labor force during the war was only temporary. In the next chapter, I explore whether this upward shift in female labor force participation persisted across generations, long after the reversion of sex ratios to their natural balance.

CHAPTER 3

THE LEGACY OF THE MISSING MEN (1962–2012)

Did the short-run upward shift in female labor force participation due to World War I persist in the long run? To uncover the legacy of the missing men independent from confounding institutional factors, the empirical strategy in this chapter mirrors the epidemiological approach to culture (Fernández, 2011). This approach implies comparing women born in locations that were exposed to varying levels of military death rates, but who reside within the same location, thereby facing similar local institutional constraints when making decisions. I combine all the French censuses for which microdata are available—the thirteen censuses from 1962 to 2012—and find that women born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 5 percentage points more likely to be working between 1962 and 2012. Regression coefficients are stable throughout the period, though their magnitude relative to mean levels in female labor force participation fades over time. Estimates relying on variations in the working behavior of women *across*—rather than *within*—départements suggest that individual-level transmission mechanisms account for half of the overall long-run impact of WWI military fatalities on female labor force participation.

Because the identification stems from variations in the working behavior of internal migrants, I thoroughly explore whether selective in- and out-migration patterns can account for the results. For instance, using a rich set of residence location fixed effects for smaller aggregation units, I show that the estimates are unchanged when comparing women residing within the same département, within the same local labor market, or within the same municipality, thereby alleviating the possibility of selective in-migration. Other strategies to account for selective migration patterns similarly suggest that these do not drive the results. A replication of the analysis using the combination of all 32 labor force surveys between 1982 and 2013 yields similar estimates.

To account for these findings, I explore three underlying mechanisms of transmission: vertical intergenerational transmission (from mothers and fathers to daughters), transmission through marriage (from husbands to wives, and from mothers in-law to daughters in-law), and oblique intergenerational transmission (from migrants to non-migrants). To identify vertical intergenerational transmission, I use the extended annual labor force surveys 2005–2012, which contains the départements of birth of respondents' parents. I focus on the sample of second-generation internal migrants and compare women born and residing within the same département, but whose parents were born in départements exposed to varying levels of military death rates. I find compelling evidence for a mother-to-daughter transmission channel, as women with mothers born in départements exposed to high rather than to low military death rates were 13 percentage points more likely to be working. I also find evidence for a father-to-daughter transmission channel, though its magnitude is comparatively smaller.

I argue that the women who were induced to enter the labor force in the interwar period because of WWI military fatalities altered the preferences and beliefs about female labor of their daughters, of their sons, and of their entourage, and that these changes translated into the working behavior of women in subsequent generations. Because individuals form their preferences and beliefs early in life upon learning and socializing with their parents, peers, and neighbors (Bisin and Verdier, 2001, 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 views toward female labor, providing a rationale for the long-run impact of WWI military fatalities on female labor force participation.[1] Consistent with this argument, using the Gen-

1. Many studies find a strong correlation between both the beliefs about female labor and the working behavior of mothers and their daughters', of mothers in-law and their daughters in-law's, and of mothers and their daughters' peers'. For instance, Farre and Vella (2013) show that the attitudes of mothers in the U.S. toward gender roles and their working behavior is correlated with their own daughters' attitudes when young as well as their working behavior when adults. This phenomenon has also been empirically established for Great Britain (Berrington et al., 2008; Johnston, Schurer and Shields, 2014) and Mexico (Campos-Vazquez and Velez-Grajales, 2014). Moreover, Olivetti, Patacchini and Zenou (2018) show that the working behavior of the mothers of a woman's friends when growing up affects her own working behavior later in life. Finally, the transmission channel from mothers in-law's labor choices to their daughters in-law's has been empirically verified for the U.S. (Morrill and Morrill, 2013), Japan (Kawaguchi and Miyazaki, 2009), Switzerland (Bütikofer, 2013), and China (Chen and Ge, 2018).

eration and Gender Survey (GSS) of 2005, I find that men and women born in départements exposed to high levels of military death rates hold more progressive views toward the role of women in the labor force.

Related Literature and Contributions This chapter uncovers the intergenerational transmission mechanisms at play behind the revolution of female labor. Fernández, Fogli and Olivetti (2004) argue that it can be explained by the increasing number of men who grew up with a working mother. In particular, they show that the entrance of women in the labor force during WWII in the U.S. propagated to their daughters in-law after the war. Consistent with their study, I find evidence for a mother in-law to daughter in-law transmission channel, but also for a broader set of mechanisms: from mothers to daughters, and from migrants to non-migrants. Moreover, the empirical strategy I use enables to identify individual-level transmission independent from confounding institutional factors. Finally, using WWI rather than WWII as a source of variation provides the opportunity to investigate the diffusion dynamics of women's working behavior over the timespan of three generations, from the beginning to the end of the revolution of female labor.

This chapter also helps clarify the mechanisms underlying the persistence of history. With a methodological focus on a *location-based* aspect of history—how historical events in a given location shape long-run outcomes in that location—, domestic institutions have been pointed out as a primary channel of historical persistence (Acemoglu, Johnson and Robinson, 2005; Nunn, 2014; Michalopoulos and Papaioannou, 2017). However, as a result of this methodological tendency, a crucial linkage of historical persistence has received less attention: individuals. Indeed, uncovering how individuals transmit the legacies of history across generations independent from confounding institutional structures requires extracting from a location-based approach to history and shifting toward a *lineage-based* approach to history. Applying this lineage-based approach, Michalopoulos, Putterman and Weil (2016) show that pre-modern economic lifeways in Africa still affect economic outcomes today.[2] Moreover, Alesina, Giuliano and Nunn (2013) find that up to 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 their descendants, rather than to long-run changes in institutional structures. Consistent with their study, I find that this lineage aspect accounts for half of the long-run impact of WWI military fatalities on female labor force participation, suggesting an important role of individuals relative to local institutional structures in generating persistence of historical shocks. In addition, one novelty in this chapter is the use of the lineage approach *within* a country, reducing potential biases introduced when comparing migrants to non-migrants.

Finally, this chapter complements the literature that investigates how cultural norms form, and how they change over time (Giuliano and Nunn, 2017). Various studies explore how historical shocks alter the economic role of women in subsequent generations, and in particular shocks to the sex ratio (Giuliano, 2017, pp. 20–23). For instance, Teso (2018) finds that sex ratio imbalances generated by the transatlantic slave trade—slaves were predominantly male—induced later generations of women to enter the labor force. Moreover, Grosjean and Khattar (2018) 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 as well as for attitudes toward female labor. I similarly find that sex ratio imbalances resulting from WWI military fatalities had a permanent impact on the economic role of women. This historical experiment illuminates how even a short disruption can permanently alter cultural norms.

The remainder of this chapter is organized as follows. I first show that the short-run upward shift in female labor force participation due to World War I military fatalities persisted across generations (section 3.1). Then, I uncover three mechanisms of transmission (section 3.2): vertical intergenerational transmission, transmission through marriage, and oblique in-

2. See also Nunn and Wantchekon (2011) and Teso (2018) for a similar approach.

tergenerational transmission. Finally, I show that this historical shock permanently altered preferences and beliefs toward female labor (section 3.3).

3.1 The Persistent Legacy of the Missing Men

3.1.1 The Epidemiological Approach

To assess the legacy of the missing men, I use an empirical strategy that mirrors the epidemiological approach to culture (Fernández, 2011). Because the relationship between inherited beliefs and behavior may be codetermined by institutional factors, the epidemiological approach identifies the role of culture by analyzing the behavior of individuals with different geographical origins but residing within the same environment, thereby facing similar local institutional constraints.[3] The underlying assumption of this approach is that migrants carry the preferences and beliefs of their geographical origins and transmit them to their children. Given that they are likely to assimilate and acquire local social norms over time, the association between cultural origins and behavior should weaken across generations. As a result, while the validity of this strategy is superior to that of cross-country studies, it is constrained by design. This is not an issue in the present case, as the magnitude of the historical shock under scrutiny is large enough for intergenerational transmission effects to be identified even after a century.

Why use the epidemiological approach? I showed in chapter 2 that the upward shift in female labor force participation during the interwar period was driven by increased female labor supply, depressing female wages in locations more affected by the war. This decline in the relative price of the female labor input could have provided firms with incentives to specialize in female labor intensive activities. Should these changes in local labor market

3. For instance, to identify the role of cultural origins for the working behavior of women, a growing literature analyzes the working behavior of first- and second-generation female immigrants to the U.S. as a function of female labor force participation rates and other measures of gender roles in their countries of origin (Fernández and Fogli, 2009; Blau and Kahn, 2015; Gay et al., 2017).

conditions have persisted in the long run, the incentive structure faced by women would differ systematically across locations that were exposed to varying levels of military death rates. To identify the portable component of the legacy of the missing men and disentangle intergenerational transmission channels from confounding institutional factors, I leverage on variations in the working behavior of women who make decisions under similar local institutional constraints but whose geographical origins differ in their exposure to WWI military fatalities.

3.1.2 Data: The Censuses (1962–2012)

I combine all the French censuses for which microdata are available: the thirteen censuses between 1962 and 2012.[4] Except for the censuses of 1962 and 1999, which are 5% samples of the population, these censuses are 20–25% samples of the population. The baseline regression sample consists of internal migrant married women aged 30 to 49, born and residing in metropolitan France. In total, it contains about 6.5 million individuals.

Internal migrants reside in a département that is different from their département of birth—in 2012, 50% of married women aged 30 to 49 were internal migrants (see Appendix Figure C.1). I focus on this age group to ensure that human capital investments are completed and to abstract from retirement considerations. Moreover, I restrict the sample to married women in order to explore the role of husbands and mothers in-law in diffusing the legacy of the missing men.[5] Focusing on married women is also of substantial interest because their entrance in the labor force has been the dominant force behind the revolution of female labor (Goldin, 2006). The share of working women in the sample has been steadily increasing from 30 percent in the early 1960s to 80 percent in the late 2000s.[6]

4. The censuses for which microdata are available are the ones of 1962 (5% sample), 1968 (25% sample), 1975 (20% sample), 1982 (25% sample), 1990 (25% sample), 1999 (5% sample), and every year between 2006 and 2012 (20% samples).

5. Because the share of married women aged 30 to 49 declined from 86% to 63% between 1962 and 2012 (Appendix Figure C.1), I also include unmarried women that are in a couple, e.g., those in a civil union.

6. Appendix Figure C.2 displays sample means for labor, fertility, and education outcomes. The full set

Migrant and non-migrant women are broadly alike along observable characteristics: they are equally likely to be working and were born in départements with similar military death rates (see Appendix Figure C.3).[7] This suggests that sample selection through migration is unlikely to drive the correlation between military death rates and labor market outcomes. I provide below a series of robustness checks to substantiate this assertion.

3.1.3 Empirical Strategy

I estimate the following specification separately for each census:

$$\texttt{employed}_{ibrt} = \beta\ \texttt{death\_rate}_b + \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \widetilde{\mathbf{X}}'_{1911,b} + \mu_{1914,b} + \delta_r + \varepsilon_{ibrt}, \tag{3.1}$$

where $\texttt{employed}_{ibrt}$ is an indicator for whether individual i, born in département b, and residing in département r in census t, is employed. Vector $\mathbf{X}_i$ contains a set of year of birth indicators. Vector $\widetilde{\mathbf{X}}_{1911,b}$ is the set of pre-war controls capturing the systematic determinants of military death rates generated by the policies of the Ministry of War as well as the pre-war determinants of later female labor force participation.[8] $\mu_{1914,b}$ is a fixed effect for military region of birth.[9] Consistent with the epidemiological approach, this specification includes a département of residence fixed effect, δ_r. I use two-way clustering and

of summary statistics for each census is available in Appendix Tables C.1–C.13.

7. Internal migrant women are nevertheless slightly more educated. The last column of summary statistics Tables C.1–C.13 reports the estimate when regressing migration status on observable characteristics. To learn more about female internal migration patterns in the mid-twentieth century, I explored the *Geographical Mobility and Urban Concentration* study conducted in 1961 by the INED (Girard, Bastide and Pourcher, 1964). This study provides information about migration histories of a nationally representative sample. In 1961, migrant married women aged 30 to 49 migrated for the first time at age 23 on average. Two-fifths declared their primary migration motive as family related, and another two-fifths as work related. One-fifth moved from urban to rural areas, and another one-fifth from rural to urban areas. The rest remained in the same type of area. See Appendix Table C.14.

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

9. Using military region fixed effects has the additional advantage of making the conditional independence assumption more plausible, as soldiers from the same military region were sent to similar battlefields, making the distribution of military death rates more likely to be idiosyncratic within military regions.

cluster standard errors at the level of départements of birth and départements of residence (Cameron and Miller, 2015).

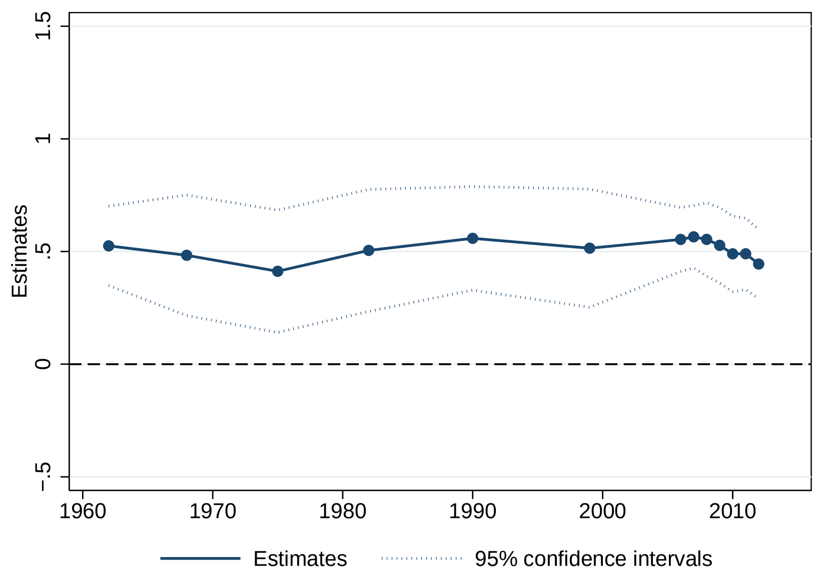
To interpret regression coefficients, I compare women born in départements exposed to high military death rates (20%) to women born in départements exposed to low military death rates (10%). This roughly corresponds to switching from a median département in the "low" group (25th percentile) to a median département in the "high" group (75th percentile). The coefficient of interest β is identified off variations in the working behavior of migrant married women of the same cohort, residing in the same département, but born in neighboring départements exposed to varying levels of military death rates.

3.1.4 Results

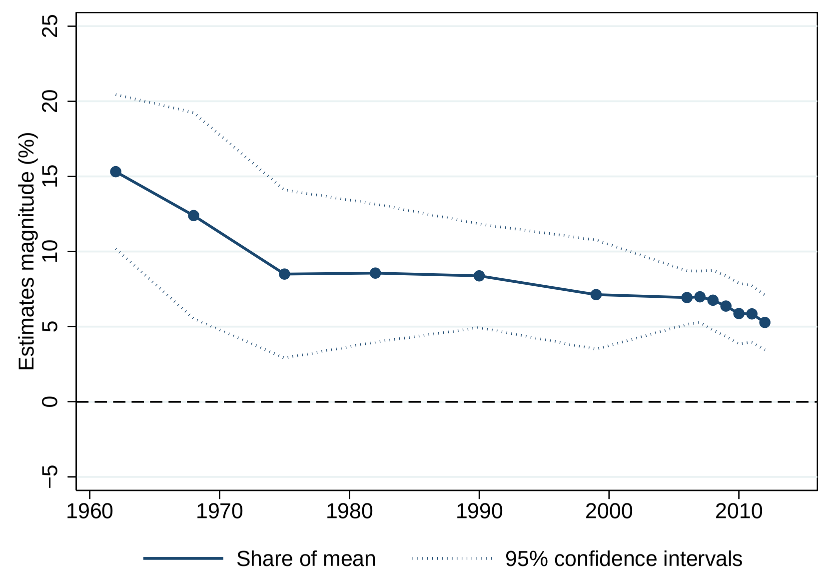
Baseline Estimates

Panel A of Figure 3.1 reports the results.[10] The estimates imply that women born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 5 percentage points more likely to be working between 1962 and 2012. They are all significant at the 1% level and stable across time. Nevertheless, because the average female labor force participation rate increased from 30% in the early 1960s to 80% in the late 2000s, their magnitude relative to the mean fades over time, from 16% of the mean in 1962 to 6% in 2012 (Panel B). Moreover, they explain 10–15% of the standard deviation in female employment rates (see Appendix Figure C.4).

10. The full set of results is also available in table form in Appendix Tables C.21–C.33.



(A) Baseline Estimates



(B) Magnitude Relative to the Mean

Figure 3.1: The Impact of WWI Military Fatalities on FLFP

Notes. Panel A reports the OLS coefficients from estimating equation 3.1. 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 a set of historical controls measured at the level of individuals' départements of birth in 1911. They consist in the share of rural population, the share of the residing population born in the département, the female labor force participation rate, the total fertility rate, the share of girls aged 5 to 19 who go to primary or secondary school, and the average private 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 Appendix Table C.13 for details about sample sizes for each census year. Appendix Tables C.21–C.33 report the results for each census year separately. Panel B reports the magnitude of the coefficients from Panel A with respect to the outcome mean. The magnitude is interpreted as the share of the mean in the dependent variable explained by switching from being born in a département exposed to a military death rate of 10% to a département exposed to a military death rate of 20%. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

In chapter 2, I showed that in départements exposed to military death rates of 20% rather than 10%, female labor force participation was 4 percentage points higher in the interwar period. Combining results from both analyses provides a rough estimate of the overall magnitude of intergenerational transmission. The ratio of coefficients is 0.5/0.4 = 1.25, suggesting that a 1 percentage point increase in female labor force participation in the interwar period was associated with a 1.25 percentage point increase in the likelihood of a woman to be working between 1962 and 2012.

Epidemiological versus Location-Based Approach How do these results compare to those obtained with a location-based approach? I estimate the following specification, in which I assign military death rates and pre-war controls at the level of the département of residence:

$$\texttt{employed}_{irt} = \beta \, \texttt{death\_rate}_r + \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \widetilde{\mathbf{X}}'_{1911,r} + \mu_{1914,r} + \varepsilon_{irt}, \tag{3.2}$$

where r indexes départements of residence. In order to capture the legacy of the missing men that operated both through individuals and local institutional structures, I use the sample of non-migrant married women aged 30 to 49. In contrast with the epidemiological approach, this specification does not include residence location fixed effects. As a result, the coefficient of interest β is identified off variations in the working behavior of women *across*—rather than *within*—départements. Standard errors are clustered at the level of départements of residence.

I report the results in Figure 3.2. The estimates imply that women residing in départements exposed to high military death rates (20%) rather than low military death rates (10%) were 7–11 percentage points more likely to be working between 1962 and 2012, suggesting that 45–59% of the overall legacy the missing men operated directly through individuals rather than through changes in local institutional structures. This magnitude is consistent with the results of Alesina, Giuliano and Nunn (2013, VIII), as they find that 35–50% of the overall impact of historical plough use on contemporaneous gender-role attitudes is due to transmission of cultural norms at the individual level.

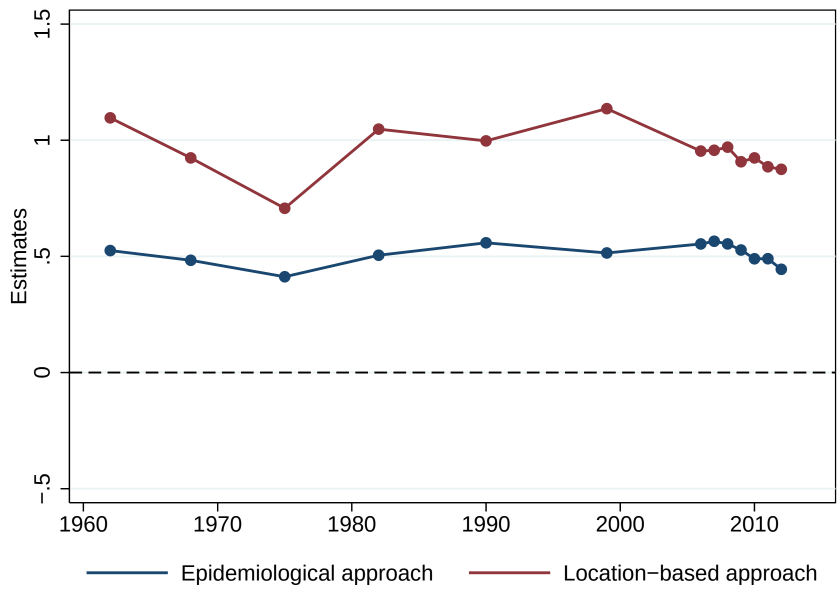


FIGURE 3.2: EPIDEMIOLOGICAL VERSUS LOCATION-BASED APPROACH

Notes. This figure reports the OLS coefficients from estimating equation 3.2. 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. The estimates are computed using the sample weights provided in the censuses. This figure also reports the estimates from Figure 3.1 for comparison. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.

Robustness

I perform a series of robustness checks that support the credibility of the baseline estimates. The full set of results is available in appendix C.3.

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

Selective Migration Patterns Because the coefficients of interest are identified off internal migrants, selective migration could be an important mechanism if migration patterns were correlated with both military death rates and working behavior.

The epidemiological approach requires comparing individuals that are under similar institutional conditions. Yet, the residents of a département may not all face similar local labor market structures. If those from départements exposed to higher military death rates systematically sorted into the more dynamic local labor markets in their destination département, then at least part of the effect would be attributable to selective migration patterns. Comparing residents of the same municipality through 6–23 thousand location fixed effects leaves the estimates unchanged, revealing that this type of selective migration does not affect the results.[11]

To further assess whether selective migration affects the results, 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 restrict the sample to individuals who migrated at least one decade earlier, the "one-and-a-half" generation, as they may be less subject to the biases due to recent migration. Both strategies only slightly decrease the estimates, suggesting that selective migration is not a primary mechanism.

Inaccurate Assignment of Military Death Rates The epidemiological approach requires the key regressor to be assigned at the level of cultural origins, i.e., at the level of the département in which internal migrants' ancestors were residing right after WWI. However, the censuses do not provide parental origins. As a result, I assume that départements of birth and of origin are identical. While the regression sample for 1962 contains individuals born from the 1910s to the 1930s, this assumption becomes increasingly stringent over time.

11. Estimates are similarly unchanged when dropping urban départements from the sample.

I relax this assumption and replicate the analysis using the extended labor force surveys 2005–2012, as they provide provide parental origins. In particular, I restrict the sample to internal migrants whose parents were born in the same département as them. A typical respondent in this sample has parents who were born in the 1930s, making it is all the more plausible that départements of birth trace back to the war. The results are slightly inflated compared to the baseline, suggesting that the inaccurate assignment of military death rates creates a small attenuation bias.[12]

Education and Fertility Labor market outcomes are endogenous to human capital investment and fertility decisions. As a result, these decisions may mediate the relationship between women's working behavior and WWI military fatalities. Including indicators for educational attainment and number of children does not affect the results, suggesting that the long-run impact of WWI military fatalities was direct rather than mediated by education and fertility choices.

The Potential Role of WWII Finally, I show in Appendix C.4 that WWII military fatalities and destructions do not affect the results.

Other Results

Further results are reported in Appendix C.5. I show that women born in départements exposed to higher military death rates do not make different fertility or education choices, confirming that these decisions do not mediate the relationship between WWI military fatalities and women's working behavior. Moreover, these women do not marry with men that differ along observables. Further, I generally find no heterogeneity across women with different characteristics (number of children, level of education, age, marital status). Additionally, I provide cohort-specific estimates, as well as a placebo test using men.

12. A related potential concern is that départements of birth may not correspond to départements of childhood. Comparing women with similar migration histories generates results identical to the baseline.

Finally, I combine all thirty-two annual labor force surveys between 1982 and 2013 to corroborate the results obtained with the censuses. Analyses of labor force surveys further suggest that women born in départements exposed to higher military death rates are more attached to the labor force, but that this impact on the extensive margin does not translate into the intensive margin, as they work shorter hours. Using wage information contained in the labor force surveys, I also show that heterogeneity in *unobserved* human capital does not account for the pattern in the data.

3.2 Intergenerational Transmission Mechanisms

In this section, I explore three mechanisms underlying the historical persistence of the impact of WWI military fatalities on women's working behavior: vertical intergenerational transmission (section 3.2.1), transmission through marriage (section 3.2.2), and oblique intergenerational transmission (section 3.2.3).[13] While I find evidence for all three transmission channels, the mother-to-daughter channel appears quantitatively as the most important.

3.2.1 Vertical Intergenerational Transmission

I first explore whether the legacy of the missing men persisted through vertical intergenerational transmission—from parents to daughters. Among others, Farre and Vella (2013) provide suggestive evidence that the both beliefs and working behavior of mothers affect their daughters' working behavior when adults. This mechanism is also at play in France: women with parents—and especially mothers—born in départements exposed to higher levels of military death rates are more likely to work. In particular, war-induced changes in mothers' working behavior is a primary underlying force behind vertical intergenerational

13. Identifying each transmission channel independent from confounding institutional factors requires using samples that differ from the one used in section 3.1. As a result, the results in section 3.2 may not fully relate to those in section 3.1. Nevertheless, they are still informative as the characteristics of women in each of the sample used to analyze intergenerational transmission mechanisms are very similar, which comforts the idea that transmission channels at play in one sample are also at play in other samples.

transmission.

Empirical Strategy

The extended labor force surveys 2005–2012 contain parental origins, enabling to put the theory of vertical intergenerational transmission to a direct test. Again, I use an empirical strategy that mirrors the epidemiological approach to culture. Different from previous analyses, I focus on second-generation internal migrants and restrict the regression sample to *non-migrant* married women aged 30 to 59, i.e., those with parents born in a département that is different from their own département of birth.

Focusing on second- rather than first-generation internal migrants further improves the credibility of the identification strategy. First, a typical respondent in this sample has parents who were born in the 1930s. As a result, their département of birth plausibly traces back to the war. Second, because the location of second-generation internal migrants was determined prior to their birth, the results are unlikely to be driven by selective migration patterns.[14]

To determine the role of mothers' origins, I estimate the following specification:

$$\begin{aligned} \texttt{employed}_{ihjmflrt} &= \beta\, \texttt{death\_rate}_m + \boldsymbol{\gamma}_1 \mathbf{X}_i' + \boldsymbol{\gamma}_2 \mathbf{X}_{hj}' + \boldsymbol{\gamma}_3 X_f \\ &+ \boldsymbol{\gamma}_4 \widetilde{\mathbf{X}}_{1911,m}' + \delta_r + \eta_t + \omega_{fl} + \varepsilon_{ihjmflrt}, \end{aligned} \tag{3.3}$$

where m indexes mothers, f, fathers, and l, parents in-law. Historical controls are assigned at the level of mothers' départements of birth ($\widetilde{\mathbf{X}}_{1911,m}$), and $\mathbf{X}_{hj}$ contains a set of husband and household characteristics.[15] Following the epidemiological approach, specification 3.3 contains département of residence fixed effects, δ_r—because the sample consists of second-generation migrants, départements of residence and of birth are identical. η_t is a survey-year

14. As with the censuses, second-generation migrants and non-migrants whose mothers were born in the same département as them are broadly alike: they are equally likely to be employed, and there is no correlation between their migration status and the military death rate of their département of birth. Nevertheless, second-generation migrant women are slightly more educated (see Appendix Table C.1).

15. $\mathbf{X}_{hj}$ contain husbands' incomes together with husbands' age, age squared and educational attainment, an indicator for home ownership, and the number of rooms in the home.

fixed effect. To neutralize the impact of other parental origins, I further include father and parents in-law départements of birth fixed effects, ω_{fl}. This enables to effectively compare women whose fathers and parents in-law were born in the same départements. I use two-way clustering and cluster standard errors at the level of départements of residence and mothers' départements of birth. To analyze the role of fathers' origins, I estimate an analogous specification in which the key variables are assigned at the level of fathers' départements of birth.

Results

I report the results in Table 3.1. In column 1, the coefficient of interest is identified off variations in the working behavior 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 exposed to varying levels of military death rates. The estimate is significant at the 1% level and implies that women whose mothers were born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 14 percentage points more likely to be working. Including husband and household controls in column 2 does not change this estimate. In column 3, comparing women whose fathers and parents in-law have identical origins to further isolate the role of mothers only slightly decreases the estimate.[16] A replication using fathers' origins reveals that they too matter, but to a smaller extent than mothers do (panel B).[17]

16. The results are similar when the outcome is a labor force participant indicator (see Appendix Table C.2).

17. To assess the relative magnitude of vertical intergenerational transmission, I first replicate the baseline estimates from section 3.1 with the sample from the extended labor force surveys. This yields a coefficient of 0.48 (standard error of 0.22). Adding mothers départements of birth fixed effects decreases the coefficient to 0.15, suggesting that mothers play a crucial role.

Table 3.1
Transmission from Parents to Daughters

Dependent variable	Employed					
	A. Mother			B. Father		
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate, parental origin	1.39***	1.37***	1.10**	1.25***	0.83*	0.57
	[0.48]	[0.47]	[0.48]	[0.45]	[0.42]	[0.46]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	No	Yes	Yes	No	Yes	Yes
Parental controls						
Father high social class	Yes	Yes	Yes	Yes	Yes	Yes
Mother pre-war controls (1911)	Yes	Yes	Yes	No	No	No
Father pre-war controls (1911)	No	No	No	Yes	Yes	Yes
Mother birth département FE	No	No	No	No	No	Yes
Father birth département FE	No	No	Yes	No	No	No
Mother in-law birth département FE	No	No	Yes	No	No	Yes
Father in-law birth département FE	No	No	Yes	No	No	Yes
Clusters						
Birth-residence département	92	92	92	92	92	92
Mother's département of birth	92	92	92			
Father's département of birth				92	92	92
Observations	17,258	17,258	17,258	17,995	17,995	17,995
Outcome mean	0.83	0.83	0.83	0.83	0.83	0.83

Notes. This table reports the OLS coefficients from estimating specification 3.3. All regressions include survey-year indicators as well as an indicator for whether both parents were born in the same département. Husbands and household controls include husbands' incomes, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the individuals' départements of birth and at the level of their mothers' or fathers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose parents were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

The Mother-to-Daughter Channel

Did war-induced changes in mothers' working behavior transmitted to their daughters? I explore this question through 2SLS. I first analyze the impact of WWI military fatalities on mothers' working behavior when their daughters were growing up—the first-stage. I use the sample of second-generation internal migrant married women aged 30 to 59 in the extended labor force surveys 2005–2012, and estimate:

$$\texttt{worked}^{\texttt{mother}}_{irmflt} = \beta\ \texttt{death\_rate}_m + \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \mathbf{X}'_{hj} + \boldsymbol{\gamma}_3 \widetilde{\mathbf{X}}'_{1911,m} + \delta_r + \eta_t + \omega_{fl} + \varepsilon_{irmflt}, \quad (3.4)$$

where $\texttt{worked}^{\texttt{mother}}_{irmflt}$ is an indicator for whether i's mother was working when i was growing up.[18] Military death rates and the vector of pre-war controls $\widetilde{\mathbf{X}}_{1911,m}$ are assigned at the level of mothers' départements of birth. δ_r is a département of residence (and birth) fixed effect, and η_t a survey-year fixed effect. To effectively compare women whose fathers and parents in-law were born in the same départements, I further include father and parents in-law départements of birth fixed effects, ω_{fl}. I use two-way clustering and cluster standard errors at the level of départements of residence and mothers' départements of birth.

I report the results in column 1 of Table 3.2. The estimate implies that mothers born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 16 percentage points more likely to have been working when their daughters were growing up.[19] In column 2, comparing women whose fathers and parents in-law have identical origins yields similar results.

Next, I instrument $\texttt{worked}^{\texttt{mother}}_{irmflt}$ with $\texttt{death\_rate}_m$ and estimate:

$$\texttt{employed}_{irmflt} = \beta\ \texttt{worked}^{\texttt{mother}}_{irmflt} + \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \mathbf{X}'_{hj} + \boldsymbol{\gamma}_3 \widetilde{\mathbf{X}}'_{1911,m} + \delta_r + \eta_t + \omega_{fl} + \varepsilon_{irmflt}. \quad (3.5)$$

18. In the labor force surveys, the relevant variable is OPROFM, which corresponds to the answer of the following question: "What was your mother's occupation? Indicate the mother's occupation at the time when the respondent completed her education."

19. This corresponds to 28% of the mean—in the sample, 56% of daughters report having a working mother when growing up, which is the female labor force participation rate in the mid-1970s. Given that women in the sample were born between the 1960s and the 1980s, their mothers were most likely born between the 1930s and the 1950s—the labor force surveys do not report parents' ages, but the average age of childbearing was 27 in the 1970s (Daguet, 2002). As a result, these mothers would have been mostly present in the censuses of 1962, 1968, and 1975. For these censuses, I found in section 3.1 a magnitude for the legacy of the war of 10–15 percent of the mean. One possibility to explain this discrepancy is that women over-report having a working mother in the labor force surveys: the labor force surveys ask for the occupation of respondents' mothers at the time they completed their education. However, it may well be the case that respondents answered instead whether they had a mother that had been working at some point in time because of imperfect recall. This would result in larger estimates.

Table 3.2
Transmission from Mothers to Daughters (2SLS)

Dependent variable	Mother worked		Employed			
	A. First-Stage		B. Reduced Form		C. Second-Stage	
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate, mother origin	1.57***	1.84***	1.37***	1.10**		
	[0.55]	[0.58]	[0.47]	[0.48]		
Mother worked					0.88**	0.60**
					[0.38]	[0.27]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls						
Father high social class	Yes	Yes	Yes	Yes	Yes	Yes
Mother pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Father birth département FE	No	Yes	No	Yes	No	Yes
Mother in-law birth département FE	No	Yes	No	Yes	No	Yes
Father in-law birth département FE	No	Yes	No	Yes	No	Yes
Clusters						
Birth-residence département	92	92	92	92	92	92
Mother's département of birth	92	92	92	92	92	92
Observations	17,258	17,258	17,258	17,258	17,258	17,258
Outcome mean	0.56	0.56	0.83	0.83	0.83	0.83
Cragg-Donald Wald F	39.48	49.39				
Kleibergen-Paap Wald rk F	8.04	10.97				

Notes. This table reports the coefficients from estimating specifications 3.4 (panel A), 3.3 (panel B), and 3.5 (panel C). All regressions include survey-year indicators and an indicator for whether both parents were born in the same département. Husband and household controls include husbands' income, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the respondents' départements of birth and at the level of their mothers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

Second-stage estimates are reported in Panel C.[20] Under the exclusion restriction, the baseline estimate in column 5 implies that a 10 percentage points increase in mothers labor force

20. All the results are similar when the outcome is a labor force participant indicator (see Appendix Table C.4).

participation rates induced by WWI military fatalities generated a 9 percentage points increase in the likelihood of their daughters to be working. At the risk of comparing different samples, the magnitude of this intergenerational transmission channel (0.88) is substantial compared to that of overall intergenerational transmission found in section 3.1 (1.25), suggesting a crucial role for mothers in diffusing the legacy of the missing men.

This interpretation nevertheless relies on the validity of the exclusion restriction. Indeed, the reduced-form impact of WWI military fatalities may have transmitted from mothers to daughters through other channels than changes in the working behavior of mothers. While this specification isolates the role of mothers from that of fathers and parents in-law as well as confounding changes in local institutional structures, other factors may be at play such as changes in the beliefs toward female labor held by mothers (see section 3.3). As a result, second-stage estimates likely provide an upper bound for the role of changes in mothers' working behavior in vertical intergenerational transmission.

3.2.2 Transmission Through Marriage

Fernández, Fogli and Olivetti (2004) argue that the sons of working mothers hold more progressive views toward female labor than the sons of stay-at-home mothers, making these men less averse toward having a working wife, and that this provides women with incentives to enter the labor force. Should this mechanism be at play, because men born in départements exposed to higher military death rates are more likely to have been growing up with a working mother, they should be more likely to have a working wife. As a result, women whose mothers in-law were born in départements exposed to higher military death rates should be more likely to work. I show that this mechanism had a role in the persistence of the legacy of the missing men: by generating a new type of men—those with a working mother—, the war contributed to establish and perpetuate a progressive norm toward female labor.

Transmission from Husbands to Wives

To assess the role of husbands origins, I regress wives' working behavior 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 départements of birth fixed effects. This enables to effectively compare women born in the same département but whose husbands were born in départements exposed to varying levels of military death rates.[21] Using the censuses, I estimate the following specification on the sample of migrant married women aged 30 to 49:

$$\texttt{employed}_{ijhbrt} = \beta\ \texttt{death\_rate}_h + \boldsymbol{\gamma}_1\mathbf{X}'_i + \boldsymbol{\gamma}_2\mathbf{X}'_{hj} + \boldsymbol{\gamma}_3\widetilde{\mathbf{X}}'_{1911,h} + \delta_r + \omega_b + \varepsilon_{ijhbrt}, \quad (3.6)$$

where $\texttt{death\_rate}_h$ is the military death rate exposure of the département of birth of husband h of wife i in household j, and ω_b is a wife département of birth fixed effect. Vector $\mathbf{X}_{hj}$ contains the same set of husband and household characteristics as those used in section 3.1. Vector $\widetilde{\mathbf{X}}_{1911,h}$ is the set of pre-war controls corresponding to husbands' départements of birth.

I report the estimates along with 95% confidence intervals in Figure 3.3.[22] In Panel A, I do not include wives départements of birth fixed effects. The coefficients of interest are identified off variations in the working behavior of migrant married women of the same cohort, residing in the same département, but whose husbands were born in départements exposed to varying levels of military death rates. The estimates imply that women whose husbands were born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 3–5% points more likely to be working between

21. The military death rates exposure of the départements of birth of a wife and her husband are likely to be correlated for two reasons: they are likely to be born in the same département, and there should be some degree of homogamy in military death rates as individuals with similar views are more likely to marry one another. I provide evidence for such homogamy in military death rates in Appendix C.6.

22. The results from Figure 3.3 can be found in table form in Appendix Tables C.47–C.59.

1962 and 2012. Including wives départements of birth fixed effects to effectively compare women with identical origins slightly decreases the estimates, which remain significant at conventional levels.[23]

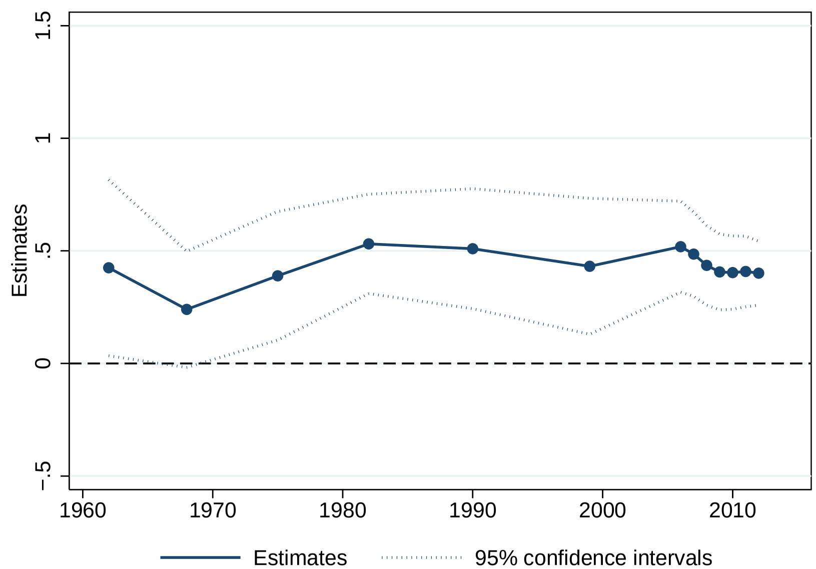
Transmission from Mothers In-Law to Daughters In-Law

I now directly explore whether mothers in-law had a role in diffusing the legacy of the missing men. Using the extended labor force surveys 2005–2012, I replicate the analysis of section 3.2.1 and regress daughters in-law's working behavior on the military death rates exposure of the départements of birth of their mothers in-law.

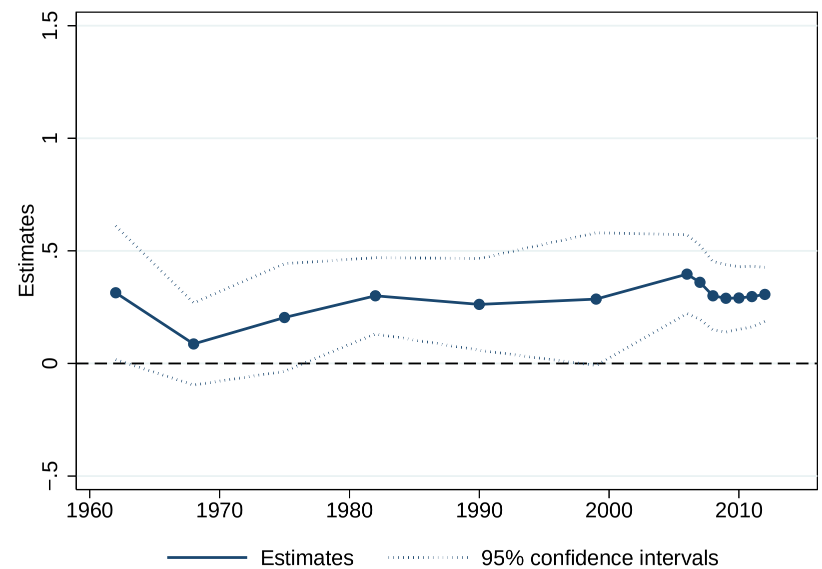
I report the results in Table 3.3. The baseline coefficient is significant at the 5% level and implies that women whose mothers in-law were born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) were 3 percentage points more likely to be working.[24] This result is less robust than with own mother, as including own parents and fathers in-law départements of birth fixed effects decreases both the estimates and their significance. They are nevertheless positive, suggesting a (limited) role of mothers in-law in diffusing of the legacy of the missing men. This result contrasts with Fernández, Fogli and Olivetti's (2004), as they find that mothers in-law—rather than own mothers—explain the impact of WWII mobilization rates on female labor force participation in the U.S.

23. Including fertility and education controls barely changes the results, suggesting again that these are not channels of transmission (see Appendix Figure C.5). To assess the relative magnitude of transmission through marriage, I replicate the baseline estimates from section 3.1 and include husbands départements of birth fixed effects. This enables to effectively compare women whose husbands were born in the same départements and therefore neutralize to some extent the role of marriage as a channel of persistence. I report the results in Appendix Figure C.6. Including husbands' départements of birth fixed effects makes the estimates decrease by 15% on average, suggesting that a small part of the legacy of the missing men persisted through a marriage channel.

24. The results are similar when the outcome is a labor force participant indicator (see Appendix Table C.5).



(A) No Wife Birth Département FE



(B) Wife Birth Département FE

Figure 3.3: Transmission from Husbands to Wives

Notes. This figure reports the OLS coefficients from estimating specification 3.6. All regressions include household and husband controls. Standard errors are clustered at the level of individuals' départements of residence and at the level of their husbands' départements of birth. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

Table 3.3
Transmission from Mothers In-Law to Daughters In-Law

Dependent variable	Employed			
	(1)	(2)	(3)	(4)
Military death rate, mother in-law origin	0.29**	0.27**	0.25**	0.13
	[0.14]	[0.13]	[0.13]	[0.16]
Birth year FE	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes
Husband and household controls	No	Yes	Yes	Yes
Education and fertility controls	No	No	Yes	Yes
Parental controls				
Father high social class	Yes	Yes	Yes	Yes
Mother in-law pre-war controls (1911)	Yes	Yes	Yes	Yes
Mother birth département FE	No	No	No	Yes
Father birth département FE	No	No	No	Yes
Father in-law birth département FE	No	No	No	Yes
Clusters				
Birth-residence département	92	92	92	92
Mother in-law's département of birth	92	92	92	92
Observations	29,896	29,896	29,896	28,559
Outcome mean	0.84	0.84	0.84	0.84

Notes. This table reports the OLS coefficients from estimating specification 3.3. All regressions contain survey-year indicators. Husband and household controls include husbands' income, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the individuals' départements of birth and at the level of their mothers in-law départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers in-law were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
** Significant at the 5% level.

3.2.3 Oblique Intergenerational Transmission

The third mechanism I explore is oblique intergenerational transmission through internal migrants. For each census and each département, I construct an *immigrant norm* defined as the weighted average military death rates exposure among immigrants in a département:

$\texttt{death\_rate}_r^{\texttt{norm}} = \sum_{o \neq r} \texttt{sh\_imi}_{o,r} \times \texttt{death\_rate}_o$, where $\texttt{sh\_imi}_{o,r}$ is the share of immigrants from département o residing in département r. Because women are more likely to use other working women as role models, I use female immigrants of working age to compute the immigrant norm, and assign the norm of the preceding census. I estimate the following specification on the sample of non-migrant married women aged 30 to 49:

$$\begin{aligned}\texttt{working}_{ijhrt} &= \beta\,\texttt{death\_rate}_{r,t-1}^{\texttt{norm}} + \gamma_1 \mathbf{X}_i' + \gamma_2 \mathbf{X}_{hj}' + \\ &+ \gamma_2 \widetilde{\mathbf{X}}_{1911,r,t-1}^{\prime\texttt{norm}} + \gamma_3\ \texttt{sh\_imi}_{r,t-1} + \varepsilon_{ijhrt},\end{aligned} \tag{3.7}$$

where $\widetilde{\mathbf{X}}_{1911,r,t-1}^{\texttt{norm}}$ is a vector of pre-war characteristics calculated in the same way as the immigrant norm in military death rates, $\texttt{death\_rate}_{r,t-1}^{\texttt{norm}}$. I also control for the share of immigrants in a département in the previous census, $\texttt{sh\_imi}_{r,t-1}$. I cluster standard errors at the level of départements of residence.

I report the results in Figure 3.4.[25] The estimates imply that women residing in départements in which the immigrant norm was one percentage point higher in the preceding census were 3–4 percentage points more likely to be working between 1968 and 2012. These results highlight the role of local interactions in explaining the diffusion of female labor force participation across the economy (Fogli and Veldkamp, 2011).

3.3 Changes in Preferences and Beliefs Toward Female Labor

To account for the empirical evidence of intergenerational transmission, I argue that the women induced to enter the labor force in the interwar period because of WWI military fatalities altered the preferences and beliefs toward female labor of their daughters, of their sons, and of their entourage, and that these changes translated into the working behavior of women in subsequent generations. Because individuals form their preferences and beliefs

25. The full set of results in table form is available in Appendix Tables C.60–C.71. The estimates are broadly similar when assigning the immigrant norm to two censuses before (see Appendix Figure C.7), or when the outcome is a labor force participant indicator (see Appendix Figure C.8). They are slightly weaker when using male internal migrants of working age to compute the immigrant norm (see Appendix Figure C.9).

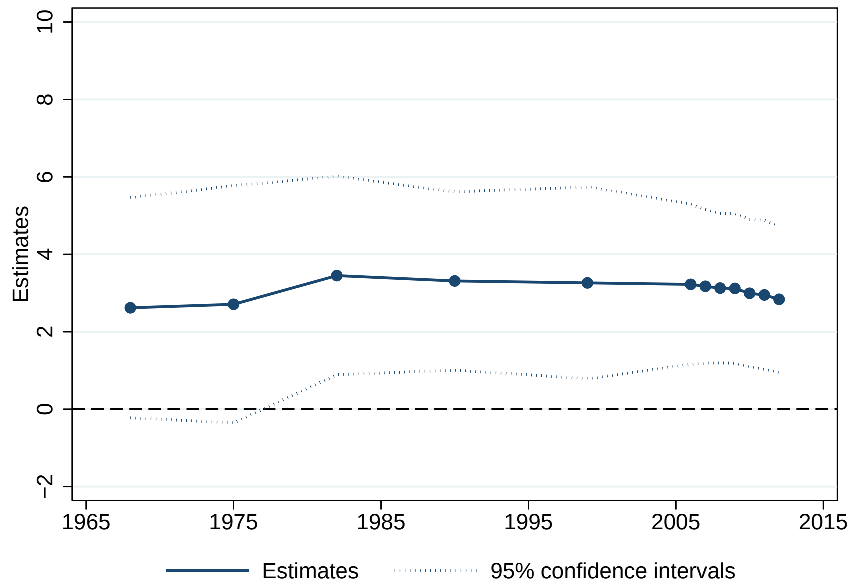


Figure 3.4: Transmission from Female Migrants to Non-Migrants

Notes. This figure reports the OLS coefficients from estimating specification 3.7. Standard errors are clustered at the level of individuals' départements of residence. The sample consists of non-migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

early in life upon learning and socializing with their parents, peers, and neighbors (Bisin and Verdier, 2001, 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 views toward female labor, providing a rationale for the long-run impact of WWI military fatalities on female labor force participation.

To explore the validity of this argument, I use the Generation and Gender Survey (GSS) of 2005, which contains a sample of ten thousand individuals aged 18 to 79.[26] Because I study preferences and beliefs rather than behavior, I do not put age restrictions on the regression sample. I focus on internal migrants born in metropolitan France, and drop respondents who did not grow up with their parents. The regression sample contains 1,140 men and 1,660

26. See Régnier-Loilier (2016) for a comprehensive presentation of this survey. The two main other datasets with information on cultural beliefs are the opinion barometer of the DRESS and the International Social Survey (ISSP). However, they do not provide respondents' départements of birth.

women.[27]

GSS respondents were proposed three statements directly related to their views about the role of women in the labor force, and asked whether they “agree”, “somewhat agree”, “do not agree nor disagree”, “somewhat disagree”, or “disagree” with them. These 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 value 0 to “agree”, value 1 to “disagree”, and use 0.25 point increments for responses in between. As a result, higher values indicate more progressive views toward gender roles. I report in Table 3.4 average responses for men and women separately. Three-quarter of respondents “somewhat disagree” with the statements. There is no notable difference between men and women in their attitudes. Next, I aggregate these statements on a three-points scale, which I standardize to a one-point scale.[28] The survey also contains questions related to preferences and beliefs about religion, marriage, and the family. I report average responses relative to these statements in Appendix Tables C.6–C.8.

To estimate the long-run impact of WWI military fatalities on preferences and beliefs, I use the epidemiological approach. I pool men and women together, and add an interaction term to assess the potentially differential impact on women’s beliefs:

$$\begin{aligned} \texttt{values}_{ihmfbr} &= \beta_1 \, \texttt{death\_rate}_b + \beta_2 \, \texttt{female}_i + \beta_3 \, \texttt{death\_rate}_b \times \texttt{female}_i \\ &+ \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \mathbf{X}'_h + \boldsymbol{\gamma}_3 \mathbf{X}'_{fm} + \boldsymbol{\gamma}_4 \widetilde{\mathbf{X}}'_{1911,b} + \delta_r + \varepsilon_{ihmfbr}, \end{aligned} \tag{3.8}$$

27. Summary statistics are available in Appendix Tables C.17 and C.18. As with the censuses, there is no correlation between migration status and origin département military death rates, or employment status (see Appendix Table C.19). However, internal migrants hold slightly more progressive values in general. This is essentially driven by the fact that internal migrants are more educated than non-migrants (see Appendix Table C.20). Importantly, internal migrants are equally progressive along all the beliefs spectrum: female labor, but also religion, marriage, and the family.

28. The survey contains a fourth question that somewhat relates to preferences and beliefs about the role of women in the labor force: “Taking care of one’s home or family is as fulfilling as working for pay”. On average, 27% of men and 36% of women disagree with this statement. The results reported in Table 3.5 are similar when integrating this question into the cultural index (see Appendix Table C.10).

Table 3.4
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 GSS dataset. Disagreement with the statement implies higher values. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

where $\texttt{values}_{ihmfbr}$ is 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. $\mathbf{X}_i$ contains 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 labor status indicators.[29] The set of historical controls $\mathbf{X}_{1911,b}$ is assigned at the level of départements of birth. Consistent with the epidemiological approach, I include a département of residence fixed effect, δ_r. I use two-way clustering and cluster standard errors at the level of départements of birth and of residence.

I report the results in Table 3.5. The coefficient of interest β_1 is identified off variations in the beliefs held by respondents of the same cohort, residing in the same département, but born in départements exposed to varying levels of military death rates. Column 1 reports

29. $\mathbf{X}_h$ contains an indicators for the respondent's home being a house rather than an apartment, whether she owns her housing, whether she has partner in the household, and the number of rooms in her home.

the results when not including the interaction term. $\widehat{\beta}_1$ is significant at the 1% level and implies that respondents born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) hold more progressive beliefs toward female labor—the aggregate is 11 percentage points higher in this case, which corresponds to 15% of mean beliefs. Men and women hold equally progressive beliefs. Adding the interaction term in column 2 reveals a slightly stronger impact on women's beliefs, but the coefficient is not significant. Adding parental and household controls, and controlling for respondents' employment status, education, and fertility does not substantially change the results.[30]

To verify that these results do not reflect more progressive attitudes in general, I replicate the analysis for other cultural indexes—those related to beliefs about religion, marriage, and the family (see Appendix Table C.12). Consistent with my interpretation, WWI military fatalities did not impact cultural beliefs beyond those related to the role of women in the labor force.[31]

30. Restricting the regression sample to individuals that are in a couple—70% of the sample—does not alter the results (see Appendix Table C.9). Moreover, there is no heterogeneity in the impact of WWI military fatalities on preferences and beliefs across marital status (see Appendix Table C.11).

31. The GSS survey also contains questions related to the distribution of tasks in the household. In Appendix C.7, I show that WWI military fatalities had no impact on the distribution of tasks in the household.

Table 3.5
The Impact of WWI Military Fatalities on Cultural Beliefs

Dependent variable	Cultural values index (one-point scale)				
	(1)	(2)	(3)	(4)	(5)
Military death rate	1.13***	1.01***	0.94***	0.95***	0.96***
	[0.21]	[0.32]	[0.33]	[0.33]	[0.34]
Female	0.02	-0.01	-0.01	-0.01	-0.02
	[0.01]	[0.03]	[0.03]	[0.03]	[0.03]
Military death rate × Female		0.18	0.21	0.20	0.24
		[0.21]	[0.20]	[0.20]	[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
Father high social class	No	No	Yes	Yes	Yes
Mother education	No	No	Yes	Yes	Yes
Father 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 the OLS coefficients from estimating specification 3.8. 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 the individuals' départements of birth and départements of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GSS. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level.

3.4 Conclusion

Did the upward shift in female labor force participation generated by WWI military fatalities persist across generations? I find that one century after WWI, the legacy of the missing men is still vivid. Comparing women residing under the same institutional setting but born in départements differentially exposed to military death rates, I provide empirical evidence for the persistent impact of WWI military fatalities on women's working behavior at the individual level. I uncover three mechanisms at play behind the diffusion of women's working behavior: vertical intergenerational transmission, transmission through marriage, and oblique intergenerational transmission. Consistent with formal models of intergenerational diffusion of female labor force participation, I provide supportive evidence that men and women born in départements exposed to higher levels of military death rates are more likely to hold progressive views toward the role of women in the labor force.

PERSPECTIVES

In this dissertation, I provide a comprehensive analysis of the short and long-run impact of WWI military fatalities on female labor force participation in France. I now discuss how it may contribute to the economic history literature and provide some insights for the future of the discipline.

A Cliometric Approach

In chapter 2, I analyze the short-run impact of WWI military fatalities on female labor force participation. This chapter follows a cliometric approach: it uses economic theory—here, economic theories of marriage—to explain the past, combined with a counterfactual analysis (Demeulemeester and Diebolt, 2007; Diebolt, 2007). It shows once again that "the past has useful economics", and supports the assertion that history expands economists' laboratory, offering them access to experiments that enable to test economic theories in their pure form, as "historical experiments [are] larger, clearer and more decisive than most that could be framed on the basis of recent experience" (McCloskey, 1976, p. 447).

It further highlights the historical dependence of model implications. Here, the response of female labor to sex ratio imbalances could be uncovered precisely because of the context in which the historical experiment occurred: France's revolution of female labor was yet to come, and its economy was still in the midst of the structural transformation. Moreover, the shock to the sex ratio was of an unprecedented magnitude. As a result, changes in marriage market conditions affected the extensive margin of female labor to its full potentialities. In contrast, a tightening of the marriage market after the Napoleonic wars would probably not have triggered similar changes because of the few female jobs in the manufacturing sector available at that time. A tightening of the marriage market today would similarly not trigger such dramatic consequences as close to 90% of women aged 30 to 50 are now in the labor force.

This chapter also engages with the historiography in an effort to alleviate the "danger in the use of economic theory in economic history", in that "theory contains a bias towards flattening out the particularities of the past" (Arrow, 1986, p. 17). Historians have provided considerable attention to consequences of the Great War for female labor. Against the belief ingrained in collective memory that the war "liberated women", they generally conclude that the positive impact of the war on female labor was only superficial and temporary (McMillan, 1981; Thébaud, 1992, 2013; Grayzel, 2014). Thébaud and Bard (1999) even argue that the war mostly had anti-feminist consequences as it revitalized the norm of a maternal role for women (Cova, 1997; De Luca Barrusse, 2008). The quantitative analysis in this chapter reveals that the inflow of women in the labor force during the war was indeed only temporary. It nevertheless suggests more subtle implications—mostly absent from the historiography—in that the war impacted female labor through its consequences on post-war marriage market conditions, a fact that could be uncovered only through the guidance of economic theory.

Although this suggests that historians need interdisciplinary exchange with economic historians, the reverse is equally true: economic historians need the historian's craft to escape from a naive interpretation of historical sources and quantitative results (Lamoreaux, 2015; Hansen and Hansen, 2016; Margo, 2018). Following historical research (Daric, 1947; Maruani and Meron, 2012), a critical reading of the censuses cautioned me against the use of the statistics of female labor from the census of 1901 (see Appendix B.5). I also provided qualitative evidence in support for the empirical findings through various reports of labor inspectors (see pp. 35 and 48). Nevertheless, I must acknowledge the limited depth of that aspect of the analysis. More substantial attention to qualitative sources such as diaries, letters, or company records would have improved our understanding of the inner functioning of the economic mechanisms at play in context beyond the sole quantitative evidence.

The Channels of Historical Persistence

Chapter 3 contains the main contribution of this dissertation. It analyzes the long-run impact of WWI military fatalities on female labor force participation and uncovers intergenerational channels of historical persistence. A large literature similarly studies the mechanisms underlying the persistence of history (Nunn, 2009, 2014; Michalopoulos and Papaioannou, 2017). With a methodological focus on a *location-based* aspect of history—how historical events in a given location shape long-run outcomes in that location—, domestic institutions have been pointed out as a primary channel of historical persistence (Acemoglu, Johnson and Robinson, 2005). However, as a result of this methodological tendency, a crucial linkage of historical persistence has received less attention: individuals. Indeed, uncovering how individuals transmit the legacies of the past across generations independent from confounding institutional structures requires extracting from a location-based approach to history and shifting toward a *lineage-based* approach to history.

The availability of individual-level data containing parental origins has made this lineage-based approach to history now feasible. For instance, Michalopoulos, Putterman and Weil (2016) show that pre-modern economic lifeways in Africa still affect economic outcomes today.[1] Alternatively, Alesina, Giuliano and Nunn (2013) show that up to half of the overall impact of historical plough use on contemporaneous gender-role attitudes is due to the transmission of cultural norms rather than to long-run changes in institutional structures. Consistent with their study, I find that this lineage-based aspect accounts for half of the long-run impact of WWI military fatalities on female labor force participation, suggesting an important role of individuals relative to local institutional structures in generating persistence of historical shocks. In addition, one novelty of the approach in this chapter is the use of the epidemiological approach *within* a country, reducing potential biases introduced when comparing migrants to non-migrants.

1. See also Nunn and Wantchekon (2011) and Teso (2018) for a similar approach.

The general lesson drawn from lineage-based approaches is that cultural transmission is an essential element of historical persistence. The empirical evidence is nevertheless limited to contemporaneous measures of cultural outcomes. For instance, Michalopoulos, Putterman and Weil (2016) measure cultural outcomes in the Demographic and Health Surveys (DHS) of 1992–2014, and Alesina, Giuliano and Nunn (2013), those in the World Value Surveys (WVS) of 1995–2007 and the European Social Surveys (ESS) of 2004–2011.[2] I similarly use contemporaneous measures of cultural outcomes from the Generation and Gender Survey (GSS) of 2005.

I interpret the results in this chapter as evidence for a process of cultural diffusion and cultural change by which women induced to enter the labor force in the interwar period because of WWI military fatalities altered the preferences and beliefs toward female labor of their daughters, of their sons, and of their entourage, and that these changes translated into the working behavior of women in subsequent generations.[3] Providing direct empirical evidence for the feedback process between cultural beliefs and economic behavior is, however, challenging, as no survey data goes back in time to the initial historical shock. Finding innovative ways to build measures of preferences and beliefs far back in time will be a fertile avenue of research in order to improve our understanding of the process of cultural change more directly. A potential way would be to use textual analysis of newspaper content and legislators speeches as these may reflect the beliefs held at a given time and place. While such analyses are still in their infancy, a vibrant research is dedicated at developing tools to analyze textual corpora (Egami et al., 2017; Gentzkow, Kelly and Taddy, 2017).

2. To measure cultural outcomes, Nunn and Wantchekon (2011) use the Afrobarometer surveys of 2005, and Teso (2018) the DHS of 1992–2014 and the Afrobarometer surveys of 2005–2016.

3. Fernández (2013) explicitly models such a mechanism of cultural change. She builds a framework in which married women endogenously learn about the long-run costs of working upon observing the working behavior of women in the previous generation. This then gives rise to a sigmoid-shaped process for both female labor force participation and preferences and beliefs toward female labor.

Toward a 4D Economic History

This dissertation follows the new methodology of empirical economic history: Digitally-Driven Data Design (4D) economic history (Mitchener, 2015).[4] It is defined as "empirical research drawing on the use of large collections of digitized records coupled with a keener use of our econometric toolkit to answer causal questions and counterfactuals" (Mitchener, 2015, p. 1234).

Empirical Designs The first element of this methodology—common to all empirical research in economics—is the use of empirical designs and counterfactual reasoning to establish causality (Angrist and Pischke, 2010; Morgan and Winship, 2014). The general process in this dissertation is to use simple designs with the goal of making transparent and meaningful comparisons, and then support the credibility of their assumptions with more sophisticated techniques. For instance, the results in chapter 2 are based on a difference-in-differences design. To make the assumptions underlying the design more credible, I proceed in various ways such as the combination of the difference-in-differences with an instrumental variables strategy, or the use of grouped fixed effects to relax the parallel-trends assumption (Bonhomme and Manresa, 2015).

Big Data The second element is the use of "Big Data" (Gutmann, Merchant and Roberts, 2018).[5] The key explanatory variable in this dissertation is a measure of military death rates at the département level, which is constructed using the individual military records of all the 1.3 million French soldiers who died because of the war from the *Mémoire des Hommes* archive (see Appendix A.3). This database contains images of these records along with their informational content in textual form, which was transcribed by volunteer "citizens

4. See also Abramitzky (2015) and Collins (2015) for a description of the new methodology of empirical economic history.

5. The use of big data in economic history should not, however, preclude the study of historical periods and areas that do not provide access to this type of data, such as the medieval period (Curtis, Van Bavel and Soens, 2016).

historians". The completion of this massive transcription project was undoubtedly fostered by the communication effort of the public interest group *Mission Centenaire*, which was created in 2012 by the French Government in the perspective of the First World War Centennial.[6]

Other studies also use a measure of military death rates from WWI in France as their key explanatory variable. For instance, Abramitzky, Delavande and Vasconcelos (2011) and Vandenbroucke (2014) use a measure from Huber (1931, p. 426) that varies across 22 military regions.[7] My measure has several advantages over the one in Huber (1931). First, it is based on individual-level information rather than on information aggregated at the regional level. Moreover, the information in Huber (1931) is based on a military report to the Assemblée Nationale in 1920 (Marin, 1920), which purpose was to assess funding for financial assistance to war widows. The data in this report were themselves based on estimates made in early 1919. The accuracy of these estimates has been largely challenged by historians as providing an account of military fatalities was extremely difficult given of the disorganization of the army at the end of the war (Prost, 2008). Overall, the use of large collections of individual-level digitized records, rather than aggregated information gathered from secondary sources, is paramount for researchers to access a precise and unbiased view of the past.

Given that the ability of even state-of-the-art OCR softwares to extract accurate information from handwritten texts is still far from perfect (Volker, Umapada and Apostolos, 2018), crowd-sourcing the transcription of historical records on a massive scale seems a fruitful avenue for economic historians (Hedges and Dunn, 2017). One possibility, mentioned by Gutmann, Merchant and Roberts (2018), is to use the Zooniverse platform and its underlying software, Panoptes, to create "citizen science" projects (Bowyer et al., 2015).[8] For instance, a prominent project on the Zooniverse platform is *Operation War Diary*—launched in 2014 by the British National Archives and the Imperial War Museums—, which goal is

6. More information on this public interest group can be found at centenaire.org.

7. Gilles, Guironnet and Parent (2014) also use the MDH database to study the geography of military fatalities in France.

8. The Zooniverse platform is accessible at zooniverse.org.

to transcribe 1.5 million pages from the war diaries of British soldiers on the Western Front during World War I (Grayson, 2016).[9]

The other big data element in this dissertation corresponds to the use of large population datasets in chapter 3, in which I combine all the French censuses for which microdata are available: the thirteen censuses between 1962 and 2012.[10] Except for the censuses of 1962 and 1999, which are 5% samples of the population, these censuses are 20–25% samples of the population. Given that the main analysis focuses on a specific subset of the population—French internal migrant married women aged 30 to 49—most regressions contain 6.5 million observations.[11] One advantage resulting from the statistical power provided by these large datasets is that it enables to focus on the economic rather than on the statistical significance of empirical estimates, and therefore alleviates biases resulting from the overemphasis on p-values (Ziliak and McCloskey, 2008). Beyond this advantage, such statistical power shifts the informativeness of significance from rejected nulls toward failures to reject nulls, as these carry more substantial information (Abadie, 2018). For instance, while estimates relative to working behavior are all significant at (much higher than) conventional levels, those relative to fertility, education, and marital behavior are not significant and close to zero, suggesting that the persistent impact of WWI military fatalities on women's working behavior did not operate through these channels.

A fruitful use of these large datasets nevertheless requires computationally efficient es-

9. The *Operation War Diary* project is accessible at operationwardiary.org.

10. Unfortunately, microdata for earlier censuses are not available for France. Other countries are much more advanced on this front. For instance, the North Atlantic Population Project (NAPP, nappdata.org) provides the full-count of the censuses of Canada (1881, 1891), Denmark (1787, 1801), Great Britain (18851, 1861, 1871, 1881, 1891, 1901, 1911), Iceland (1703, 1729, 1801, 1901, 1910), Norway (1801, 1865, 1875, 1900, 1910), Sweden (1880, 1890, 1900, 1910), and the United States (1850, 1880) (Minnesota Population Center, 2017). The Integrated Public Use Microdata (IPUMS, ipums.org) further issued preliminary releases of the full-count of the censuses of the United States for 1900, 1910, 1920, 1930, and 1940 (Ruggles et al., 2017). French historical demographers have instead focused on another approach: the use of vital statistics to reconstruct life trajectories (Bourdieu, Kesztenbaum and Postel-Vinay, 2014, pp. 18–25). For instance, the TRA project reconstructs life trajectories of the descendants of 3,000 families from 1793 to 1902 in France (tra.web.ined.fr).

11. The specifications comparing the epidemiological approach to the location-based approach (Figure 3.2) nevertheless contain close to 14 million observations.

timators. For instance, to verify that selective in-migration patterns within destination départements do not drive the results in chapter 3, a robustness check consists in using a rich set of residence location fixed effects for small aggregation units and compare women residing within the same municipality. This implies running specifications with 6.5 million observations together with nearly 120 thousand multilevel fixed effects for cohort, region of birth, municipality of residence, a procedure that would be unachievable with standard computational techniques. To make the empirical analysis feasible, I use the computationally efficient estimator built by Correia (2016) and implemented through the `reghdfe` Stata package, which is a generalization of `areg` and `xtreg,fe` for multiple levels of fixed effects. It also allows for multi-way clustering, which I use throughout the analysis.[12,13]

Documentation and Replications A final element that should be part of the new economic historian toolkit is a constant effort toward enabling replications to improve the credibility of research findings, a domain in which economics is lagging relative to other disciplines (Duvendack, Palmer-Jones and Reed, 2017).[14] Transparency and thorough documentation of data sources are especially important in economic history where most variables are constructed by assembling a variety of primary and secondary sources. Such documentation can enable other researchers to assess and complement important research findings by a critical evaluation of data sources and improvements of the quality of the data.[15] For this purpose, I provide a detailed description of all the data sources used in this dissertation in an extensive

12. A full description of this package is available at scorreia.com/software/reghdfe.

13. Related to the movement toward better data, geographic information systems (GIS) have been increasingly used in economic history, for instance to link administrative constituencies over time or to map the spatial structures of transportation and communication systems (Atack, 2013). While not central in this dissertation, I use GIS to build a precise map of military regions and subdivisions at the eve of the war (Figures 1.1 and A.3), and to provide an explanation for why the location of recruitment bureaus cannot not be used to build a local measure of military death rates (see Appendix A.4.2).

14. See Clemens (2017), Pesaran (2003), Hamermesh (2007), and Hubbard (2015) for definitions of replication in economics. Proceedings of the AEA meetings of 2017 provide an overview of the current state of replication in economics (see Anderson and Kichkha, 2017; Berry et al., 2017; Chang and Li, 2017; Duvendack, Palmer-Jones and Reed, 2017; Höffler, 2017).

15. For instance, Albouy's (2012) critical evaluation of the data sources in Acemoglu, Johnson and Robinson (2001) improved the credibility of their findings (Acemoglu, Johnson and Robinson, 2012).

Data Appendix (Appendix D).[16] I further assess the validity of the main results by providing alternative ways of measuring military death rates (Appendix A.4) and female labor force participation (Appendix B.5), by examining the sensitivity of the results to specific observations such as war départements (Appendix B.6), or by using alternative datasets such as the labor force surveys. This comes at the cost of larges appendices, but hopefully the results in this dissertation meet the standards of a certain scientific rigor.

An effort toward replication is also crucial for understanding how context conditions historical findings. History offers a wide range of historical experiments to draw from (Diamond and Robinson, 2010). For instance, I discussed above the potential historical dependence of the effect identified in chapter 2: because World War I occurred in a context in which a majority of women was not in the labor force and female jobs in the manufacturing sector were potentially in large supply, changes in marriage market conditions affected the extensive margin of female labor to its full potentialities. The unavailability of substantial subsidies to war widows in the 1920s may also have fostered this mechanism. Without a comparative analysis, it is however challenging to assess the relative importance of each contextual factor for the impact of sex ratio imbalances on female labor market outcomes. Analyzing the impact of WWI military fatalities on female labor across countries with different characteristics may be a fruitful avenue for future research.[17] This may improve our understanding of "whether and in what sense the laws of economics are 'historically conditioned"' (Wright, 1986, p. 77).

16. Given its length (75 pages), the Data Appendix provided as supplementary material. Regression and summary statistics tables for chapter 3 (73 pages) are also provided as supplementary material (Appendices C.8 and C.9).

17. Primary candidates are those countries that suffered an especially large death toll relative to their pre-war population, such as Serbia (10.0%), the Ottoman Empire (3.8%), Romania (3.3%), Germany (3.1%), Austria-Hungary (2.1%), the U.K. (2.0%), Italy (1.8%), or New Zealand (1.6%) (Rohrbasser, 2014, p. 12).

APPENDIX A

APPENDIX TO CHAPTER 1

A.1 Appendix Figure

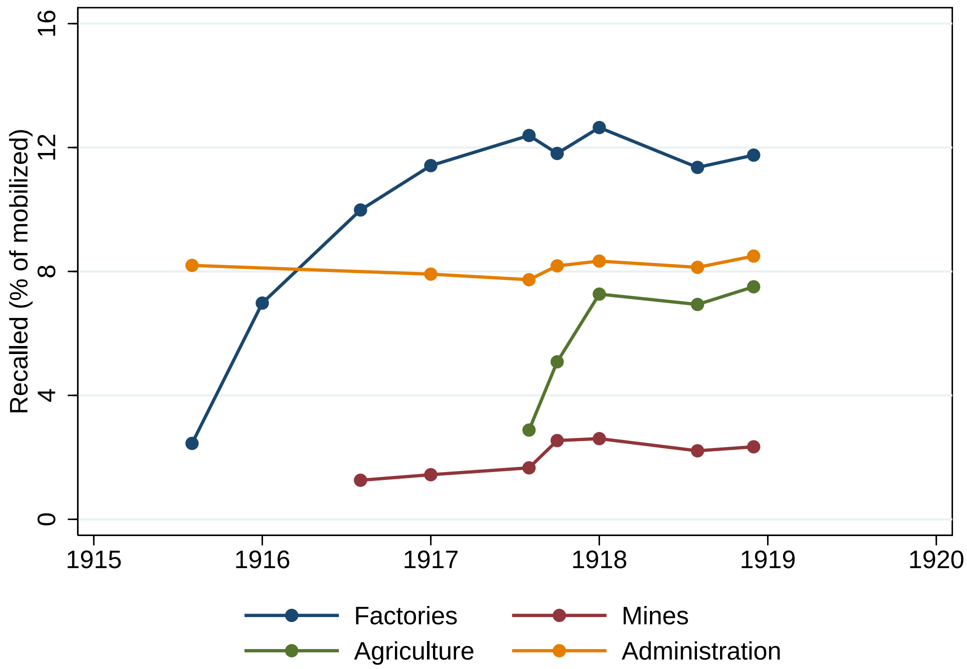


Figure A.1: Shares of Recalled Active Soldiers

Notes. This figure displays the share of soldiers that were recalled from the front lines during the war. *Mines* includes navigation. *Administrations* includes railway transportations. *Agriculture* does not include soldiers on agricultural leaves. See Appendix Table A.2 for more details. Data are from Fontaine (1924, p. 61).

A.2 Appendix Tables

Table A.1
Length of Military Service by Military Law

	Law of 1872	Law of 1889	Law of 1905	Law of 1913
Active army	5	3	2	3
Reserve of active army	4	7	11	11
Territorial army	5	6	6	7
Reserve of territorial army	6	9	6	7
Total length of service	20	25	25	28

Notes. This table reports the length of the military service in years across various military laws. The data are from Crepin (2013).

Table A.2
Soldiers Mobilized Outside of Armed Services

Date		Mobilized outside of armed services (thousand)					
		War factories	Mines	Administrations	Agriculture	Total	Mobilized
Aug.	1914			408			3,781
July	1915	122					4,978
Jan.	1916	339					4,857
July	1916	467	59				4,677
Jan.	1917	515	65	357			4,511
July	1917	559	75	349	130	1,113	4,512
Sep.	1917	511	110	354	220	1,195	4,327
Jan.	1918	534	110	352	307	1,303	4,223
July	1918	493	96	353	301	1,243	4,340
Nov.	1918	487	97	352	311	1,247	4,143

Notes. Mines includes navigation. *Administrations* includes railway transportations. *Agriculture* does not include soldiers on agricultural leaves. No data when left blank. Data are from Fontaine (1924, p. 61).

Table A.3
Military Death Rates and Département Characteristics (Detailed Estimates)

Dependent variable: military death rate							
A. Demographic		B.1. Economic		B.2. Economic		C. Other	
Variable	Estimate	Variable	Estimate	Variable	Estimate	Variable	Estimate
Population (thousands)	-0.00***	FLFP (%)	-0.15***	Personal wealth	-0.00***	Distance to war (km)	0.00*
	[0.00]		[0.05]		[0.00]		[0.00]
Population density (per km^2)	-0.00***	Share in industry (%)	-0.22***	Banking deposits	-0.19***	Share in religious schools (%)	-0.05
	[0.00]		[0.03]		[0.07]		[0.15]
Share rural population (%)	0.18***	Share in agriculture (%)	0.19***	Direct taxes	-0.27***	Vote in 1905 (%)	-0.02
	[0.02]		[0.02]		[0.04]		[0.01]
Share born in département (%)	0.26***	Road density (km per km^2)	-0.00	Share read and write (%)	-0.17***	Turnout in 1914 (%)	0.10
	[0.03]		[0.00]		[0.04]		[0.09]
Age	-0.12	Rail density (km per km^2)	-0.57***	Share primary education (%)	-0.09***		
	[0.21]		[0.16]		[0.03]		
Height (cm)	-1.10***	Share cultivared land (%)	0.03				
	[0.30]		[0.03]				

Notes. Each cell in this table reports the OLS coefficients from estimating separately regressions of the form $\texttt{death\_rate}_d = \alpha + \beta\, \mathbf{X}_d + \varepsilon_d$, where $\mathbf{X}_d$ is a département characteristic in 1911. Each regression contains 87 départements. The dependent variable is military death rate. *FLFP* is female labor force participation. Robust standard errors are in brackets. *** Significant at the 1% level. * Significant at the 10% level.

A.3 The Mémoire des Hommes Archive

I assembled a novel dataset to build a precise measure of military death rates at the département level. To that end, I collected data for the 1.3 million French soldiers who died as a result of the war from the *Mémoire des Hommes* (MDH) archive made available by the French Ministry of Defense.[1] This archive contains information about soldiers who received the mention "Mort pour la France" ("Died for France"), and those who did not. The mention "Mort pour la France" was given to all soldiers who died because of the war, except to those who died following an execution by the French military due to treason, desertion, or mutiny. This mention was created by the law of July 2nd, 1915. The first article of this law stipulates that "*[t]he death certificate of a servicemen of the army or the navy killed in combat or dead from injuries or a disease sustained on the battle field [...] shall [...] contain the mention: 'Died for France'.*"[2] I collected the records of all the soldiers in the MDH archive and extracted first name, last name, date of birth, département of birth, and département of recruitment. I then excluded soldiers born outside of France, and removed duplicate records.[3] An example of a military record is displayed in Appendix Figure A.2.

Other papers also use a measure of military death rates as their key explanatory variable. For instance, Abramitzky, Delavande and Vasconcelos (2011) and Vandenbroucke (2014) use a measure from Huber (1931, p. 426) that varies across 22 military regions.[4] My measure has several advantages over the one in Huber (1931). First, it is based on individual-level information rather than on information aggregated at the regional level. Second, the information in Huber (1931) is based on a military report to the Assemblée Nationale in

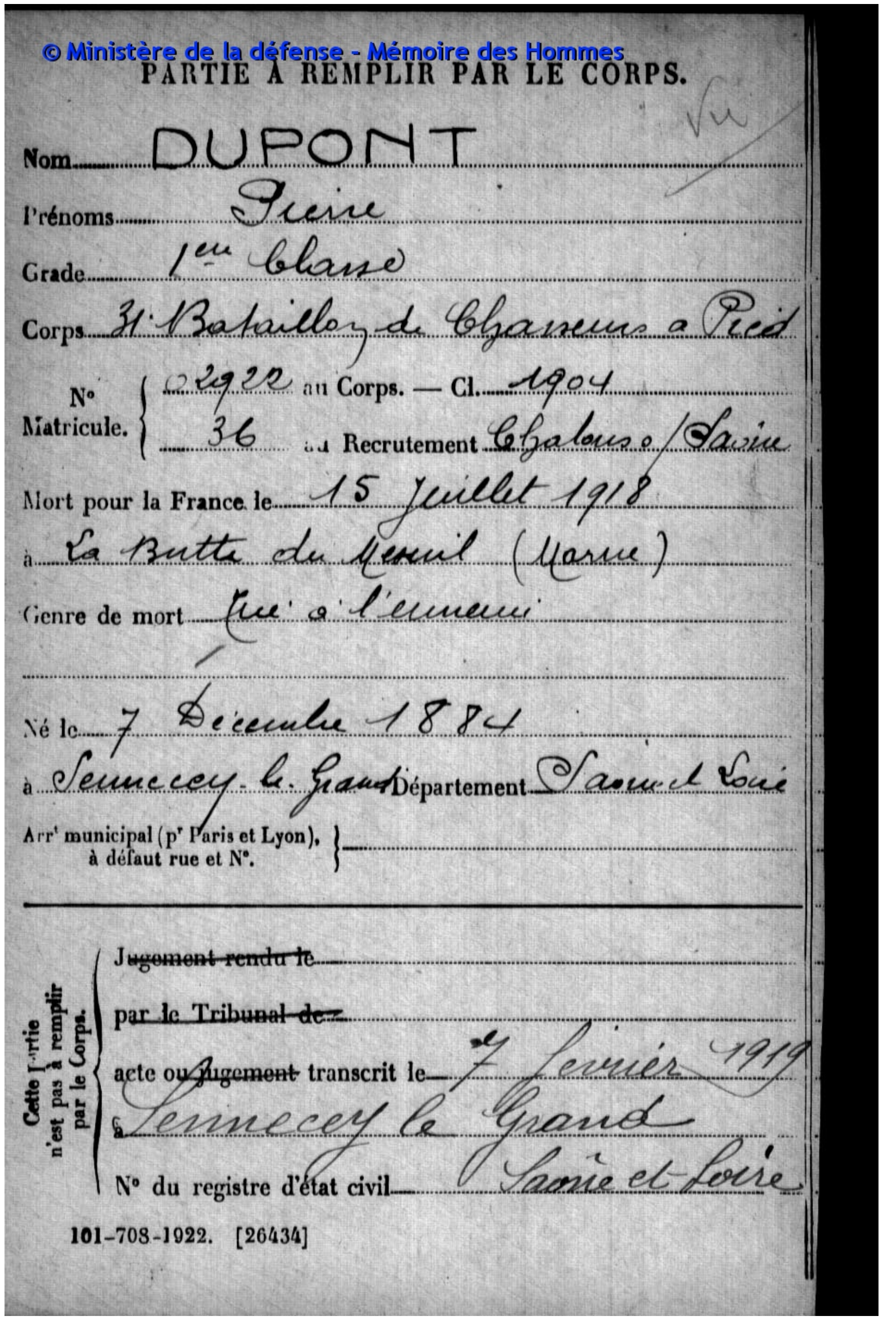
1. The archive is accessible at http://www.memoiredeshommes.sga.defense.gouv.fr.

2. The original text is from the *Journal Officiel de la République Française, Lois et Décrets*, *47* (184), p. 4653, dated July 9th, 1915.

3. Officers were more likely to have duplicate records. I also included the 95,000 soldiers who died without the mention "Mort pour la France".

4. Gilles, Guironnet and Parent (2014) also use the MDH database to study the geography of military fatalities in France.

1920 (Marin, 1920), which purpose was to assess funding for financial assistance to war widows. The data in this report were themselves based on estimates made in early 1919. The accuracy of these estimates has been largely challenged by historians as providing an account of military fatalities was extremely difficult given of the disorganization of the army at the end of the war (Prost, 2008). Finally, the dataset I constructed enables to compute military death rates for each of the 87 départements, instead of assigning a military death rate from 22 military regions to each département.



PARTIE À REMPLIR PAR LE CORPS.

Vu

Nom DUPONT

Prénoms Pierre

Grade 1re classe

Corps 31e Bataillon de Chasseurs à Pied

N° Matricule. { 02922 au Corps. — Cl. 1904
36 au Recrutement Chalons s/ Saône

Mort pour la France le 15 juillet 1918

à La Butte du Mesnil (Marne)

Genre de mort Tué à l'ennemi

Né le 7 Décembre 1884

à Sennecey-le-Grand Département Saône et Loire

Arr^t municipal (p^r Paris et Lyon), à défaut rue et N°.

Cette partie n'est pas à remplir par le Corps.

~~Jugement rendu le~~

par ~~le Tribunal de~~

acte ou ~~jugement~~ transcrit le 7 février 1919

à Sennecey le Grand

N° du registre d'état civil Saône et Loire

101-708-1922. [26434]

Figure A.2: Military Record from the MDH Archive

Notes. Military record from the Mémoire des Hommes archive made available by the Ministry of Defense.

A.4 Military Death Rates and Pre-War Migration Patterns

The number of military fatalities in a département is determined using soldiers' départements of birth. Pre-war migration patterns could introduce some bias in this measure as 19% of the men subject to the conscription during the war were living outside their département of birth in 1911—see Table A.4, which reports summary statistics for the share of men born outside their residence département in 1911 across various age groups.[5] This could be problematic if men born in rural départements systematically migrated to urban départements. In this case, military death rates in urban départements would be understated and those in rural départements, overstated.

Table A.4
Shares of Men Born Outside Their Département of Residence

Age group	Mean	S.d.	Min	Max
15–19	15.2	7.5	2.7	45.2
20–24	*17.9*	*9.2*	*3.6*	*56.8*
25–29	20.8	10.4	5.6	61.0
30–34	20.9	10.9	4.7	63.3
35–39	20.7	11.0	4.0	64.1
40–44	20.3	11.2	2.3	64.7
15–44	19.2	9.9	3.7	58.7

Notes. Summary satistics for 87 départements in 1911. Shares are in percents. The figure for the age group 20–24 is relative to women (see footnote 5).

Using the censuses to assess the intensity of internal migrations is restrictive because they only allow to observe individuals at one point in time. To have a more meaningful picture of internal migration flows, Kesztenbaum (2014) collected a random sample of military records for 2,600 soldiers. For each soldier, these military records provide all the locations he resided

5. The figure for the male age group 20–24 (36.2%) is highly overstated in the census because it does not correct for men in military barracks during their military service. Instead, I use the data for women in this age group as migration rates for men and women were similar: the share of women residing outside their département of birth was 20.6% for the age group 25–29 against 20.8% for men; 20.8% for the age group 30–34 against 20.9% for men; 20.3% for the age group 35–39 against 20.7% for men; and 20.1% for the age group 40–44 against 20.3% for men.

in from his entrance to his dismissal from the army. In this sample, 62% of soldiers had migrated at least once to another département in their lifetime. Among the men who migrated at least once, two third migrated further than 20 kilometers from their city of birth. Moreover, two third migrated to an urban département (Kesztenbaum, 2014, p. 26). About a quarter eventually came back to their département of birth, with an average time of 6 years between both movements (Kesztenbaum, 2014, p. 30). Overall, this study shows that census data—or birth, marriage, and death certificates—overstate the intensity of internal migration flows in France.[6]

A.4.1 Correct for Pre-War Migration Patterns

I use the census of 1911 to construct a measure of military death rate which takes into account bilateral migration flows between départements. For each département, the census provides the number of residents that were born in each of the other départements.[7] This information is not available by age group, so I implicitly assume that all age groups migrate at similar rates. The computation proceeds in three steps. Throughout, i indexes the département of residence, and j, the département of birth:

1. For each département, I compute the share of men born in département i that migrated to département j. Denote this share $\texttt{share}_{ij}$, where $\sum_{j=1}^{87} \texttt{share}_{ij} = 100$, $\forall i \in \{1, \ldots, 87\}$.

2. I then compute the number of soldiers born in département j that need to be reallocated to département i: $\texttt{fatalities}_j \times \texttt{share}_{ij}$, where $\texttt{fatalities}_j$ is the number of military fatalities born in département j.

6. Kesztenbaum (2014) assesses that these conventional sources only allow to observe a third of the migrations flows he identifies using military records. See also Tugault (1970) and White (1989) for more details on internal migrations in France in the early twentieth century.

7. Such detailed information on migration patterns is only available in the censuses of 1901, 1911, and 1941.

3. Finally, I aggregate military fatalities for each département i:
$\widehat{\text{fatalities}}_i = \sum_{j=1}^{87} \texttt{fatalities}_j \times \texttt{share}_{ij}$.

I report summary statistics for both measures in Table A.5. Correcting for pre-war migration flows slightly decreases the average and variance of military death rates. Nevertheless, both measures are highly correlated—the correlation coefficient is 0.93.

Table A.5
Two Measures of Military Death Rates

	Mean	S.d.	Min	Max
Military death rate (uncorrected)	15.6	3.8	6.0	28.6
Military death rate (corrected)	14.6	2.1	8.1	19.8

Notes. This table reports summary statistics for two measures of military death rates across 87 départements: the raw measure, and the measure corrected for pre-war migration flows.

In Table A.6, I report selected coefficients from regressing these measures of military death rates on pre-war characteristics. As with the uncorrected measure, the corrected measure is not correlated with pre-war female labor force participation rates. Moreover, accounting for bilateral migration flows purges military death rates from some the correlation with rurality—the coefficient on the share of the population born in the département is not significant in column 6. Furthermore, rurality now explains 61% of the variation in military death rates, suggesting that 13% of that variation was due to pre-war migration flows. I nevertheless show in chapters 2 and 3 that the results of the analysis are similar when using the measure of military death rates corrected for pre-war migration patterns rather than the uncorrected measure.

A.4.2 Use Départements of Recruitment

The military records used to compute military death rates contain the location of recruitment of each soldier, which corresponds to their location of residence at age 20. This information

Table A.6
Two Measures of Military Death Rates and Département Characteristics

Dependent variable	Military death rate					
	Uncorrected			Corrected		
	(1)	(2)	(3)	(4)	(5)	(6)
Share rural population		0.12***	0.12***		0.07***	0.08***
		[0.02]	[0.01]		[0.01]	[0.01]
Share born in département		0.13***	0.12***		0.08***	0.03
		[0.03]	[0.03]		[0.02]	[0.03]
Female labor force participation rate	-0.09	-0.02		-0.03	0.02	
	[0.06]	[0.04]		[0.04]	[0.02]	
Share girls aged 5–19 in school	0.13	0.09		0.06	-0.00	
	[0.08]	[0.07]		[0.05]	[0.04]	
Total fertility rate	0.00***	0.00*		0.00***	0.00*	
	[0.00]	[0.00]		[0.00]	[0.00]	
Personal wealth (thousand francs)	-0.00	0.00**		-0.00	0.00***	
	[0.00]	[0.00]		[0.00]	[0.00]	
Other demographic characteristics	No	Yes	No	No	Yes	No
Other economic characteristics	No	Yes	No	No	Yes	No
Départements	87	87	87	87	87	87
R^2	0.350	0.800	0.739	0.156	0.773	0.611

Notes. This table reports the OLS coefficients from regressing military death rates on various pre-war département characteristics. The mesure of military death rates is uncorrected in columns 1–3, and corrected for pre-war migration flows in columns 4–5. The *other demographic* and *economic* characteristics are 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. See Appendix D for details about variables sources and definitions. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

could in principle be used to build a measure that corrects for unobserved patterns of migration between birth date and recruitment date. However, such a measure is contaminated with measurement error because the geography of military recruitment did not overlap with département boundaries. Summary statistics already hint at this issue: while the measure of military death rates based on départements of birth ranges from 6% to 29%, the one based on départements of recruitment ranges from 0.2% to 37%. Such a range in military death rates is not plausible.

The Geography of Military Recruitment In August 1874, after the Franco-Prussian War of 1870, the geography of military recruitment was reorganized. Nineteen military regions were created, and each military region was further divided into eight subdivisions. These 144 subdivisions represent the relevant constituencies of military recruitment. Because each subdivision had to count a similar number of recruits, they were not created along the lines of départements but along the lines of electoral constituencies—*arrondissements* and *cantons*—which were created following population criteria. Each subdivision of military region had one recruitment bureau that was managing the recruitment process of young men residing within the boundaries of the subdivision. The geography of military recruitment created in 1874 underwent six minor modifications through 1914.[8] The geography most relevant to soldiers who fought during WWI was in place from September 1899 to September 1913. Figure A.3 displays this geography of military recruitment.

Given that subdivisions of military regions were drawn independently from département boundaries, there is little overlap between the two. Therefore, using soldiers' recruitment bureaus as a measure of their départements of residence either overstates or understates département-level military death rates. The subsequent examples explore these two types of measurement errors in more details.

Example 1: Département of Belfort Suppose that a subdivision of military region overlaps several départements. Figure A.4 displays the case of the subdivision of Belfort, which contains the département of Belfort and extends into two other départements—Doubs and Haute-Saône. Because the recruitment bureau of this subdivision is located in the city of Belfort, which is inside the département of Belfort, a soldier residing in the départements of Doubs or Haute-Saône but inside the subdivision of Belfort would be recruited by the bureau of Belfort. Using a soldier's recruitment bureau to assign his département of residence would in this case erroneously assign him to the département of Belfort, dramatically overstating the military death rate of the département of Belfort. Indeed, while the military death rate

8. These modifications occurred in January 1892, December 1897, February 1898, September 1899, September 1913, and December 1913. Boulanger (2001) provides a detailed account of the evolutions of this geography.

Figure A.3: The Geography of Military Recruitment

Notes. This map represents the geography of military recruitment that was in place from September 1899 to September 1913. Bold lines indicate military regions, and thin lines, subdivisions of military regions. The regions of Paris and Lyon had specific arrangements that are not represented on this map. Appendix D provides details about the primary sources used to generate this map.

of this département is 6% when using the département of birth, it rises to 31% when using the recruitment bureau.

Example 2: Département of Ardèche Suppose now that a département is not fully contained inside a subdivision of military region. Figure A.5 displays the case of the département of Ardèche, which is composed by two subdivisions, one of which extends into another département along with its recruitment bureau—here, the recruitment bureau of Pont-Saint-Esprit. Because this recruitment bureau is located outside the département of Ardèche, a soldier residing inside the département of Ardèche and inside the subdivision of Pont-Saint-Esprit would be recruited by the bureau of Pont-Saint-Esprit. Using a soldier's recruitment bureau to assign his département of residence would in this case erroneously

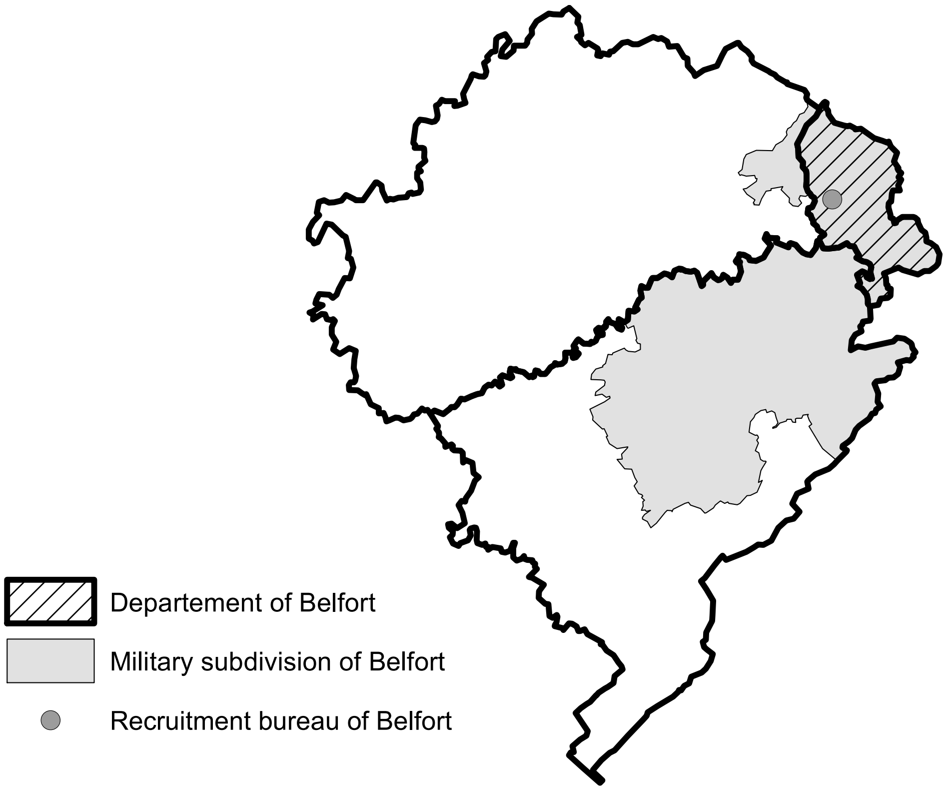


Figure A.4: Military Subdivisions of the Département of Belfort

assign him to another département, dramatically understating the military death rate of the département of Ardèche. Indeed, while the military death rate of this département is 21% when using the département of birth, it decreases to 13% when using the recruitment bureau.

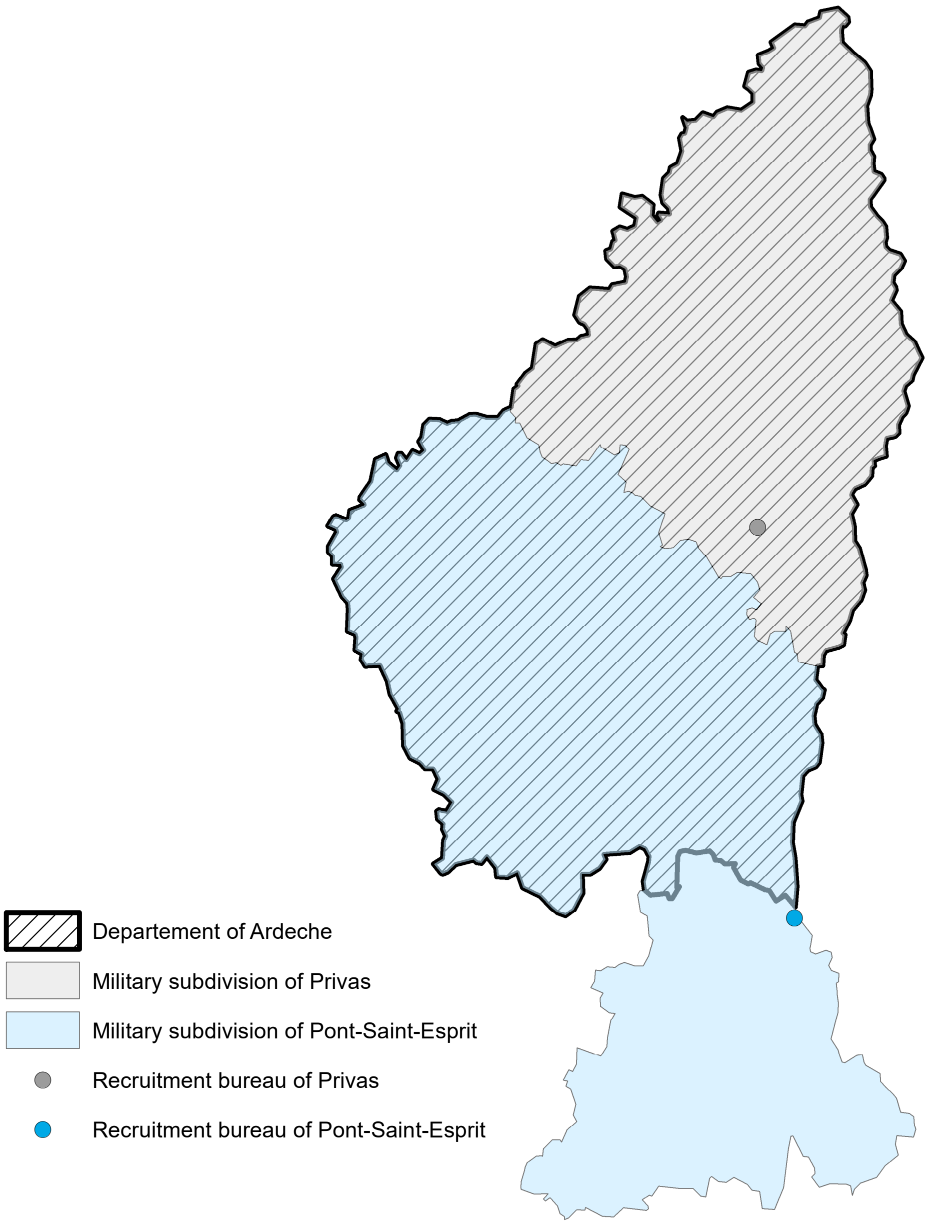


Figure A.5: Military Subdivisions of the Département of Ardèche

A.5 Enlistment Rates and Pre-War Health Conditions

Using the male population aged 15 to 44 in 1911 may not adequately capture the pool of drafted men as not all men subject to military conscription were enlisted in the army—78.5% of the men aged 20 to 48 were enlisted at the beginning of the war (Huber, 1931, p. 93). The reminder of this age group was not enlisted, mostly due to poor health conditions. Given that health conditions partially determine a soldier's ability on the battle field, départements with worse pre-war health conditions could have experienced higher military death rates. If this were the case, and if these differences in pre-war health conditions could not be controlled for, part of the effect of military fatalities on female labor force participation could be attributable to pre-war health rather than to military death rates per se.

To deal with this issue, I explore the sources of variation in enlistment rates across départements, and analyze whether they are correlated with military death rates. I find that départements with lower enlistment rates were those with adverse pre-war health conditions. Nevertheless, I show that differences in recruitment rates across départements are fully captured by measures of rurality.

A.5.1 Differences in Enlistment Rates Across Départements

I first analyze the sources of variations in enlistment rates across départements. Data for enlistment rates at the département level are available separately for each age class for their year of recruitment. As a result, it is only possible to learn about the enlistment rate of a cohort at age 20. To have a good approximation of the pre-war health environment, and to avoid any contamination resulting from the anticipation of the war by the military command, I consider age classes from 1905 to 1911.[9] Reports of the recruitment of these age classes provide a "recruitment list" in which the conscripts are classified into to eight categories.

9. Boulanger (2001) shows that the military command required recruitment bureaus to increase the size of the active army as the war was becoming more likely, effectively increasing the proportion of enlisted men at the onset of the war.

Three of these categories either exempt or classify potential recruits into auxiliary services because of their poor health conditions.[10] Those who were exempted for reasons unrelated to health—for instance, to finish medical school—were to be recalled later by the army. I provide summary statistics for the classification of several age classes in Table A.7. 20–25% of each age class was not enlisted in the army because of poor health conditions.

Table A.7
Enlistment Rates of Various Age Classes

	Age Classes					
	1905	1907	1908	1909	1910	1911
Enlisted in armed forces (%)	66.3	66.1	68.9	69.6	69.6	71.0
	(4.9)	(4.1)	(4.9)	(6.0)	(4.6)	(5.7)
Not incorporated in armed forces for health reasons (%)	24.3	25.2	22.8	22.2	22.0	20.8
	(3.6)	(3.7)	(3.5)	(4.6)	(3.2)	(4.1)
Incorporation adjourned (%)	9.4	8.7	8.3	8.3	8.5	8.1
	(3.4)	(3.4)	(3.8)	(5.6)	(3.8)	(5.4)
Départements	87	87	87	87	87	87

Notes. Averages across 87 départements. The data are missing for the class of 1906. Standard deviations are in parenthesis. See Appendix D for details about variables sources and definitions.

I now explore whether these differences in enlistment rates are related to pre-war health conditions. I use two measures of pre-war health conditions at the département level: the mortality rate, defined as the ratio of the number of deaths of individuals younger than 65 to the population younger than 65, and the height of conscripts of the relevant age class. For instance, when I analyze the relationship between health measures and enlistment rates for the class of 1905, I use the height of conscripts of the class of 1905. I show in Table A.8 that départements in which conscripts were shorter also had lower enlistment rates on

10. Details of these categories relevant for the recruitment of the class of 1911 are provided by paragraphs 2, 3, and 4 of article 18 of the law of March 21st, 1905 (*Journal Officiel de la République Française, Lois et Décrets*, *37* (81), pp. 1870–1881, dated March 23rd, 1905). More specifically, this article stipulates that "[f]rom the point of view of physical abilities, the revision council classifies youngsters into four categories: [...] 2—Those who, suffering from a relative disability without their general constitution to be doubtful, are recognized fit for the auxiliary service; 3—Those who, being of a too weak physical constitution, are adjourned until a new examination; 4—Those whose general constitution is bad or determine a partial or total functional disability are exempted of any military service, either armed or auxiliary."

health grounds. Moreover, départements with higher levels of mortality also display lower enlistment rates on health grounds. These results imply that variations in enlistment rates were correlated with pre-war health conditions.

Table A.8
Enlistment Rates and Pre-War Health Conditions

Dependent variable	Non-Enlistment Rate					
Age class	1905	1907	1908	1909	1910	1911
Height (cm)	-1.72***	-1.26***	-1.44***	-1.05**	-0.64**	-0.38
	[0.36]	[0.33]	[0.32]	[0.49]	[0.29]	[1.70]
Mortality rate (%)	3.67**	3.50*	3.70**	2.32	3.83**	5.05**
	[1.70]	[1.85]	[1.68]	[2.35]	[1.53]	[1.97]
Départements	87	87	87	87	87	87
R^2	0.304	0.175	0.235	0.073	0.112	0.079

Notes. The dependent variable is the non-enlistment rate on health grounds of a given age class, i.e., 1− enlistment rate. *Height* is the average height of the relevant age class when recruited. For instance, the specification in column 1 is: $\texttt{unincorporation}_{\texttt{class 1905},d} = \alpha + \beta\, \texttt{height}_{\texttt{class 1905},d} + \gamma\, \texttt{mortality}_d + \varepsilon_d$. Robust standard errors are in brackets. See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

A.5.2 Enlistment Rates and Military Death Rates

With this in mind, I analyze the relationship between enlistment rates and military death rates. The first six odd columns of Table A.9 show that départements with lower enlistment rates had higher military death rates, suggesting that pre-war health characteristics were correlated with military death rates. Nevertheless, rurality captures most of the variations in pre-war health conditions across départements. Controlling for measures of rurality is therefore sufficient to alleviate the potential problem posed by uneven enlistment rates across départements.

A.5.3 The Spanish Flu

The Spanish flu is unlikely to have been a significant contributor to military fatalities in France. While it killed 20–40 million people worldwide in 1918 and 1919, it affected France much less than other countries. Guenel (2004) reports that 125,000–250,000 civilians died because of the disease. In the army, it affected about 400,000 men, with 30,000 deaths. This is unlikely to bias the measure of military death rates because of the small magnitude of the epidemics compared to military fatalities during the war. Moreover, the pattern of diffusion of the disease was not correlated with the distribution of military death rates as it spread mostly along coastal areas and in large cities.

Table A.9
Military Death Rates and Enlistment Rates

Dependent variable	Military Death Rate													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Non-enlistment rate of														
Class 1905	0.29***	0.06											0.23	0.05
	[0.08]	[0.05]											[0.19]	[0.13]
Class 1907			0.20**	0.04									-0.09	-0.04
			[0.08]	[0.04]									[0.28]	[0.15]
Class 1908					0.27***	0.07							0.42	0.14
					[0.09]	[0.05]							[0.25]	[0.15]
Class 1909							0.06	0.02					-0.03	-0.02
							[0.08]	[0.04]					[0.10]	[0.06]
Class 1910									0.12	0.02			-0.27	-0.14
									[0.11]	[0.06]			[0.28]	[0.16]
Class 1911											0.02	0.04	-0.06	0.06
											[0.09]	[0.04]	[0.12]	[0.05]
Rural		0.12***		0.12***		0.12***		0.12***		0.12***		0.12***		0.12***
		[0.01]		[0.01]		[0.01]		[0.01]		[0.01]		[0.01]		[0.01]
Born in dép.		0.11***		0.12***		0.12***		0.12***		0.12***		0.12***		0.11***
		[0.03]		[0.03]		[0.03]		[0.03]		[0.03]		[0.03]		[0.04]
Départements	87	87	87	87	87	87	87	87	87	87	87	87	87	87
R^2	0.074	0.748	0.039	0.747	0.061	0.748	0.006	0.746	0.010	0.745	0.001	0.747	0.109	0.753

Notes The dependent variable is military death rate. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level.

APPENDIX B

APPENDIX TO CHAPTER 2

B.1 Appendix Figures

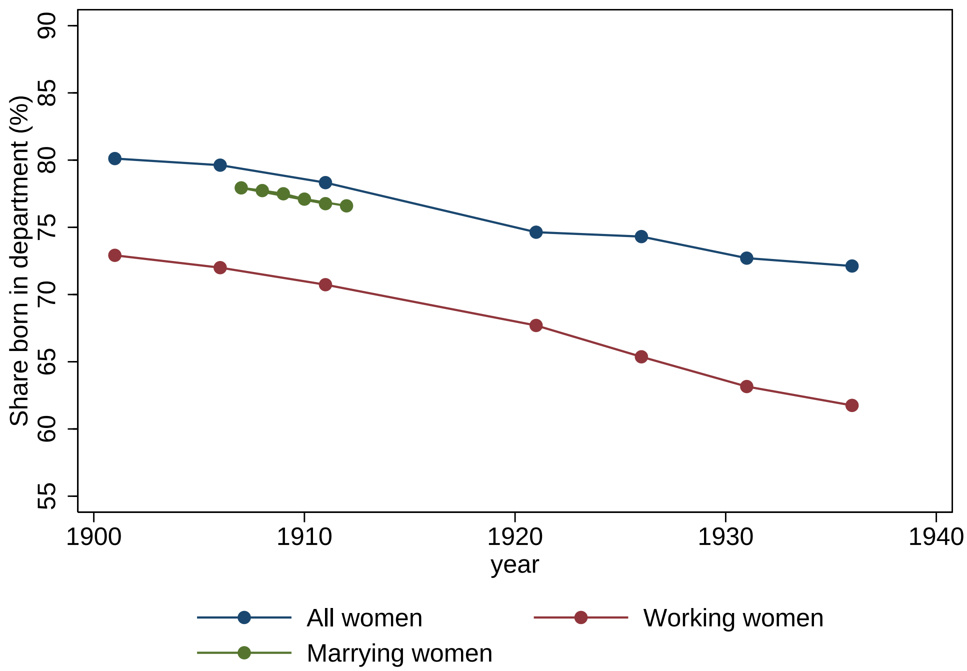


Figure B.1: Share of Women Born in their Département of Residence

Notes. This figure displays the shares of women born in their département of residence for all women, working women, and women at the time of marriage. See Appendix D for details about variables sources and definitions.

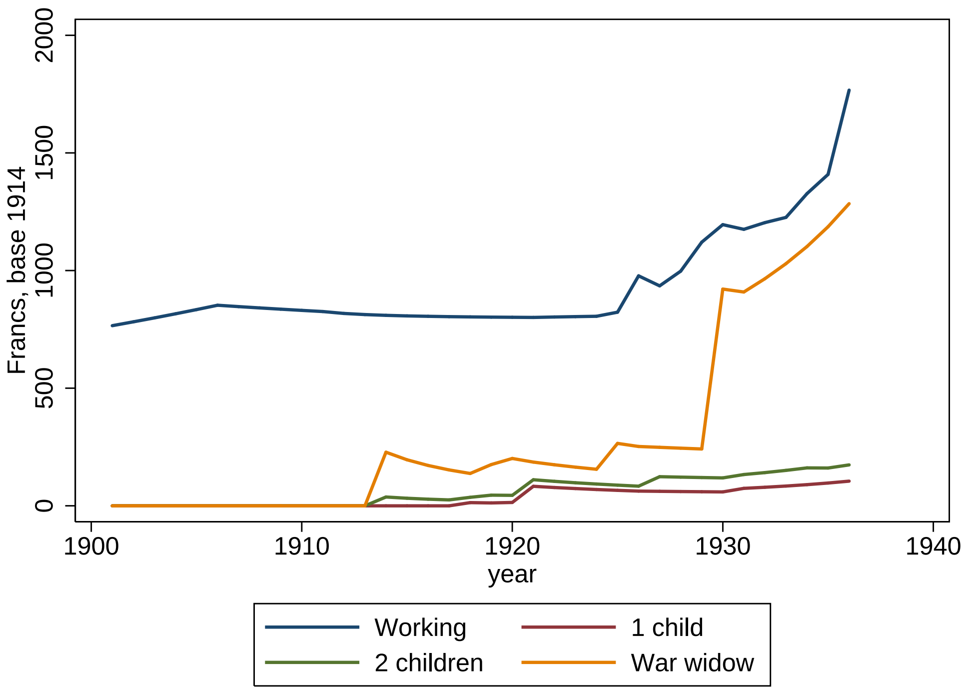


Figure B.2: Simulated Women's Real Income

Notes. This figure displays simulated real incomes of women according to their marital and labor statuses. Incomes of non-working women are simulated following social security and widows benefits laws passed from 1914 to 1936. See Appendix D for details about variables sources and definitions.

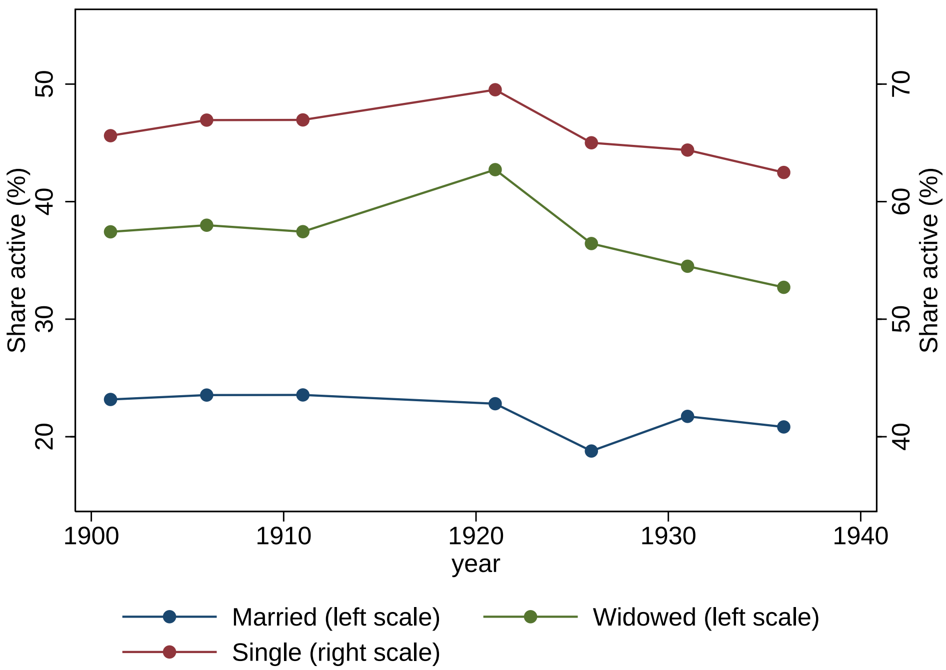


Figure B.3: Female Labor Force Participation Rates by Marital Status

Notes. The labor force participation rate of a given marital status is defined as the share of the population aged 15 and above of that marital status that has an occupation. Labor force participation rates of married and widowed women are measured on the left axis. Labor force participation rates of single women are measured on the right axis. See Appendix D for details about variables sources and definitions.

B.2 Appendix Tables

Table B.2
The Impact of WWI Military Fatalities on MLFP

Dependent variable	Male Labor Force Participation			
	(1)	(2)	(3)	(4)
Military death rate × post	0.05	-0.01	0.04	-0.01
	[0.09]	[0.07]	[0.08]	[0.06]
Rural	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	609	609	609	609
Départements	87	87	87	87
Within R^2	0.636	0.669	0.656	0.675
1911 mean	93.2	93.2	93.2	93.2

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is male labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.

Table B.1
Summary Statistics, Labor Force Participation Rates

	1901		1906		1911		1921		1926		1931		1936	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
LFP (net of farm owners)		32.9		32.7		31.4		35.0		29.9		30.1		28.1
		(8.7)		(9.0)		(8.9)		(8.3)		(7.8)		(7.3)		(6.7)
LFP	92.7	45.0	92.8	51.9	93.2	51.5	93.6	55.7	91.6	49.6	90.1	49.4	88.3	47.0
	(3.0)	(10.5)	(3.2)	(8.5)	(2.9)	(8.5)	(3.6)	(10.3)	(4.1)	(9.4)	(3.9)	(9.0)	(4.2)	(8.9)
Agriculture	50.9	46.5	50.4	52.3	48.8	51.5	49.6	55.8	47.0	53.6	44.7	51.1	44.6	50.7
	(14.7)	(17.3)	(15.1)	(16.9)	(15.5)	(17.4)	(17.2)	(17.6)	(16.8)	(17.7)	(16.5)	(17.6)	(16.2)	(17.3)
Industry	30.6	30.3	30.7	27.6	31.5	27.7	33.5	23.8	35.9	24.4	36.9	24.1	34.7	21.9
	(10.6)	(12.8)	(10.7)	(12.2)	(11.2)	(12.5)	(13.1)	(11.7)	(13.3)	(11.9)	(12.9)	(11.6)	(11.7)	(10.4)
Commerce	7.0	8.9	7.5	8.5	7.0	9.0	7.4	9.4	8.2	10.2	8.7	12.1	9.5	13.2
	(3.4)	(2.8)	(3.7)	(2.8)	(3.2)	(3.0)	(3.5)	(3.7)	(3.6)	(4.0)	(3.6)	(4.3)	(3.7)	(4.5)
Liberal professions	10.3	4.5	10.3	3.6	11.7	3.9	8.8	5.0	8.2	5.4	9.0	6.1	10.5	7.2
	(4.4)	(1.5)	(4.6)	(0.9)	(5.1)	(1.0)	(3.3)	(1.5)	(2.8)	(1.5)	(3.4)	(1.7)	(4.3)	(2.1)
Domestic services	1.1	9.8	1.1	8.0	1.0	8.0	0.7	6.0	0.7	6.4	0.7	6.6	0.6	7.0
	(0.6)	(3.8)	(0.7)	(3.7)	(0.5)	(3.4)	(0.5)	(3.0)	(0.5)	(3.2)	(0.6)	(3.2)	(0.5)	(3.1)

Notes. This table reports summary statistics for male and female labor force participation rates by sector across 87 départements. *M* denotes men, *F*, women, and *LFP*, labor force participation rates in percents. Standard deviations are in parenthesis. Shares in each sector is defined as the share of the active population working in that sector.

Table B.3
Regression Weights and Département Characteristics

Dependent variable	Regression Weights				
	(1)	(2)	(3)	(4)	(5)
Military death rate	-0.06				
	[0.17]				
FLFP		-0.01			
		[0.04]			
Rural			-0.04**		-0.02
			[0.02]		[0.02]
Born in dép.				-0.07**	-0.04*
				[0.03]	[0.03]
Départements	87	87	87	87	87
R^2	0.011	0.002	0.128	0.137	0.149

Notes. The dependent variable is the regression weight, constructed following Aronow and Samii (2016). To build regression weights, I first extract residuals from estimating the following specification, which mirrors specification 2.1: $\texttt{death\_rate}_d \times \texttt{post}_t = \boldsymbol{\theta}' \, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_t + \varepsilon_{d,t}$, where $\texttt{death\_rate}_d$ is the military death rate in département d during the war, $\texttt{post}_t$ is an indicator variable equal to 1 if $t > 1918$, $\boldsymbol{\gamma}_d$ are département fixed effects, $\boldsymbol{\delta}_t$ are time fixed effects, and $\mathbf{X}_{d,t}$ is a vector containing the share of rural population and the share of the residing population born in the département. Then, I compute the relative size of the residuals squared for each département. The resulting regression weights, w_d, are such that $w_d \in [0, 1]$ and $\sum_d w_d = 1$. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Robust standard errors are in brackets.

** Significant at the 5% level. * Significant at the 10% level.

Table B.4
The Impact of WWI Military Fatalities on FLFP
(Year-Specific Estimates)

Dependent variable	Female Labor Force Participation			
	(1)	(2)	(3)	(4)
Military death rate × 1901	0.09	0.10	0.09	0.09
	[0.06]	[0.06]	[0.06]	[0.07]
Military death rate × 1906	0.04	0.04	0.03	0.03
	[0.04]	[0.04]	[0.04]	[0.05]
Military death rate × 1921	0.43***	0.43***	0.44***	0.43***
	[0.10]	[0.10]	[0.10]	[0.10]
Military death rate × 1926	0.38***	0.36***	0.37***	0.35***
	[0.09]	[0.09]	[0.09]	[0.09]
Military death rate × 1931	0.40***	0.38***	0.40***	0.38***
	[0.10]	[0.09]	[0.10]	[0.09]
Military death rate × 1936	0.44***	0.43***	0.44***	0.41***
	[0.09]	[0.08]	[0.09]	[0.08]
Rural	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	609	609	609	609
Départements	87	87	87	87
Within R^2	0.580	0.581	0.580	0.583

Notes. This table reports the OLS coefficients from estimating specification 2.2. The dependent variable is female labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.

*** Significant at the 1% level.

Table B.5
Alternative Measure of Military Death Rates

Dependent variable	Female Labor Force Participation							
	A. Original measure				B. Alternative measure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.37***	0.35***	0.37***	0.35***	0.59***	0.56***	0.59***	0.55***
	[0.08]	[0.07]	[0.07]	[0.07]	[0.12]	[0.14]	[0.12]	[0.13]
Corrected death rate	No	No	No	No	Yes	Yes	Yes	Yes
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609	609	609
Départements	87	87	87	87	87	87	87	87
Within R^2	0.578	0.579	0.579	0.581	0.566	0.568	0.566	0.569
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation. The military death rate measure is the standard measure in panel A, and the one corrected for pre-war migration flows in panel B. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level. *** Significant at the 1% level.

Table B.6
Adjusting Standard Errors for Spatial Correlation

Dependent variable	Female Labor Force Participation					
	A. Clusters			B. Spatial cutoff		
	Dép.	Adm. reg.	Mil. reg.	250 km	500 km	750 km
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.35***	0.35***	0.35***	0.35***	0.35***	0.35***
	[0.07]	[0.08]	[0.07]	[0.05]	[0.06]	[0.04]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609
Départements	87	87	87	87	87	87
Clusters	87	21	22			
Within R^2	0.581	0.581	0.581	0.581	0.581	0.581
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the OLS coefficients from estimating specification 2.1. *Clusters* corresponds to standard errors that are clustered at the département level (column 1), at the administrative region level (column 2), or at the military region level (column 3). *Spatial cutoff* corresponds to standard errors that are corrected for spatial correlation up to some distance cutoff. These standard errors are computed using Hsiang's (2010) `ols_spatial_HAC` command. The dependent variable is female labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. The significance levels reported are those relevant to the specification and its degrees-of-freedom adjustment. For instance, clustering by administrative region leaves 20 degrees of freedom, meaning that the p-value is calculated using a Student distribution for the t statistics with 20 degrees of freedom. *** Significant at the 1% level.

Table B.7
Population-Weighted Regressions

Dependent variable	Female Labor Force Participation							
	A. No weights				B. Population weights			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.37***	0.35***	0.37***	0.35***	0.50***	0.49***	0.51***	0.48***
	[0.08]	[0.07]	[0.07]	[0.07]	[0.06]	[0.06]	[0.09]	[0.07]
Population weights	No	No	No	No	Yes	Yes	Yes	Yes
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609	609	609
Départements	87	87	87	87	87	87	87	87
Within R^2	0.578	0.579	0.579	0.581	0.632	0.636	0.633	0.636
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation. Population weights are used in panel B. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

Table B.8
Summary Statistics, Female Marital Status by Age Groups

	1911				1921			
Age group	15–19	20–29	30–39	40–49	15–19	20–29	30–39	40–49
Share of single women	92.1	38.9	14.6	11.2	94.2	44.2	15.5	11.3
	(3.0)	(8.0)	(3.7)	(2.9)	(2.2)	(7.3)	(4.1)	(2.8)
Share of married women	6.6	58.6	80.2	76.8	5.8	50.6	72.9	75.7
	(2.9)	(8.1)	(4.1)	(4.0)	(2.2)	(6.8)	(3.8)	(3.9)
Share of widowed women		1.0	4.0	10.8		2.7	10.0	11.6
		(0.2)	(0.7)	(1.6)		(0.8)	(1.2)	(1.6)
Share of divorced women		0.3	0.7	0.7		0.4	0.9	0.9
		(0.2)	(0.4)	(0.5)		(0.2)	(0.6)	(0.5)

Notes This table reports summary statistics for female marital status in percents across 87 départements. Standard deviations are in parenthesis. See Appendix D for details about variables sources and definitions.

Table B.9
Replication of Table 2 in Abramitzky et al. (2011)

Dependent variable	Female Marital Status (%)			
	Single	Married	Widowed	Divorced
	(1)	(2)	(3)	(4)
Age group				
15–19	0.02	-0.06**	0.00	0.00
	[0.03]	[0.02]	[0.00]	[0.00]
20–29	0.27***	-0.30***	0.01	-0.01***
	[0.05]	[0.06]	[0.02]	[0.00]
30–39	0.11***	-0.23***	0.16***	-0.03***
	[0.04]	[0.05]	[0.04]	[0.00]
40–49	0.08***	-0.17***	0.13***	-0.01***
	[0.03]	[0.04]	[0.03]	[0.00]

Notes. Each cell of this table reports the OLS coefficients from estimating specification 2.3. The dependent variables are the share of women in a given age group with a specific marital status. All regressions include 87 départements. This table partially reproduces Table 2 in Abramitzky, Delavande and Vasconcelos (2011, p. 136). The census years are 1911 and 1921. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

Table B.10
The Impact of WWI Military Fatalities on FLFP
(Drop 1906 and 1911)

Dependent variable	Female Labor Force Participation							
	A. All years				B. Drop 1906 and 1911			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.37***	0.35***	0.37***	0.35***	0.32***	0.30***	0.33***	0.30***
	[0.08]	[0.07]	[0.07]	[0.07]	[0.08]	[0.08]	[0.08]	[0.07]
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	435	435	435	435
Départements	87	87	87	87	87	87	87	87
Within R^2	0.578	0.579	0.579	0.581	0.678	0.679	0.679	0.682
1901 mean	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936 in panel A, and 1901, 1921, 1926, 1931, and 1936 in panel B. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

Table B.11
The Impact of WWI Military Fatalities on Female Marital Status (Drop 1906)

Dependent variable	A. Single (%)			B. Widow (%)		
Age group:	20–29	30–39	40–49	20–29	30–39	40–49
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.24**	0.25***	0.13***	-0.01	0.08***	0.15***
	[0.10]	[0.06]	[0.05]	[0.01]	[0.03]	[0.04]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	435	435	435	435	435	435
Départements	87	87	87	87	87	87
Within R^2	0.851	0.214	0.324	0.851	0.932	0.574
1911 mean	42.5	15.3	11.5	1.3	5.0	11.8

Notes. This table reports the OLS coefficients from estimating specification 2.3. The dependent variable is the share of single women in panel A, and the share of widowed women in panel B. *Widows* also includes divorced women. The census years are 1901, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

Table B.12
The Substitution Channel (Physical Capital and Foreign Labor)

Dependent variable	Foreign Labor	Boilers	Machines	Horse Power
	(1)	(2)	(3)	(4)
Military death rate × post	-0.11	25.55*	37.49***	-0.00
	[0.22]	[13.85]	[12.33]	[0.01]
Rural	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	261	261	261	261
Départements	87	87	87	87
Within R^2	0.468	0.083	0.189	0.195
1911 mean (levels)	35.0	1,176	937	26.55

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is the labor force participation rate of foreigners in percents column 1, the number of boilers per département in column 2, the number of machines per département in column 3, and the log total horse power per département in thousands of kW in column 4. Census years for column 1 are 1911, 1921, and 1926, and survey years for columns 2–4 are 1905, 1911, 1921, and 1926. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level. See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. * Significant at the 10% level.

Table B.13

Female Employment in Several Industries During the War

	Pre-war employment = 100												
	Aug–14	Jan–15	Jul–15	Jan–16	Jul–16	Jan–17	Jul–17	Jan–18	Jul–18	Jan–19	Jul–19	Jan–20	Oct–20
Book industry	49	57	59	64	68	75	74	77	75	81	75	90	103
Casting, excavation	40	80	152	115	198	121	201	176	335	199	154	143	186
Chemical industry	51	75	89	110	125	146	150	150	139	127	112	127	128
Clothing, fabric and feathers	37	58	64	75	79	82	87	87	90	86	85	92	89
Cutting of precious stones	32	52	60	69	70	73	75	83	75	86	80	101	108
Fine metals	18	45	55	63	70	70	75	80	84	82	102	113	107
Food industry	49	64	75	72	88	86	98	75	67	65	75	74	78
Handling and transportations	59	79	129	170	336	376	425	367	370	371	316	265	193
Leather	40	65	78	81	95	96	107	105	108	106	117	121	109
Metallurgy	43	140	300	367	569	631	768	667	636	323	244	247	238
Rubber, paper and cardboard	42	71	74	86	88	94	96	104	95	94	94	118	121
Textile industry	45	68	74	84	85	90	90	90	85	81	77	100	113
Various commerces	61	72	78	91	95	97	101	102	107	107	111	111	113
Wood industry	32	59	75	94	109	128	145	150	152	116	109	120	116
Work on stones	20	40	45	60	64	70	73	76	78	75	78	87	99
Total	43	68	80	94	105	114	121	118	113	98	92	108	113

Notes This table reports the number of women working in various industrial sectors, standardized at 100 in July 1914. See Appendix D for details about variables sources and definitions.

Table B.14
Military Death Rates, Female Labor, and Female Suffrage

Dependent variable	Military Death Rate			
	A. Female Labor		B. Female Suffrage	
	(1)	(2)	(3)	(4)
Female labor (1914–1917)	-0.01			
	[0.01]			
Share of female labor (1914–1917) (%)		-0.03		
		[0.03]		
Switch support (1914–1919)			1.48	1.13
			[1.17]	[1.28]
Conservatism (1905)				-0.02
				[0.01]
Départements	87	87	83	83
R^2	0.012	0.014	0.018	0.036

Notes. This table reports the coefficients from estimating the specification $\texttt{death\_rate}_d = \alpha + \beta\ X_d + \varepsilon_d$, where X_d is one of the three following variables: *Female labor (1914–1917)*, which is the change in female employment in the industrial sector between July 1914 and July 1917, *Share of female labor (1914–1917)*, which is the change in the share of women employed in the industrial sector between July 1914 and July 1917, and *Switch support (1914–1919)*, which is the share of representatives within a department which switched from opposing to supporting female suffrage between June 1914 and May 1919. *Conservatism (1905)* is the share of representatives within a département that supported the law separating the State and the Church in 1905. Robust standard errors are in brackets. See Appendix D for details about variables sources and definitions.

Table B.15
Alternative Mechanisms

Dependent variable	FLFP			
	(1)	(2)	(3)	(4)
Change in female labor (1914–1917) × post	-0.01	-0.01		
	[0.01]	[0.01]		
Switch support (1914–1919) × post			0.09	0.03
			[1.04]	[1.02]
Rural	No	Yes	No	Yes
Born in dép.	No	Yes	No	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	609	609	593	593
Départements	87	87	87	87
Within R^2	0.524	0.536	0.515	0.526

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation (*FLFP*). The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level. See Appendix D for details about variables sources and definitions.

Table B.16
Summary Statistics, Support and Votes for Female Suffrage

Dependent variable	Support in 1914	Vote in 1919
	(1)	(2)
Aggregation level		
Département	0.29	0.76
	(0.25)	(0.28)
	[86]	[84]
Député	0.32	0.79
	(0.47)	(0.41)
	[402]	[411]

Notes. This table reports the average support to the Dussaussoy-Buisson bill in June 1914, and for the votes on that bill in May 1919. I coded `Support in 1914` = 1 if a député supported the extension of female suffrage, and 0 if he opposed it. Similarly, I coded `Vote in 1919` = 1 if a député voted in favor of the bill, and 0 if he did not. Standard deviations are in parenthesis, and the number of units for each aggregation level are in brackets. Measures for the votes in 1919 are for only 84 départments because not all députés were present on the day of the vote. There were on average 4.6 députés per département. See Appendix D for details about variables sources and definitions.

Table B.17
Religious Conservatism and Support for Female Suffrage

Dependent variable:	Support in 1914	Vote in 1919
	(1)	(2)
Vote in 1905	0.24***	0.00
	[0.08]	[0.10]
Départements	86	84
R^2	0.099	0.000

Notes. The dependent variable is the support for the Dussaussoy-Buisson bill in 1914 in column 1, and the vote in 1919 in column 2. I coded `Vote in 1905` = 1 if a député voted in favor of the separation of the Church from the State, and 0 if he opposed it. Robust standard errors are in brackets. See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level.

B.3 Estimates by Sector of Activity

I decompose the effect of military fatalities on female labor force participation by sector of activity. I consider all sectors of activity provided in the censuses: agriculture, industry, commerce, liberal professions, and domestic services. Labor force participation in each sector is defined as the ratio of the number of women active in a given sector to the number of women aged 15 and above, so that coefficients across sectors sum up to the coefficient on female labor force participation. Women's employment shares in each sector from 1901 to 1936 are reported in Appendix Table B.1.

I replicate the baseline difference-in-differences estimates of Table 2.2 in Table B.18. The results suggest that most of the effect of military fatalities on female labor force participation stems from women entering the industrial sector and the domestic services sector.

These results may be driven by the measure of female labor force participation, which excludes female farm owners. In Table B.19, I use an alternative measure that includes female farm owners (see Appendix B.5). The results are similar except that a small effect on participation in the agricultural sector can now be identified. However, it is much smaller in magnitude than that on participation in the industrial sector and the domestic services sector: while in départements that experienced military death rates of 20% rather than 10%, female labor force participation in both sectors increased by about 20% compared to pre-war levels, it only increased by 5% in the agricultural sector.

Table B.18
The Impact of WWI Military Fatalities on FLFP by Sector of Activity

Dependent variable	Female Labor Force Participation by Sector					
Sector	All	Agriculture	Industry	Commerce	Liberal	Domestic
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.35***	0.02	0.28***	-0.03	-0.01	0.09***
	[0.07]	[0.03]	[0.05]	[0.02]	[0.01]	[0.02]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609
Départements	87	87	87	87	87	87
Within R^2	0.581	0.668	0.616	0.809	0.908	0.722
1911 mean	31.4	6.8	14.0	4.5	2.0	4.0

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation by sector of activity, which is defined as the ratio of active women in a given sector to the number of women aged 15 and above in percents. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

Table B.19
The Impact of WWI Military Fatalities on FLFP by Sector of Activity

Dependent variable	Female Labor Force Participation by Sector					
Sector	All	Agriculture	Industry	Commerce	Liberal	Domestic
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.45***	0.13*	0.27***	-0.02	-0.01	0.09***
	[0.10]	[0.07]	[0.05]	[0.02]	[0.01]	[0.02]
Female farm owners	Yes	Yes	Yes	Yes	Yes	Yes
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	522	522	522	522	522	522
Départements	87	87	87	87	87	87
Within R^2	0.606	0.624	0.634	0.774	0.919	0.701
1911 mean	51.5	27.0	14.0	4.5	2.0	4.0

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation by sector of activity, which is defined as the ratio of active women in a given sector to the number of women aged 15 and above in percents. I include female farm owners. The census years are 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. * Significant at the 10% level.

B.4 Relax the Parallel Trends Assumption

B.4.1 Département-Specific Time Trends

I extend the baseline specification in equation 2.1 and control for département-specific time trends in female labor force participation. I first impose linear time trends and estimate the following specification:

$$\texttt{FLFP}_{d,t} = \beta\, \texttt{death\_rate}_d \times \texttt{post}_t + \boldsymbol{\lambda}_d \cdot t + \boldsymbol{\theta}'\, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_t + \varepsilon_{d,t}, \qquad \text{(B.1)}$$

where $\boldsymbol{\lambda}_d \cdot t$ is the département-specific linear time trend. The results are reported in columns 1 and 2 of Table B.20. All the coefficients are significant at the 1% level. Moreover, they are only slightly larger than the baseline estimates presented in Table 2.2: the coefficients from this specification imply that in départements that experienced a military death rate of 20% rather than 10%, female labor force participation was 4 percentage points higher in the interwar period. This suggests that pre-war differential trends in female labor force participation slightly biased the baseline estimates downward. Adding quadratic, cubic, or quartic time trends in columns 3–8 generates similar results.

I further relax the assumption that military fatalities had a constant effect across time and compute year-specific coefficients. I estimate the following specification:

$$\texttt{FLFP}_{d,t} = \sum_{\tau=1906}^{1936} \beta_\tau\, \texttt{death\_rate}_d \times \texttt{year}_\tau + \boldsymbol{\lambda}_d \cdot t + \theta'\, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_t + \varepsilon_{d,t}, \qquad \text{(B.2)}$$

where the year 1901 is excluded to estimate the trends. I report the results in Table B.21. As before, the coefficients are stable across time and significant at the 1% level. They are also only slightly larger than the baseline estimates presented in Table 2.2.

Table B.20
Département-Specific Time Trends

Dependent variable	Female Labor Force Participation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.41***	0.40***	0.47***	0.46***	0.47***	0.47***	0.47***	0.47***
	[0.15]	[0.15]	[0.16]	[0.16]	[0.16]	[0.16]	[0.16]	[0.16]
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dep.	No	Yes	No	Yes	No	Yes	No	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Département × year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Polynomial order	1	1	2	2	3	3	4	4
Observations	609	609	609	609	609	609	609	609
Départements	87	87	87	87	87	87	87	87
Within R^2	0.821	0.824	0.869	0.873	0.869	0.873	0.869	0.873
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the OLS coefficients from estimating specification B.1 in columns 1 and 2, and expanding the time-trend polynomial in columns 3–8. The dependent variable is female labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

Table B.21
Département-Specific Time Trends, Year-Specific Estimates

Dependent variable	Female Labor Force Participation			
	(1)	(2)	(3)	(4)
Military death rate × 1906	-0.01	-0.01	-0.00	0.00
	[0.03]	[0.03]	[0.03]	[0.03]
Military death rate × 1921	0.53***	0.51***	0.54***	0.53***
	[0.16]	[0.16]	[0.16]	[0.16]
Military death rate × 1926	0.51***	0.51***	0.54***	0.55***
	[0.16]	[0.16]	[0.17]	[0.17]
Military death rate × 1931	0.58***	0.58***	0.61***	0.61***
	[0.18]	[0.18]	[0.19]	[0.19]
Military death rate × 1936	0.67***	0.65***	0.72***	0.71***
	[0.20]	[0.20]	[0.22]	[0.22]
Rural	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Département × year	Yes	Yes	Yes	Yes
Observations	609	609	609	609
Départements	87	87	87	87
Within R^2	0.823	0.824	0.824	0.826

Notes. This table reports the OLS coefficients from estimating specification B.2. The dependent variable is female labor force participation. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.

*** Significant at the 1% level.

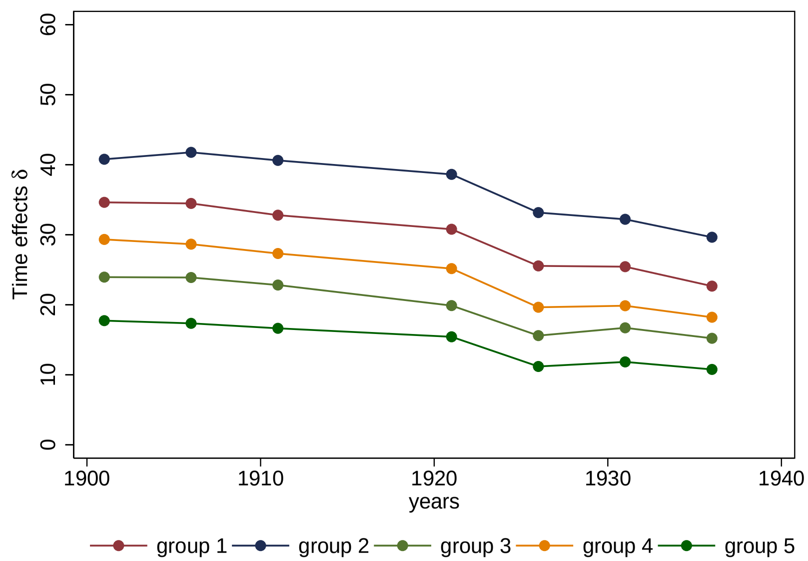
B.4.2 Grouped Fixed Effects

It is possible that some départements displayed differential time patterns in female labor force participation, biasing the baseline estimates downward. To alleviate this concern, I inspect the robustness of the baseline specification to allowing for time-varying heterogeneity across groups of départements. In particular, I relax the assumption that time fixed effects are common to all départements and estimate the following specification:

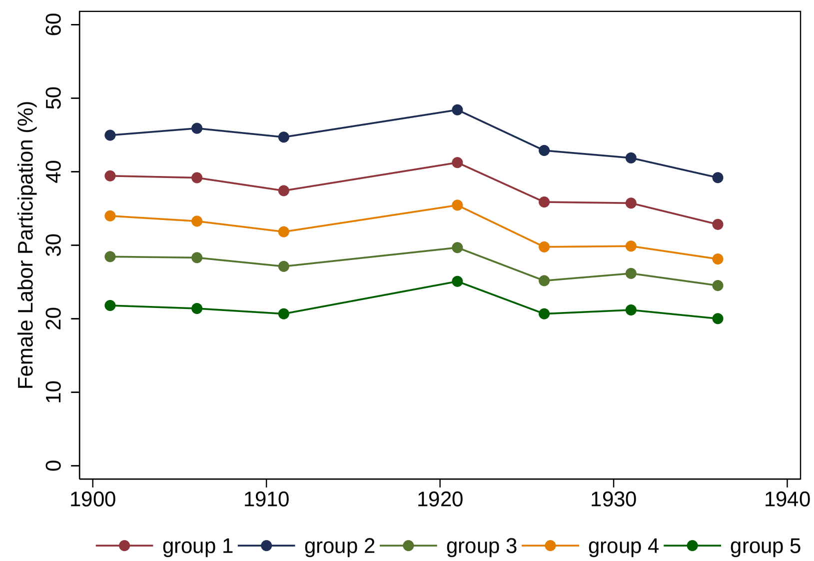
$$\texttt{FLFP}_{d,t} = \beta \, \texttt{death\_rate}_d \times \texttt{post}_t + \boldsymbol{\theta}' \, \mathbf{X}_{d,t} + \boldsymbol{\gamma}_d + \boldsymbol{\delta}_{g_d,t} + \varepsilon_{d,t}, \tag{B.3}$$

where g_d denotes département d's group membership and $\delta_{g_d,t}$ group-specific time effects. Importantly, I do not impose any *a priori* structure on group membership such as geographic clustering. Instead, I estimate group membership from the data by using Bonhomme and Manresa's (2015) grouped fixed effects algorithm. Conditional on specifying the total number of groups, the algorithm optimally groups départements with similar time profiles in female labor force participation net of the correlation with military death rates and other covariates. By controlling for differential time patterns in female labor force participation across groups, I can effectively relax the parallel trends assumption.

To illustrate this point more clearly, I set the number of groups to 5 and plot the grouped fixed effects $\widehat{\delta}_{g_d t}$ in panel A of Figure B.4. All five groups have parallel time patterns, suggesting that using a single time fixed effect is justified. Moreover, they do not display any differential time patterns in female labor force participation rates when the effect of military fatalities and département characteristics are accounted for (panel B). This suggests that the parallel trends assumption across all départements is reasonable in this context. Figure B.5 displays the estimate $\widehat{\beta}$ of equation B.3 for up to 10 groups. Allowing for heterogeneity in the time pattern of female labor force participation does not alter the baseline results much as all coefficients are close to 0.3.



(A) Group Fixed Effects



(B) Female Labor Force Participation

Figure B.4: Patterns of Grouped Heterogeneity

Notes. The estimation of grouped fixed effects $\widehat{\delta}_{gdt}$ in panel A and trends in female labor force participation in panel B follows Bonhomme and Manresa's (2015) grouped fixed effects algorithm 1.

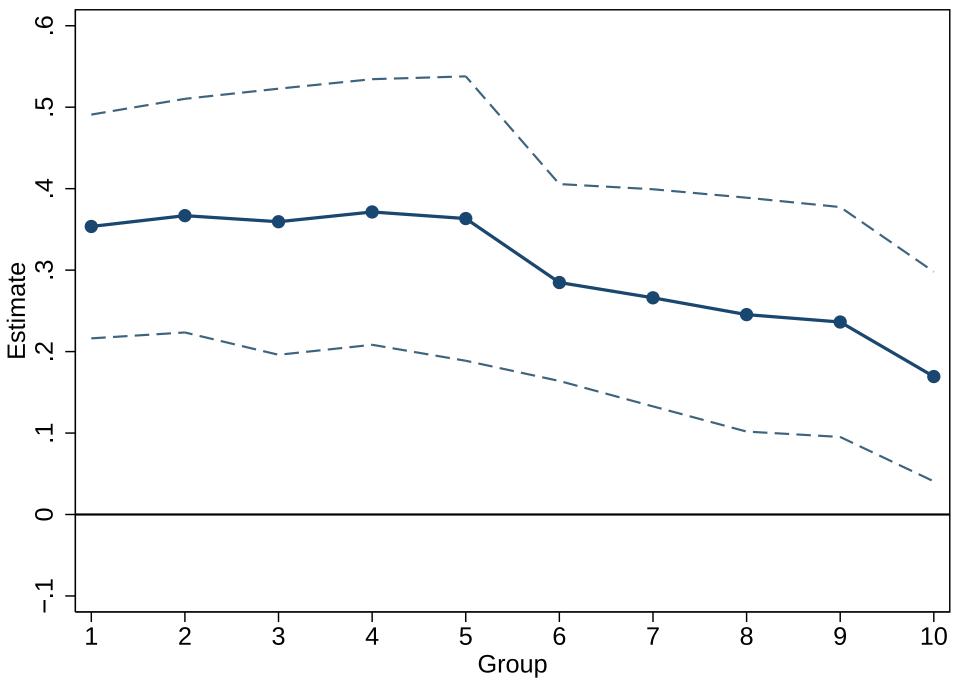


Figure B.5: Grouped Fixed Effect Estimates by Number of Groups

Notes. This figure reports the OLS coefficient from estimating specification B.3 for different numbers of groups. Group membership is determined using Bonhomme and Manresa's (2015) algorithm 1.

B.4.3 Instrumental Variables Strategy

Main Analysis

I integrate an instrumental variables strategy within the difference-in-differences framework. In particular, I leverage on some exogenous variation in military death rates that results from the recruitment process of the army. At the onset of the war, the active army was constituted with four age cohorts: the men aged 20 to 23.[1] I designate an age cohort by the year in which it was recruited by the army, i.e., the year that cohort attained age 20. For instance, I designate the cohort that was born in 1894 as the *class of 1914*. In 1914, the active army was constituted by the classes of 1911 to 1914: while the class of 1914 had just been recruited, the class of 1911 had just finished its three years of military training and was about to be transfered to the reserve of the active army. As a result, men that belonged to the classes of 1911 to 1914 had different levels of military training at the onset of the war. They were nevertheless sent to the same battlefields, within the same military units. Intuitively, men with more military training should be more efficient on the battlefield and die at lower rates. This is indeed reflected in the data: the contribution of each class to military fatalities is monotonically increasing from the class of 1911 to the class of 1914.[2] I argue that these differences are essentially due to differences in military training.

Other reasons could potentially explain differential military death rates across these four classes. First, members of each class could have differential initial physical or intellectual abilities. To examine this possibility, I collected height and education data for these classes from recruitment reports of the army. The summary statistics reported in Table B.22 clearly reject this possibility.

1. Following the military conscription law of 1913, the general army was divided into four armies: the active army, composed by the age classes currently doing their military service, the reserve of the active army, the territorial army, and the reserve of the territorial army. Appendix Table A.1 provides for the length of service in each of these armies.

2. More precisely, the class of 1911 contributed 5.7% to overall military fatalities, the class of 1912 contributed 6.2%, the class of 1913 contributed 6.5%, and the class of 1914 contributed 6.7%.

Table B.22
Class Characteristics at Age 20

	Age Classes				
	1909	1910	1911	1912	1914
Height (cm)	166.2	166.2	166.2	166.5	166.3
	(1.1)	(1.0)	(1.2)	(1.1)	(1.0)
Education					
Cannot read nor write (%)	2.6	2.6	2.5	2.4	2.2
	(1.8)	(1.8)	(1.8)	(1.7)	(1.5)
Can read (%)	1.1	1.3	1.3	1.3	1.3
	(0.7)	(1.3)	(0.9)	(1.2)	(1.0)
Can read and write (%)	26.4	27.0	27.8	29.6	29.9
	(11.0)	(11.5)	(11.6)	(12.1)	(11.8)
Primary school (%)	59.4	58.4	56.5	54.1	53.0
	(13.3)	(13.7)	(14.5)	(15.0)	(14.9)
School certificate (%)	2.5	2.5	2.5	2.6	2.6
	(1.1)	(1.0)	(0.9)	(1.0)	(0.9)
High school diploma (%)	2.1	2.1	2.0	2.0	2.0
	(0.7)	(0.8)	(0.8)	(0.8)	(0.8)
Unkown (%)	6.0	6.1	7.4	8.1	9.1
	(4.0)	(3.7)	(4.9)	(4.7)	(5.1)
Départements	87	87	87	87	84

Notes. This table reports means of class characteristics at age 20 across 87 départements (the data are only available across 84 départements for the class of 1914). *Education* refers to the share of the conscripts with a given level of education. Standard deviations are in parenthesis. See Appendix D for details about variables sources and definitions.

Second, if older soldiers died at lower rates than younger soldiers because of better physical abilities or of some form of implicit seniority, then averaging military death rates over an entire class could yield the pattern observed in the data. To verify that this is not the case, I plot the number of military fatalities by month of birth across these four cohorts in Figure B.6. It reveals that differences in military fatalities by class are not driven by an averaging effect as regression lines do not display a positive slope. In fact, soldiers born earlier in the year seem to die at higher rates.[3]

Third, older soldiers could be more likely to hold a higher military rank, and therefore less likely to be sent on the battlefield. Indeed, the mechanism of promotion in the army

3. This is not driven by cyclical birth patterns, as the same pattern holds when weighting military fatalities by the number of birth in each month.

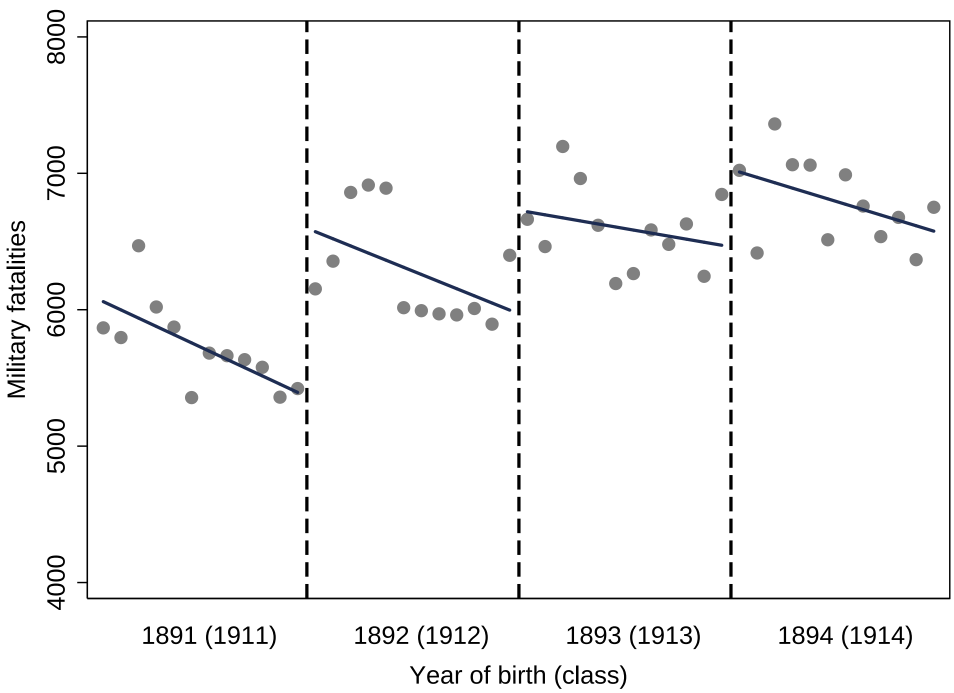


Figure B.6: Military Fatalities by Month of Birth, Classes 1911–1914

Notes. Each dot represents the number of military fatalities for soldiers born during the same month of the same year. Blue lines are regression lines for each class.

was partly based on seniority.[4] As a result, it is possible that soldiers who entered the army earlier moved up the ranks faster. This, in turn, could have decreased their probability of dying on the battlefield: Guillot and Parent (2015) show that higher ranked soldiers had a longer life expectancy during the war, although the effect is small.[5] This last reason does not invalidate the instrumental variables strategy as it is still the year of birth that creates an exogenous discontinuity in the probability of dying during the war.

The instrumental variables strategy builds on these discontinuities. Ideally, I would compute the relative size of the male population born in December of year t compared to the

4. The promotion system of the army during WWI followed the principles of the *Ordonnance* of March 16th, 1838, which required at least 6 month in a given rank to have the opportunity to move up to a higher rank—this was the case for lower ranks of the army such as 1st class soldier and corporal (*Ordonnance du 16 mars 1838 sur l'avancement dans l'armée*, Title II, Chapter I, art. 11, p. 18).

5. For instance, conditional on dying during the war, a 1st class soldier lived on average 60 days longer than a 2nd class soldier. Similarly, a corporal (the rank just above 1st class soldier) lived on average 91 days longer than a 2nd class soldier (Guillot and Parent, 2015, p. 19).

size of the male population born in January of year $t+1$. Following the reasoning, men born "by chance" in December should die at lower rates than those born in January because they got an additional year of training for plausibly exogenous reasons. Unfortunately, the census of 1911 provides information on the male population by year of birth in each département, but not by month of birth.

I build three instruments, each instrument representing the relative size of a class compared to the following class. For instance, the relative size of the class of 1913 with respect to the class of 1914 in département d is calculated as:

$$\texttt{ratio\_class}_{\texttt{1913-1914},d} = \frac{\texttt{male\_population\_class\_1913\_in\_d}}{\texttt{male\_population\_class\_1914\_in\_d}} \times 100, \tag{B.4}$$

where the population data are from the census of 1911.

I show below that the results are not sensitive to the specification of the instruments: results are similar when using the size of a given class compared to the size of the male population of all four classes, or when using the size of a given class compared to the size of the class of 1910.

The instrumental variables are based on département-specific demographic characteristics. As a result, they could be systematically correlated with unobserved determinants of pre-war migration patterns, which are themselves correlated with pre-war differential trends in female labor force participation. Consider the case of an emigration département. It may be possible that, as they get older, men leave this département to find a job in another département. This would in turn change labor market conditions for women, for instance by inducing a decline in the size of the industrial sector. Older cohorts in those départements would then be systematically smaller than younger ones in a given year. In this case, the distribution of the instruments would not be independent from potential outcomes and the exclusion restriction would be violated.

I explore this possibility by first computing the correlation across all three instruments. I find coefficients of correlation that range from 0.16 to 0.31. This suggests that the determinants of the relative size of successive cohorts are not systematically correlated. Second, I explore the dynamic pattern of the instruments within each département. They do not follow a deterministic trajectory in 60% of the cases, i.e., consecutive cohorts are neither systematically decreasing nor increasing in size (Table B.23). If the instruments were randomly assigned, I would not find any systematic pattern in 75% of the cases.[6]

Table B.23
Dynamic Patterns of the Instruments

	A. cl. 1911 > cl. 1912		B. cl. 1911 ≤ cl. 1912	
	cl. 1912 > cl. 1913	cl. 1912 ≤ cl. 1913	cl. 1912 > cl. 1913	cl. 1912 ≤ cl. 1913
cl. 1913 > cl. 1914	6%	10%	0%	43%
cl. 1913 ≤ cl. 1914	0%	6%	1%	34 %

Notes. The figures refer to the share of départements that follow a given pattern (in %). *cl.* stands for *class*.

Finally, I check in Table B.24 that the instruments are not correlated with pre-war trends in female labor force participation. All these tests support the argument that the instruments are unrelated to the determinants of pre-war trends in female labor force participation and that the exclusion restriction is unlikely to be violated.[7]

Next, I verify that the instruments are correlated with the distribution of military death rates by estimating the following first-stage specification for each instrument:

$$\texttt{death\_rate}_d \times \texttt{post}_t = \phi\, \texttt{ratio\_class}_d \times \texttt{post}_t + \boldsymbol{\kappa}'\, \mathbf{X}_{d,t} + \boldsymbol{\mu}_d + \boldsymbol{\eta}_t + \varepsilon_{d,t}. \qquad \text{(B.5)}$$

where $\boldsymbol{\mu}_d$ are département fixed effects, and $\boldsymbol{\eta}_t$ time fixed effects. I report the estimates

6. If the instruments were randomly assigned, each instrument would be above one 50% of the time. As a result, all three instruments being above one would have a probability of one eighth. Therefore, a systematic pattern of all instruments being above one *or* all instruments being below one would emerge 25% of the time.

7. An alternative scenario would be that imbalances in successive cohorts sizes affected post-war female labor market conditions through the disruption in the post-war marriage market. It would be the case if females were only mating with men from their own cohort, which is unlikely.

Table B.24
Instruments and Pre-War Trends in FLFP

Dependent variable	Instrumental Variables					
	A. 1901–1911			B. 1906–1911		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in FLFP (%)	0.35	0.27	-0.00	-0.02	0.70	-0.02
	[0.30]	[0.20]	[0.28]	[0.57]	[0.42]	[0.56]
Instrument	1	2	3	1	2	3
Change in Rural	Yes	Yes	Yes	Yes	Yes	Yes
Change in Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Départements	87	87	87	87	87	87
Within R^2	0.250	0.189	0.014	0.197	0.189	0.036

Notes. This table reports the OLS estimates from regressing the instruments on pre-war trends in female labor force participation (FLFP). The dependent variables are the instruments: the ratio of the class 1911 to the class 1912 in columns 1 and 4, the ratio of the class 1912 to the class 1913 in columns 2 and 5, and the ratio of the class 1913 to the class 1914 in columns 3 and 6. For instance, the specification in column 1 is $\texttt{ratio\_class}_{1911-1912,d} = \alpha + \beta\ \Delta\texttt{FLP}_d + \theta'\ \Delta X_d + \Delta\varepsilon_d$, where Δ denotes changes between 1901 and 1911. Robust standard errors are in brackets.

in Table B.25. As expected, the higher the size of a class relative to the following one, the lower the military death rate. Moreover, the instruments are strong: F-statistic are above 10 all three instruments (columns 1–3), and 27 when all three instruments are used together (column 4). Figure B.7 displays the first-stage estimates for all other class ratios, revealing that only the instruments I propose yield a credible first-sage. This supports the idea that the four classes I consider were uniquely affected by differential training levels.

I now instrument military death rates in equation 2.1 with the relative size of consecutive classes. I report the results in Table B.26. For reference, column 1 displays the baseline OLS estimate from column 4 of Table 2.2. The coefficient in column 5 suggests that the baseline OLS estimates were biased downward because of the slight pre-war differential trend in female labor force participation in départements with high military death rates. Instrumental variable results imply that in départements that experienced a military death rate of 20% rather than 10%, female labor force participation was 5.4 percentage points higher in the

Table B.25
First-Stage Estimates

Dependent variable	Military Death Rate × Post			
	(1)	(2)	(3)	(4)
Ratio class 1911–1912 × post	-0.28***			-0.17***
	[0.05]			[0.03]
Ratio class 1912–1913 × post		-0.39***		-0.31***
		[0.05]		[0.06]
Ratio class 1913–1914 × post			-0.31***	-0.20***
			[0.10]	[0.05]
Rural	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	609	609	609	609
Départements	87	87	87	87
Within R^2	0.959	0.967	0.955	0.974
F-statistic	29.11	55.75	10.62	27.30

Notes. This table reports the OLS coefficients from estimating specification B.5. The dependent variable is military death rates. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

interwar period. Again, only the class ratios I consider generate meaningful results (see Figure B.8).

Table B.26
Instrumental Variables Estimates

Dependent variable	Female Labor Force Participation				
	OLS	IV			
	(1)	(2)	(3)	(4)	(5)
Military death rate × post	0.35***	0.80***	0.48***	0.37**	0.54***
	[0.07]	[0.22]	[0.14]	[0.18]	[0.13]
Instrument	No	1	2	3	1–3
Rural	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609
Départements	87	87	87	87	87
Within R^2	0.581	0.507	0.575	0.581	0.567
1911 mean	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the IV coefficients from estimating specification 2.1 with the class ratio instruments. *Instrument 1* is the ratio of the class 1911 to the class 1912, *Instrument 2* is the ratio of the class 1912 to the class 1913, and *Instrument 3* is the ratio of the class 1913 to the class 1914. Column 1 reports the baseline OLS estimate from column 4 of Table 2.2. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

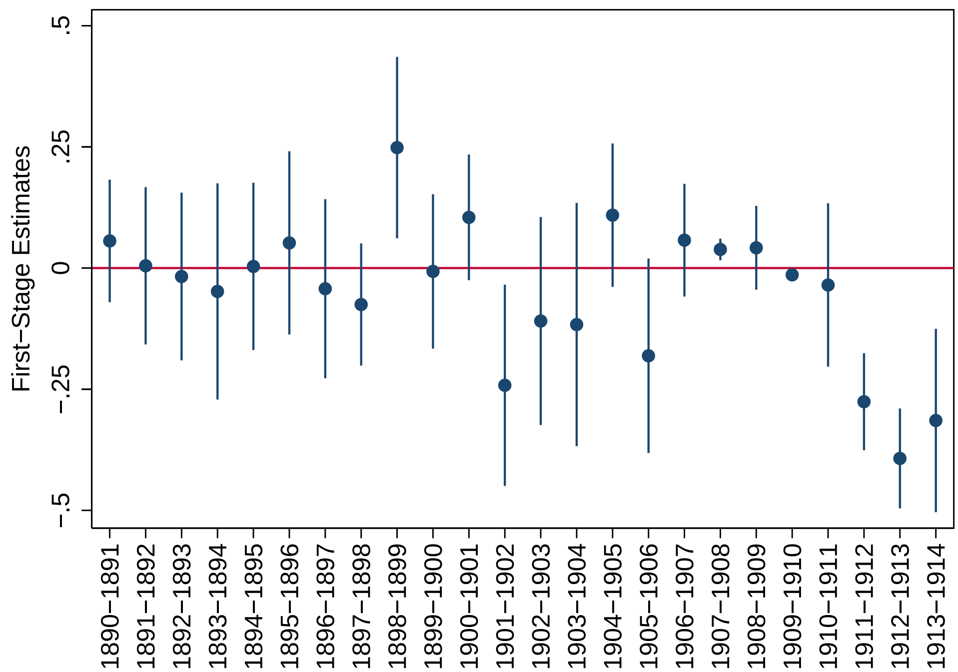


Figure B.7: First-Stage Estimates for All Class Ratios

Notes. Each category is a class ratio. For instance, `1890-1891` is the ratio of the class 1890 to the class 1891. Vertical lines indicate 95% intervals around the estimate.

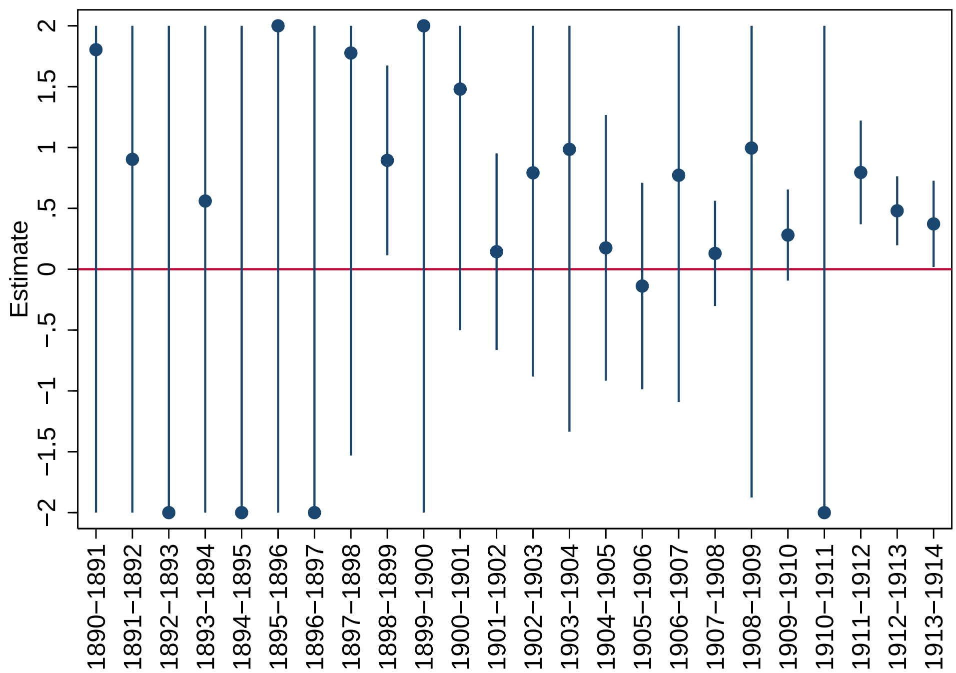


Figure B.8: Instrumental Variables Estimates for All Class Ratios

Notes. Each category is a class ratio. For instance, `1890-1891` is the ratio of the class 1890 to the class 1891. An estimate of 2 or -2 indicates an estimate that is out of the range of the figure. Vertical lines indicate 95% intervals around the estimate.

Alternative Specifications of the Instrumental Variables

In this section, I show that the results of the instrumental variables strategy are robust to alternative specifications of the instruments.

Alternative Specification 1 First, instead of building the instruments following the specification in equation B.4, I compute the size of each cohort relative to the entire pool of the four age classes of interest. The four instruments are computed as:

$$\texttt{ratio\_class}_{\texttt{j},d} = \frac{\texttt{male\_population\_class\_j\_in\_d}}{\texttt{male\_population\_classes\_1911-1914\_in\_d}} \times 100$$

Table B.27 replicates the first stage estimates of Table B.25. All the instruments are strongly correlated with military death rates, except for the second one, which is barely significant when all the instruments are pooled together. Moreover, the F-statistics are well above the conventional level of 10 for weak instruments. Because younger age classes tend to die at higher rates than older age classes, the instruments are not monotonically related to military death rates: while the relative size of older age classes is negatively correlated with military death rates, the relative size of younger age classes is positively correlated with military death rates.

Table B.28 replicates the instrumental variable estimates of Table B.26. The specification of the instruments does not drive the results because I find similar results when the instruments are pooled together: while the estimate in column 5 of Table B.26 is 0.54, the corresponding estimate in column 6 of Table B.28 is 0.55.

Table B.27
First-Stage Estimates
(Alternative Specification 1)

Dependent variable	Military Death Rate × Post				
	(1)	(2)	(3)	(4)	(5)
Ratio class 1911 × post	-1.51***				-0.50***
	[0.15]				[0.14]
Ratio class 1912 × post		-2.22***			-0.47
		[0.49]			[0.29]
Ratio class 1913 × post			2.26***		0.54**
			[0.35]		[0.24]
Ratio class 1914 × post				1.88***	0.98***
				[0.20]	[0.18]
Rural	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609
Departments	87	87	87	87	87
Within R^2	0.971	0.959	0.965	0.972	0.975
F-statistic	107.73	20.52	42.83	88.97	212.27

Notes. This table presents the OLS coefficients from estimating specification B.5. The dependent variable is military death rates. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

Table B.28
Instrumental Variable Estimates
(Alternative Specification 1)

Dependent variable	Female Labor Force Participation					
	OLS	IV				
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.35***	0.64***	0.32*	0.62***	0.52***	0.55***
	[0.07]	[0.15]	[0.17]	[0.17]	[0.12]	[0.13]
Instrument	No	1	2	3	4	1–4
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609
Départements	87	87	87	87	87	87
Within R^2	0.581	0.551	0.581	0.555	0.571	0.567
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the IV coefficients from estimating specification 2.1 with the class ratio instruments. *Instrument 1* is the ratio of the class 1911, *Instrument 2* is the ratio of the class 1912, *Instrument 3* is the ratio of the class 1913, and *Instrument 4* is the ratio of the class 1914. Column 1 reports the baseline OLS estimate from column 4 in Table 2.2. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. * Significant at the 10% level.

Alternative Specification 2 Another way of specifying the instruments is to use the size of each cohort relative to the size of an older cohort, the class of 1910. The four instruments are computed as:

$$\texttt{ratio\_class}_{\texttt{j},d} = \frac{\texttt{male\_population\_class\_j\_in\_d}}{\texttt{male\_population\_class\_1909\_in\_d}} \times 100$$

Table B.29 replicates the first stage estimates of Table B.25. When put together, all the instruments are correlated with military death rates. Moreover, all but one F-statistics are well above the conventional level of 10 for weak instruments. As with the previous alternative specification, instruments are not monotonically related to military death rates: while the relative size of older age classes is negatively correlated with military death rates, the relative size of younger age classes is positively correlated with military death rates.

Table B.30 replicates the main instrumental variable estimates of Table B.26. When the instruments are pooled together, I obtain a similar result as those above: while the estimate in column 5 of Table B.26 is 0.54, the corresponding estimate in column 6 of Table B.30 is 0.50. Overall, the results in this section suggest that the specification of the instruments does not drive the instrumental variables results.

Table B.29
First-Stage Estimates
(Alternative Specification 2)

Dependent variable	Military Death Rate × Post				
	(1)	(2)	(3)	(4)	(5)
Ratio class 1911 × post	0.04				-0.10**
	[0.09]				[0.04]
Ratio class 1912 × post		0.23***			-0.14**
		[0.05]			[0.07]
Ratio class 1913 × post			0.21***		0.10*
			[0.03]		[0.05]
Ratio class 1914 × post				0.21***	0.21***
				[0.02]	[0.04]
Rural	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609
Departments	87	87	87	87	87
Within R^2	0.948	0.959	0.970	0.974	0.976
F-statistic	0.19	17.85	40.67	75.36	32.87

Notes. This table presents the OLS coefficients from estimating specification B.5. The dependent variable is military death rates. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table B.30
Instrumental Variable Estimates
(Alternative Specification 2)

Dependent variable	Female Labor Force Participation					
	OLS	IV				
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × post	0.35***	-4.47	0.29**	0.40***	0.40***	0.50***
	[0.07]	[11.05]	[0.15]	[0.11]	[0.10]	[0.11]
Instrument	No	1	2	3	4	1–4
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	609	609
Départements	87	87	87	87	87	87
Within R^2	0.581		0.579	0.580	0.580	0.573
1911 mean	31.4	31.4	31.4	31.4	31.4	31.4

Notes. This table reports the IV coefficients from estimating specification 2.1 with the class ratio instruments. *Instrument 1* is the ratio of the class 1911 to the class 1910, *Instrument 2* is the ratio of the class 1912 to the class 1910, *Instrument 3* is the ratio of the class 1913 to the class 1910, and *Instrument 4* is the ratio of the class 1914 to the class 1910. Column 1 reports the baseline OLS estimate from column 4 in Table 2.2. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.

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

B.5 Alternative Measure of Female Labor Force Participation

Historical research has pointed out that the statistics of female labor in the censuses could sometimes be inaccurate (Devos, De Langhe and Matthys, 2014; McGeevor, 2014; van Nederveen Meerkerk and Paping, 2014; Schulz, Maas and van Leeuwen, 2014). For instance, in France, Daric (1947) and Maruani and Meron (2012) explain that farmers' wives were inconsistently recorded as labor force participants across départements in the census of 1901. Because farmers' wives accounted for almost all female farm owners (*chefs d'établissement*), I systematically exclude them from the data in order to properly examine pre-war trends in female labor force participation. I now show that excluding these women does not bias the results.

For the purpose of comparison, I replicate the main result of this chapter with the standard measure of female labor force participation when excluding the year 1901. Compared to the difference-in-differences estimate of 0.35 reported in column 4 of Table 2.2, dropping the year 1901 slightly increases to point estimate to 0.39. Including female farm owners generates an estimate of 0.45 (Table B.31).

Historians point out that many women declared having an occupation in farming after the war whereas they did not before the war: "[A]lmost a third of the 'new' [female] farmers are wives of farmers who declare themselves as active in 1921 whereas they did not do so before" (Thébaud, 2013, p. 405). Furthermore, many women became the head of their farm—thereby appearing in the statistics—because they lost a husband or a son in the war: "The total number of widows and single female farm owners reaches the large figure of 13% of the total number of farm owners, and their number grew respectively by 128,000 and 33,000. Among these widows, most are mother whose son also died in combats" (Thébaud, 2013, pp. 404–405). In contrast, these results show that the overall number of women entering the agricultural sector is relatively small as including female farm owners only slightly increase the estimates.

Table B.31
Alternative Measure of FLFP

Dependent variable	Female Labor Force Participation							
	A. Standard measure				B. Uncorrected measure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.39***	0.39***	0.40***	0.39***	0.52***	0.45***	0.52***	0.45***
	[0.08]	[0.08]	[0.08]	[0.07]	[0.11]	[0.10]	[0.11]	[0.10]
Female farm owners	No	No	No	No	Yes	Yes	Yes	Yes
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	522	522	522	522	522	522	522	522
Départements	87	87	87	87	87	87	87	87
Within R^2	0.606	0.607	0.607	0.607	0.585	0.606	0.591	0.606
1911 mean	31.4	31.4	31.4	31.4	51.5	51.5	51.5	51.5

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation excluding female farm owners in panel A, and female labor force participation including female farm owners in panel B. The census years are 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

B.6 War Départements

War combats occurred on the territory of eleven départements in the industrial North-East (see Figure 1.1). These départements suffered from minor destructions to total devastation.[8] The French State, through the *Ministère des Régions Libérées*, provided a large amount of funds to help the reconstruction effort throughout the interwar period (Michel, 1932, pp. 549–558). It could be problematic if military fatalities were correlated with war destructions or with the intensity of the reconstruction effort. On the one hand, the loss of physical capital entailed by war destructions could imply a decline in the demand for labor relative to other départements. A positive correlation between military fatalities and war destructions could therefore bias the estimates downward. On the other hand, the reconstruction effort financed by the State could imply an increase in the demand for labor relative to other départements. A positive correlation between military fatalities and the intensity of the reconstruction effort could therefore bias the estimates upward. The net impact of this process would then depend on the relative intensity of war destructions vis-à-vis the reconstruction effort, and the extent of the correlations with military fatalities.

I propose two strategies to cope with this potential problem. First, I replicate the analysis when excluding these eleven départements (section B.6.1). Second, I collect data about the intensity of war destructions and the reconstruction effort in these départements from Michel (1932) and directly check whether military fatalities are correlated with these measures (section B.6.2). The results for both strategies imply that war départements are not driving the results. Excluding these départements from the analysis does not affect the estimates, and I find no correlation between military death rates and war destructions or the intensity of the reconstruction effort.

8. The eleven départements directly affected by war combats were: Aisne, Ardennes, Belfort, Marne, Meurthe-et-Moselle, Meuse, Nord, Oise, Pas-de-Calais, Somme and Vosges. Haut-Rhin, Bas-Rhin and Moselle were also affected by war combats but I do not include them in the analysis since they belonged to Germany before the war.

B.6.1 Exclude War Départements

I replicate the main results of this chapter when excluding the eleven départements that were directly affected by war combats and report the results in Table B.32. The point estimate decreases from 0.35 to 0.28, mostly because the effect of military fatalities on female labor force participation disproportionately affected the industrial sector (see Appendix B.3), and these départements were predominantly industrial: 29% of the male active population worked in the industrial sector in départements not directly affected by war combats in 1911 compared to 49% in the départements directly affected by war combats.

Table B.32
Exclude War Départements

Dependent variable	Female Labor Force Participation							
	A. Full sample				B. Excluding war départements			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate × post	0.37***	0.35***	0.37***	0.35***	0.30***	0.28***	0.32***	0.28***
	[0.08]	[0.07]	[0.07]	[0.07]	[0.10]	[0.08]	[0.09]	[0.07]
War départements	Yes	Yes	Yes	Yes	No	No	No	No
Rural	No	Yes	No	Yes	No	Yes	No	Yes
Born in dép.	No	No	Yes	Yes	No	No	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	609	609	532	532	532	532
Départements	87	87	87	87	76	76	76	76
Within R^2	0.578	0.579	0.579	0.581	0.617	0.620	0.624	0.633
1911 mean	31.4	31.4	31.4	31.4	30.5	30.5	30.5	30.5

Notes. This table reports the OLS coefficients from estimating specification 2.1. The dependent variable is female labor force participation. The sample includes war départements in panel A, and excludes them in panel B. The census years are 1901, 1906, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level.

B.6.2 War Destructions and the Reconstruction

I directly check whether military fatalities are correlated with the extent of war destructions and the intensity of the reconstruction effort. To that end, I collect data on war destructions and the post-war reconstruction from Michel (1932). Table B.33 provides a broad picture of the magnitude of war destructions in the north-eastern départements directly affected by the war. Some suffered mild destructions while others suffered total devastation. On average, 65% of these départements' territory was invaded or bombed during the war. In terms of physical capital, 80% of their productive agricultural land was damaged by trenches, barbed wire, or shells, more than half of their houses were at least partially destroyed, and so were 83% of their factories and public buildings.

TABLE B.33
SUMMARY STATISTICS OF WAR DESTRUCTIONS

	Mean	S.d.	Min	Max
Territory				
Damaged area	65	28	17	100
Medium damages	28	20	5	70
High damages	24	15	3	58
Very high damages	2	2	0	4
Damaged cities	62	28	14	99
Damaged agricultural land	81	20	38	100
Houses				
Damaged houses	53	16	29	79
Partially damaged	27	6	17	35
Destroyed	26	15	8	54
Factories				
Damaged factories	83	27	20	100
Partially damaged	37	21	6	76
Looted	17	17	0	52
Destroyed	29	19	9	62
Public buildings				
Damaged buildings	83	7	73	94
Partially damaged	52	18	12	72
Destroyed	31	16	14	62

Notes. Summary statistics for ten war départements. No data for Belfort. See Appendix D for details about variables sources and definitions.

To measure the intensity of the post-war reconstruction effort, I compute shares of pre-war capital that were reconstituted after the war. This enables to take into account the absolute magnitude of war destructions. Figure B.9 displays the evolution of the reconstruction effort between 1920 and 1928 across various items. The reconstruction effort was intense: one decade after the war, these départements had rehabilitated most of their agricultural land (80%) and reconstructed most of their factories and public buildings (80%), and part of their houses (30%).

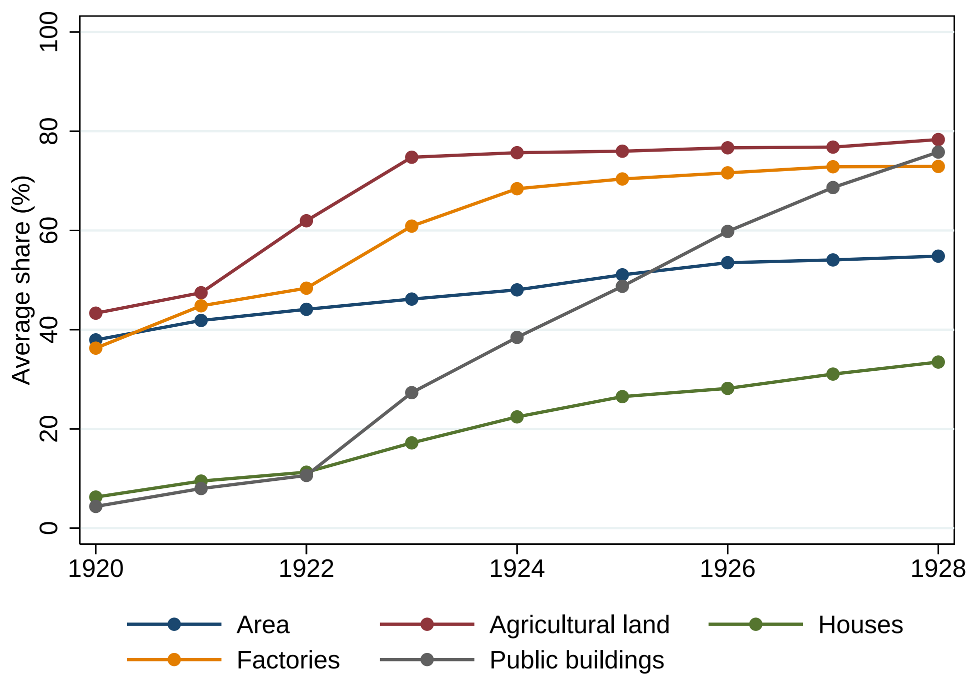


Figure B.9: The Post-War Reconstruction Effort

Notes. Average shares of pre-war stock rehabilitated and reconstructed for ten war départements. No data for Belfort. See Appendix D for details about variables sources and definitions.

Table B.34 reports the estimates from regressing military death rates on these measures of war destructions and reconstruction. I find no correlation between these. This analysis suggests that war départements are not driving the results of this chapter.

Table B.34

Military Death Rates, War Destructions, and the Reconstruction Effort

Dependent variable: military death rate			
A. Destructions		B. Reconstruction in 1928	
Variable	Estimate	Variable	Estimate
Damaged area	-0.02	Cleared area	-0.02
	[0.02]		[0.02]
Damaged cities	-0.01		
	[0.02]		
Damaged agricultural land	-0.01	Rehabilitated agricultural land	-0.01
	[0.01]		[0.02]
Damaged houses	-0.01	Reconstructed houses	-0.01
	[0.02]		[0.03]
Damaged factories	-0.01	Reconstructed factories	-0.01
	[0.01]		[0.02]
Damaged public buildings	-0.01	Reconstructed public buildings	-0.01
	[0.02]		[0.02]

Notes. Each cell reports the OLS coefficient $\widehat{\beta}$ from estimating the following specification: $\texttt{death\_rate}_d = \alpha + \beta \ \mathbf{X}_d + \varepsilon_d$, where $\mathbf{X}_d$ is a measure of war destruction or reconstruction in département d. Besides the ten war départements, I also include their eight neighboring départements in the regressions as a control group, to which I assign no destruction or reconstruction effort. Robust standard errors are in brackets.

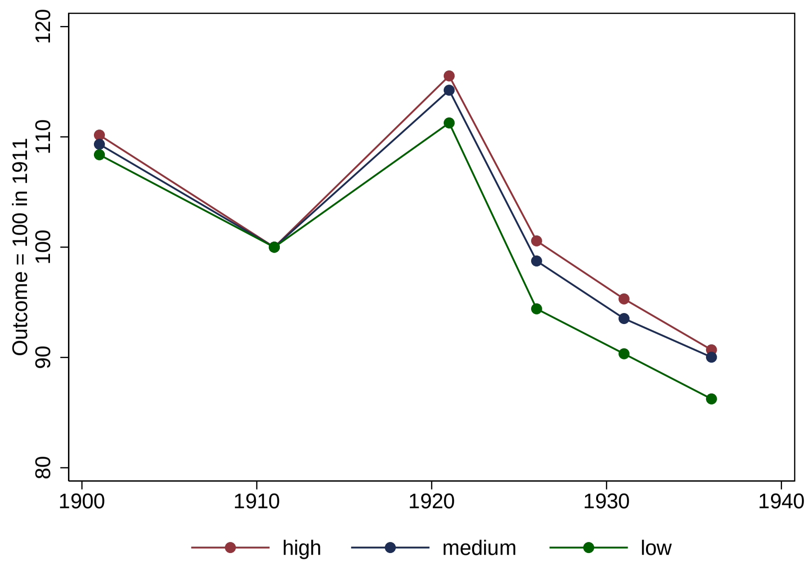
B.7 Sequential Ignorability Assumptions

Quantities $\widehat{\beta}_2 \times \widehat{\beta}_S$ and $\widehat{\beta}_3 \times \widehat{\beta}_W$ estimated from specification 2.4 provide the effect of military fatalities on female labor force participation through changes in marriage market conditions under a modified version of the "sequential ignorability" assumption (Imai et al., 2011): there are no differential trends in labor and marriage market outcomes across départements with varying levels of military death rates, and, conditionally on military death rate, there are no differential trends in labor market outcomes across départements with varying levels of marriage market outcomes. In this section, I show that imposing these assumptions is reasonable in this context.

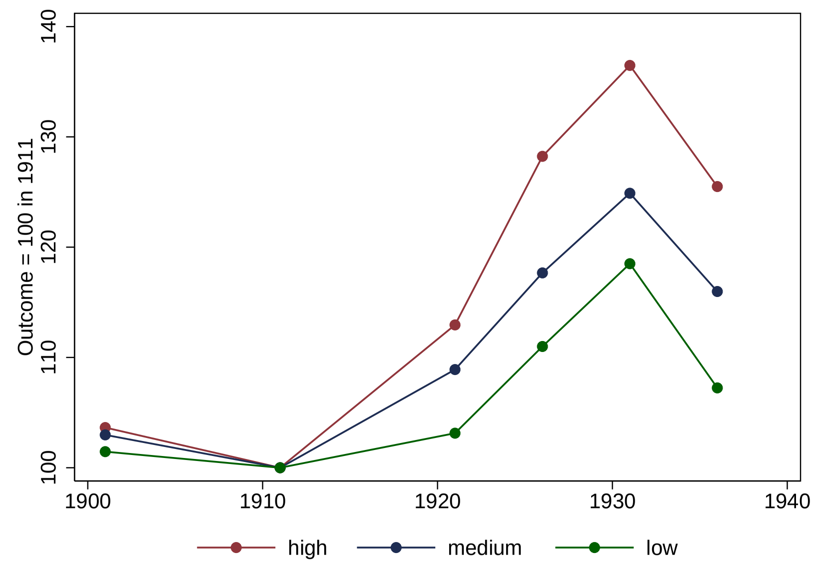
B.7.1 No Differential Trends in Labor and Marriage Market Outcomes

The first set of assumptions is similar to the parallel trends assumption in a difference-in-differences design. I already showed that this is a reasonable assumption relative to labor market outcomes. To explore its validity relative to marriage market outcomes, Figure B.10 displays relative trends in the share of single women aged 20 to 29 (panel A), and in the share of widowed women aged 40 to 49 (panel B) across groups of varying levels of military death rates.[9] I standardize the levels of each outcome variable to 100 in 1911 to make relative trends more apparent. There are no pre-war differential trends in the share of single women. Regarding widows, départements that experienced higher military death rates had a slight declining trend in the share of widowed women before the war. This suggests that the baseline estimates of the effect of military fatalities on the proportion of widows could be biased downward.

9. These age groups are the largest for these specific marital statuses. Trends are similar for other age groups.



(A) Share of Single women (20–29)



(B) Share of Widowed Women (40–49)

Figure B.10: Relative Trends in Female Marital Status

Notes. Each line corresponds to a group of 29 départments with a given level of military death rate (high, medium, or low).

To check more directly that pre-war differential trends do not drive the effect of military fatalities on post-war marriage market outcomes, I compute year-specific estimates:

$$\mathtt{Y}_{a,d,t} = \sum_{\substack{t=1901 \\ t\neq 1911}}^{1936} \beta_t \, \mathtt{death\_rate}_d \times \mathtt{year}_t + \theta' \, \mathbf{X}_{d,t} + \gamma_d + \delta_t + \varepsilon_{a,d,t}, \tag{B.6}$$

where $\mathtt{Y}_{a,d,t}$ is the share of women of a particular marital status in age group a, département d, and year t. I exclude the year 1911, and include a lead (1901) to assess whether the results are driven by pre-war differential trends in marriage market outcomes.[10] I report the results in Table B.35. The coefficients on the leads in all the columns suggest that pre-war trends in marriage market outcomes do not drive the results as they are close to zero and not significant at conventional levels across all marital statuses and all age groups. Moreover, the stability of the estimates suggest that military fatalities affected marriage market outcomes throughout the interwar period. Also, all the coefficients are in line with the results in Table 2.3 and statistically significant at the 1% level in post-war years. This suggests that the parallel trend assumption for marriage market outcomes is reasonable in this context.

B.7.2 No Differential Trends in Female Labor Force Participation

The second set of assumptions is that there are no differential trends in female labor force participation across départements with varying levels of marriage market outcomes conditional on similar levels of military death rates. Exploring the validity of this assumption is difficult as all units have different levels of military death rates. Nevertheless, this set of assumptions seems credible as départements with similar military death rates also display similar levels and trends in female labor force participation before the war. For instance, I show in Figure B.11 that trends in female labor force participation across départements with medium military death rates but low and high marriage market outcome were similar in the case of single women aged 20 to 29. For widows, it seems that départements with medium

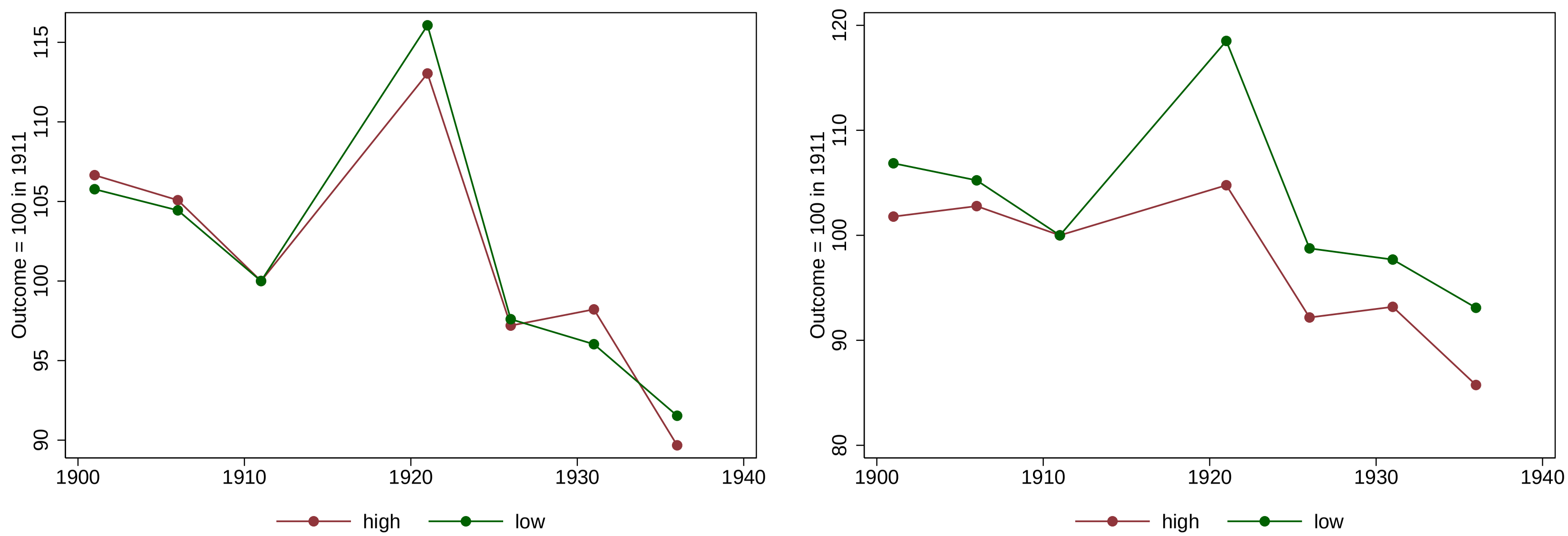
10. As mentioned in footnote 18 on page 37, comparable marital status data for 1906 are not available.

Table B.35
The Impact of WWI Military Fatalities on Female Marital Status

Dependent variable	A. Single (%)			B. Widow (%)		
Age group	20–29	30–39	40–49	20–29	30–39	40–49
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate × 1901	0.07	-0.05	0.01	0.00	0.02	0.03
	[0.08]	[0.03]	[0.03]	[0.00]	[0.01]	[0.02]
Military death rate × 1921	0.27***	0.11***	0.07***	0.00	0.13***	0.11***
	[0.05]	[0.04]	[0.03]	[0.02]	[0.04]	[0.03]
Military death rate × 1926	0.34***	0.20***	0.13***	0.00	0.12***	0.18***
	[0.06]	[0.04]	[0.03]	[0.00]	[0.04]	[0.03]
Military death rate × 1931	0.33***	0.25***	0.16***	-0.01	0.07***	0.22***
	[0.07]	[0.05]	[0.04]	[0.01]	[0.02]	[0.04]
Military death rate × 1936	0.30***	0.27***	0.22***	-0.01	0.04**	0.23***
	[0.09]	[0.05]	[0.04]	[0.01]	[0.02]	[0.05]
Rural	Yes	Yes	Yes	Yes	Yes	Yes
Born in dép.	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	522	522	522	522	522	522
Départements	87	87	87	87	87	87
Within R^2	0.825	0.288	0.357	0.848	0.930	0.357

Notes. This table reports the OLS coefficients from estimating specification 2.2. The dependent variable is the share of single women in panel A, and the share of widowed women in panel B. *Widows* also includes divorced women. The census years are 1901, 1911, 1921, 1926, 1931, and 1936. *Rural* is the share of rural population in percents. *Born in dép.* is the share of the residing population born in the département in percents. Standard errors are in brackets, and are clustered at the département level.
*** Significant at the 1% level. ** Significant at the 5% level.

military death rates and low share of widows had a slight declining relative trend in female labor force participation.



(A) Share of Single women (20–29)

(B) Share of Widowed Women (30–49)

Figure B.11: Relative Trends in Female Labor Force Participation Rates

Notes. Each line corresponds to a group of 44, and 43 départments with a given share of single or widowed women (high in red, or low in green).

APPENDIX C

APPENDIX TO CHAPTER 3

C.1 Appendix Figures

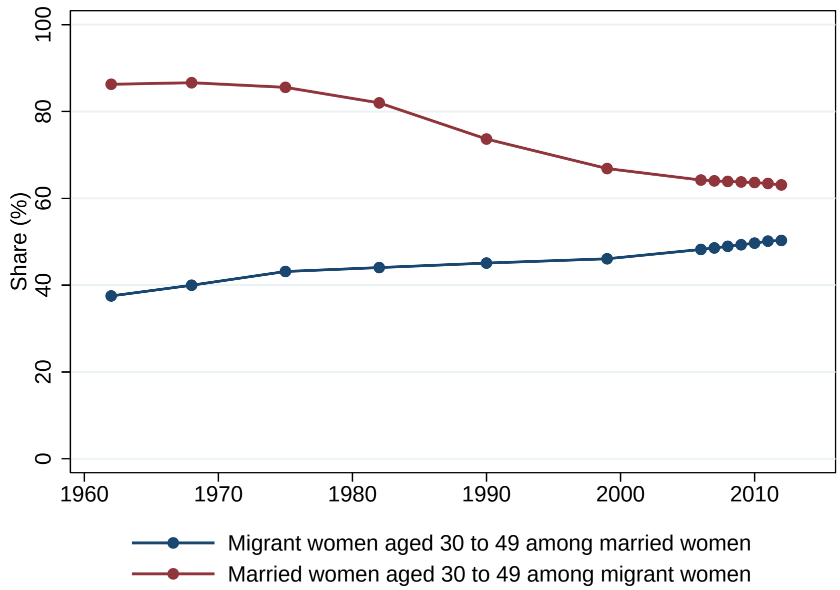
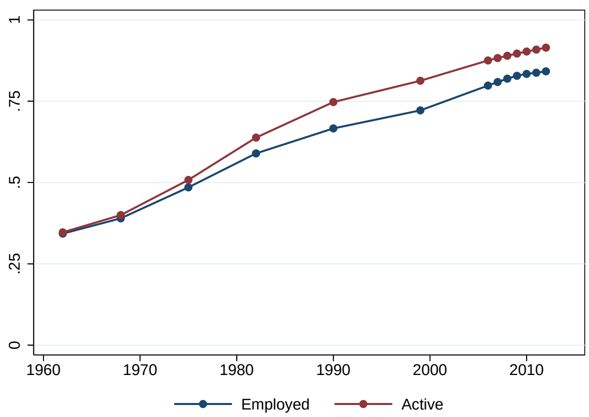
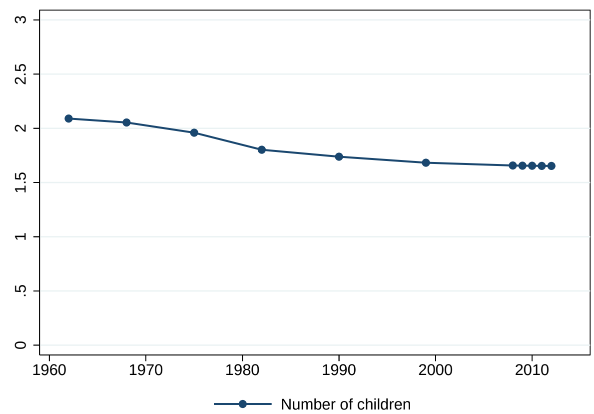


Figure C.1: Shares of Migrant and Married Women Aged 30 to 49

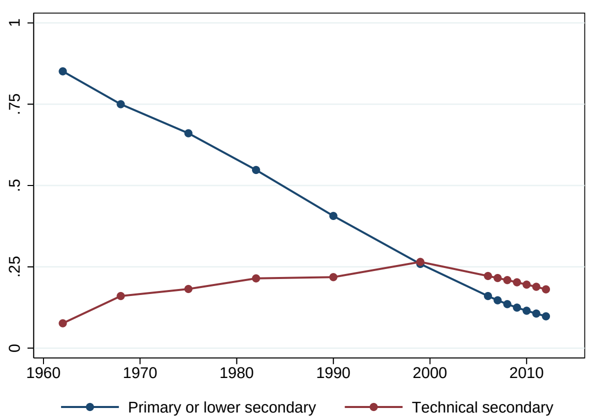
Notes. The blue line displays the share of migrant women among all French married women born in metropolitan France, aged 30 to 49. The red line displays the share of women married with a French husband born in metropolitan France among all French migrant women born in metropolitan France, aged 30 to 49, and residing in metropolitan France. These shares are calculated using the thirteen censuses between 1962 and 2012. Data from the censuses (1962–2012).



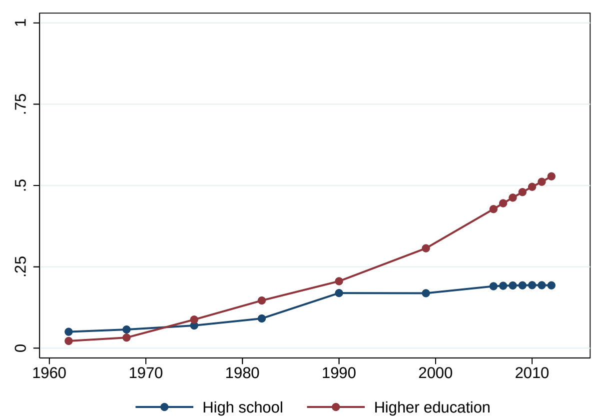
(A) Labor Force Participation



(B) Number of Children



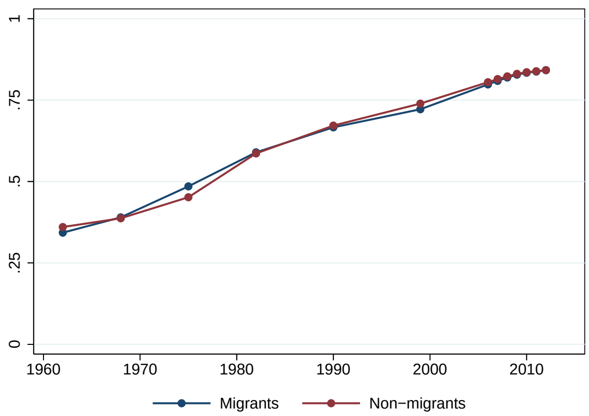
(C) Educational Attainment (Low)



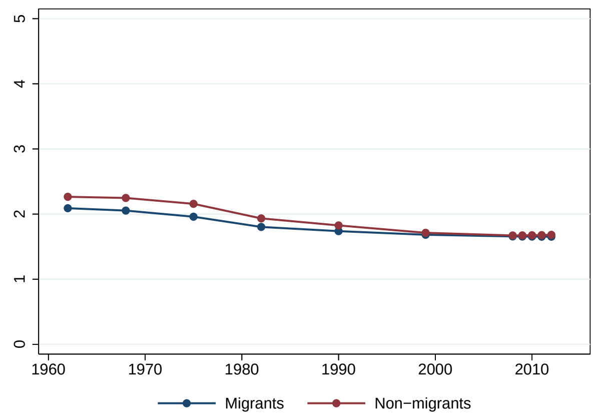
(D) Educational Attainment (High)

Figure C.2: Means of Labor, Fertility, and Education Outcomes

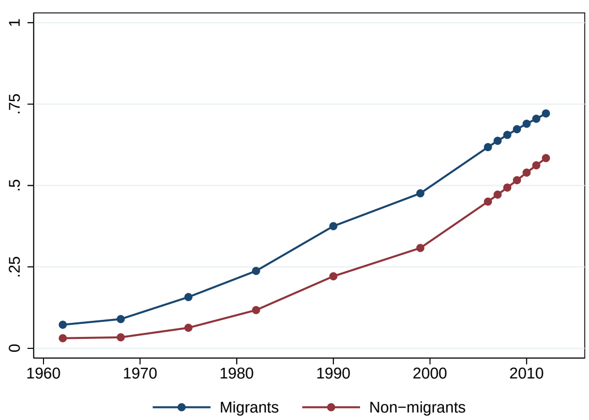
Notes. This figure reports the means of labor, fertility, and education outcomes across the censuses 1962–2012. The sample consists of migrant married women aged 30 to 49. Means are computed using sample weights provided in the censuses. *Working* and *Active* are indicator variables for whether the respondent is working or in the labor force, respectively. *Number of children* corresponds to the number of children of the respondent's family in the household. *Educational attainment* corresponds to indicator variables for the highest diploma obtained. See Appendix Tables C.1–C.13 for the full set of summary statistics. Data from the censuses (1962–2012).



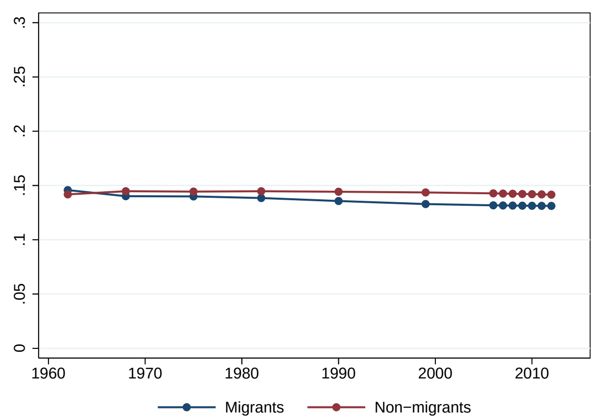
(a) Employed



(b) Number of Children



(c) High School and Above



(d) Military Death Rate

Figure C.3: Observable Characteristics across Migration Status

Notes. This figure reports the means of various observable characteristics across migration status. The sample consists of migrant and non-migrant married women aged 30 to 49. Means are computed using sample weights provided in the censuses. Data from the censuses (1962–2012).

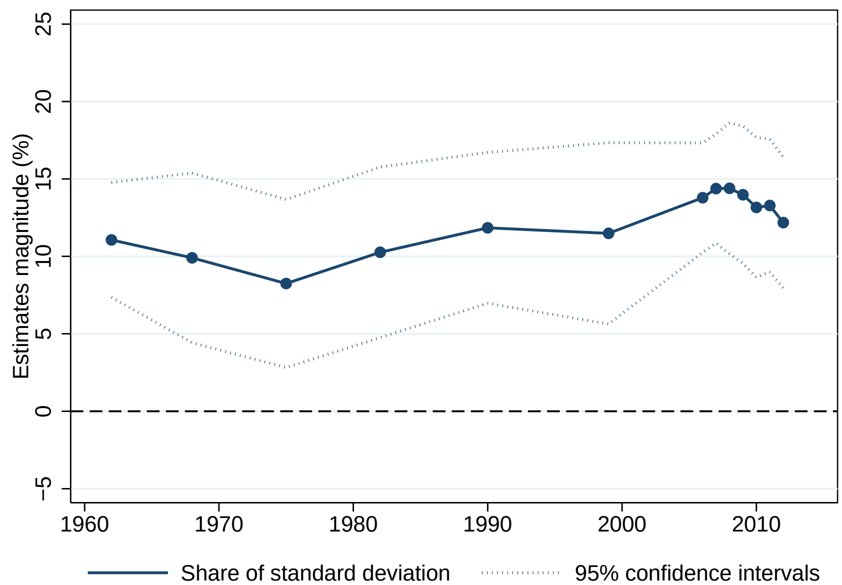
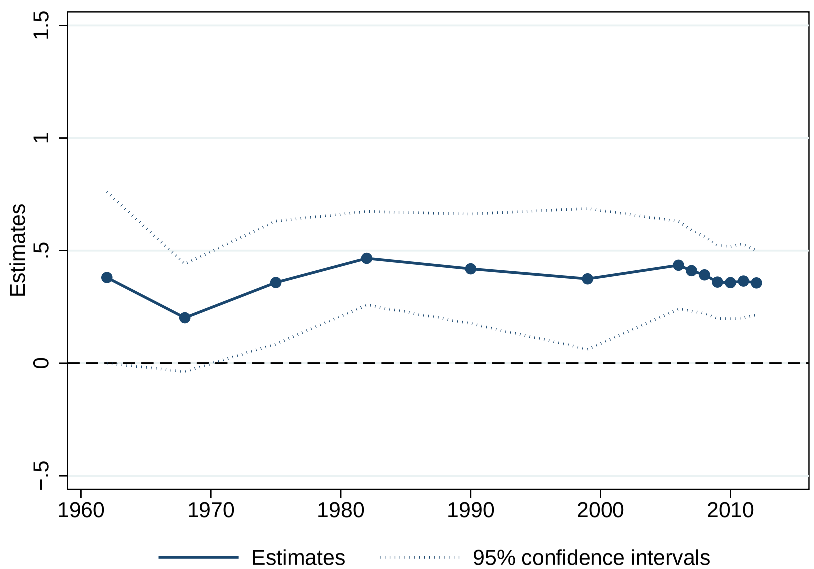
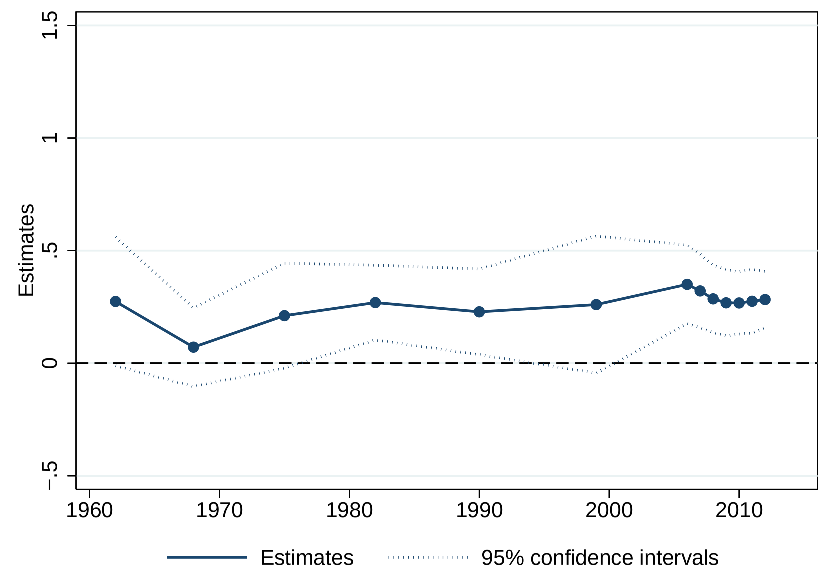


Figure C.4: Magnitude Relative to Standard Deviation

Notes. This figure reports the magnitude of the coefficients reported in Figure 3.1 with respect to the outcome standard deviation. The magnitude is interpreted as the share of the standard deviation in the dependent variable explained by switching from being born in a département with a military death rate of 10% to a département with a military death rate of 20%. Data from the censuses (1962–2012).



(A) No Wife Birth Département FE



(B) Wife Birth Département FE

Figure C.5: Transmission from Husbands to Wives (Education and Fertility Controls)

Notes. This figure reports the OLS coefficients from estimating specification 3.6. All regressions include household and husband controls as well as education and fertility controls. Standard errors are clustered at the level of individuals' départements of residence and at the level of their husbands' départements of birth. The sample consists of migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

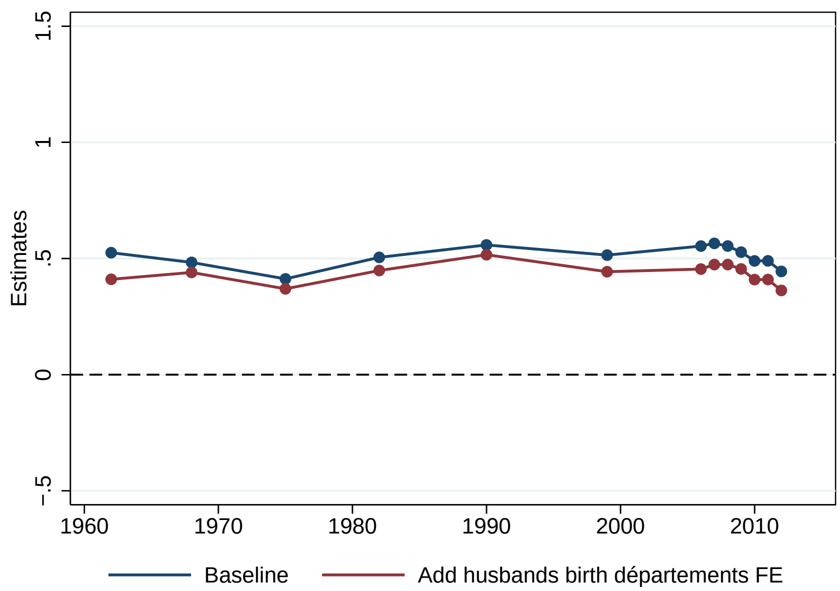


Figure C.6: Husbands Départements of Birth Fixed Effects

Notes. This figure reports the OLS coefficients from estimating baseline specification 3.1 and adding husbands départements of birth fixed effects. Standard errors are clustered at the level of individuals' départements of residence and at the level of their husbands' départements of birth. The sample consists of migrant women aged 30 to 49. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.

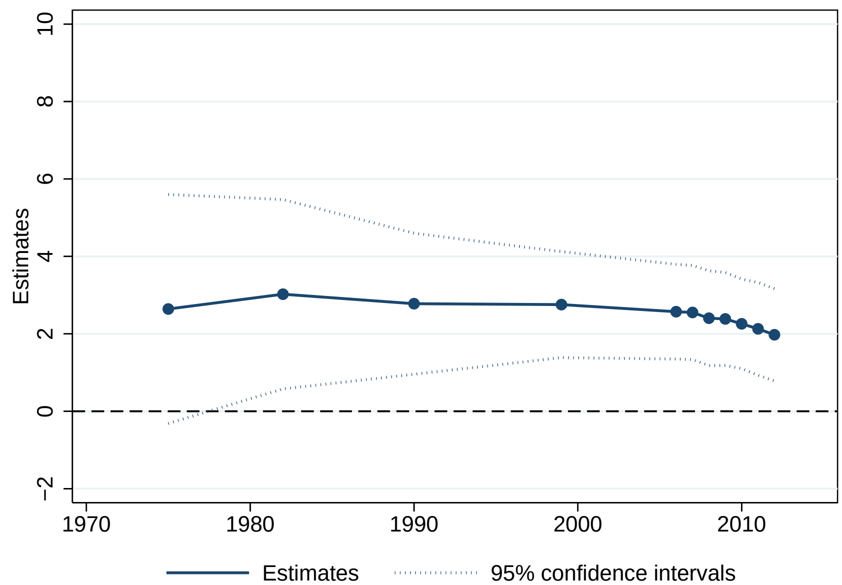


Figure C.7: Two Censuses Lag Assignment

Notes. This figure reports the OLS coefficients from estimating specification 3.7. Standard errors are clustered at the level of individuals' départements of residence. The sample consists of non-migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

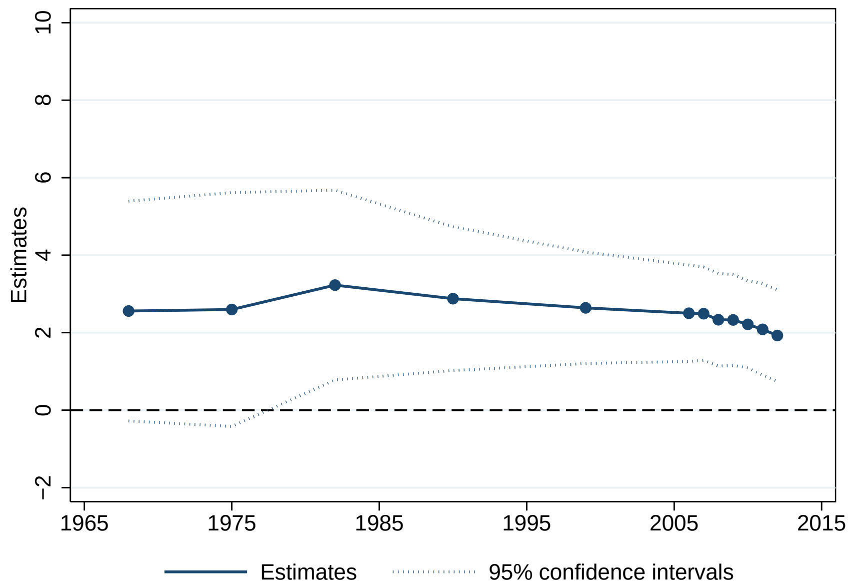


Figure C.8: Transmission from Female Migrants to Non-Migrants

Notes. This figure reports the OLS coefficients from estimating specification 3.7. The outcome is an indicator variable for whether the respondent is a participant in the labor force. Standard errors are clustered at the level of individuals' départements of residence. The sample consists of non-migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

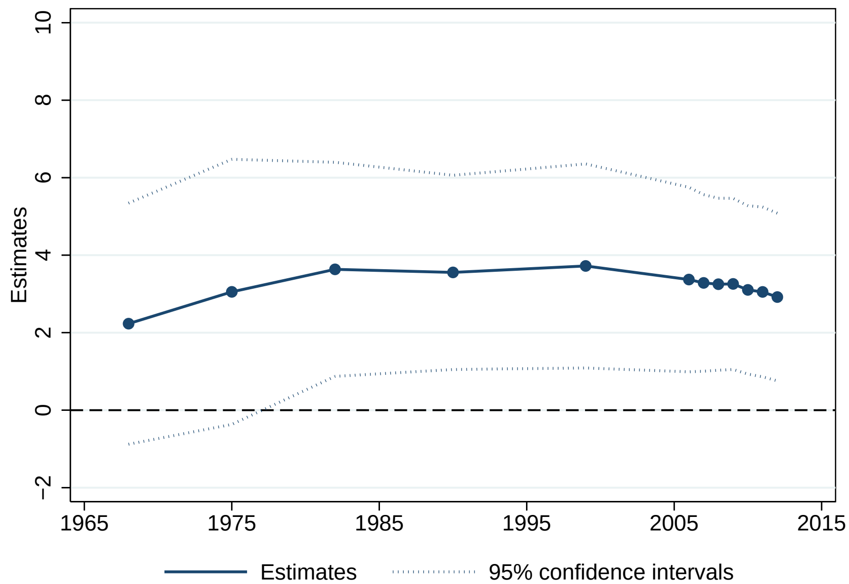


Figure C.9: Transmission from Male Migrants to Non-Migrants

Notes. This figure reports the OLS coefficients from estimating specification 3.7 when using male internal migrants of working age to compute the immigrant norm. Standard errors are clustered at the level of individuals' départements of residence. The sample consists of non-migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

C.2 Appendix Tables

Table C.1
Characteristics Across Mothers' Migration Status

Mother status	Migrant	Non-migrant
Military death rate	0.14	0.15
	(0.04)	(0.03)
Employed	0.83	0.81
	(0.38)	(0.39)
Hign school and above	0.50	0.40
	(0.50)	(0.49)
Number of children	1.4	1.4
	(1.1)	(1.1)
Observations	17,258	71,385

Notes. This table presents the means for various variables across groups of married women aged 30 to 59 as a function of the migration status of their mothers. *Migrant* means that the respondent's mother was born in a different département than herself. *Non-migrant* means that the respondent's mother was born in the same département than herself. Standard deviations are reported in parenthesis. The means are computed using the sample weights provided in the surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.

Table C.2
Transmission from Parents to Daughters

Dependent variable	Active					
	A. Mother			B. Father		
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate, parental origin	1.29***	1.28***	1.11**	1.13***	0.70*	0.53
	[0.42]	[0.41]	[0.43]	[0.41]	[0.37]	[0.37]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	No	Yes	Yes	No	Yes	Yes
Parental controls						
Father high social class	Yes	Yes	Yes	Yes	Yes	Yes
Mother pre-war controls (1911)	Yes	Yes	Yes	No	No	No
Father pre-war controls (1911)	No	No	No	Yes	Yes	Yes
Mother birth département FE	No	No	No	No	No	Yes
Father birth département FE	No	No	Yes	No	No	No
Mother in-law birth département FE	No	No	Yes	No	No	Yes
Father in-law birth département FE	No	No	Yes	No	No	Yes
Clusters						
Birth-residence département	92	92	92	92	92	92
Mother's département of birth	92	92	92			
Father's département of birth				92	92	92
Observations	17,258	17,258	17,258	17,995	17,995	17,995
Outcome mean	0.86	0.86	0.86	0.87	0.87	0.87

Notes. This table reports the OLS coefficients from estimating specification 3.3. All regressions include survey-year indicators as well as an indicator for whether both parents were born in the same département. Husbands and household controls include husbands' incomes, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the individuals' départements of birth and at the level of their mothers' or fathers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose parents were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.

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

Table C.3
Transmission from Parents to Daughters

Dependent variable	Active				Employed			
	Mother		Father		Mother		Father	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Military death rate, parental origin	1.17***	1.07***	0.45	0.21	1.24***	1.04**	0.55	0.21
	[0.38]	[0.40]	[0.36]	[0.36]	[0.45]	[0.45]	[0.39]	[0.43]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education and fertility controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls								
Father high social class	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mother pre-war controls (1911)	Yes	Yes	No	No	Yes	Yes	No	No
Father pre-war controls (1911)	No	No	Yes	Yes	No	No	Yes	Yes
Mother birth département FE	No	No	No	Yes	No	No	No	Yes
Father birth département FE	No	Yes	No	No	No	Yes	No	No
Mother in-law birth département FE	No	Yes	No	Yes	No	Yes	No	Yes
Father in-law birth département FE	No	Yes	No	Yes	No	Yes	No	Yes
Clusters								
Birth-residence département	92	92	92	92	92	92	92	92
Mother's département of birth	92	92			92	92		
Father's département of birth			92	92			92	92
Observations	17,258	17,258	17,995	17,995	17,258	17,258	17,995	17,995
Mean	0.86	0.86	0.87	0.87	0.83	0.83	0.83	0.83

Notes. This table reports the OLS coefficients from estimating specification 3.3. All regressions include survey-year indicators as well as an indicator for whether both parents were born in the same département. Husbands and household controls include husbands' incomes, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the individuals' départements of birth and at the level of their mothers' or fathers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose parents were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

Table C.4
Transmission from Mothers to Daughters (2SLS)

Dependent variable	Mother worked		Active			
	A. First-Stage		B. Reduced Form		C. Second-Stage	
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate, mother origin	1.57***	1.84***	1.28***	1.11**		
	[0.55]	[0.58]	[0.41]	[0.43]		
Mother worked					0.81**	0.60**
					[0.34]	[0.25]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls						
Father high social class	Yes	Yes	Yes	Yes	Yes	Yes
Mother pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Father birth département FE	No	Yes	No	Yes	No	Yes
Mother in-law birth département FE	No	Yes	No	Yes	No	Yes
Father in-law birth département FE	No	Yes	No	Yes	No	Yes
Clusters						
Birth-residence département	92	92	92	92	92	92
Mother's département of birth	92	92	92	92	92	92
Observations	17,258	17,258	17,258	17,258	17,258	17,258
Outcome mean	0.56	0.56	0.86	0.86	0.86	0.86
Cragg-Donald Wald F	39.48	49.39				
Kleibergen-Paap Wald rk F	8.04	10.97				

Notes. This table reports the coefficients from estimating specifications 3.4 (panel A), 3.3 (panel B), and 3.5 (panel C). All regressions include survey-year indicators and an indicator for whether both parents were born in the same département. Husband and household controls include husbands' income, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the respondents' départements of birth and at the level of their mothers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

Table C.5
Transmission from Mothers In-Law to Daughters In-Law

Dependent variable	Active			
	(1)	(2)	(3)	(4)
Military death rate, mother in-law origin	0.24*	0.22*	0.21*	0.10
	[0.13]	[0.12]	[0.12]	[0.15]
Birth year FE	Yes	Yes	Yes	Yes
Birth and residence département FE	Yes	Yes	Yes	Yes
Husband and household controls	No	Yes	Yes	Yes
Education and fertility controls	No	No	Yes	Yes
Parental controls				
Father high social class	Yes	Yes	Yes	Yes
Mother in-law pre-war controls	Yes	Yes	Yes	Yes
Mother birth département FE	No	No	No	Yes
Father birth département FE	No	No	No	Yes
Father in-law birth département FE	No	No	No	Yes
Clusters				
Birth-residence département	92	92	92	92
Mother in-law's département of birth	92	92	92	92
Observations	29,896	29,896	29,896	28,559
Outcome mean	0.87	0.87	0.87	0.87

Notes. This table reports the OLS coefficients from estimating specification 3.3. All regressions include survey-year indicators. Husbands and household controls include husbands' incomes, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of the individuals' départements of birth and at the level of their mothers' or fathers' départements of birth. The sample consists of non-migrant married women aged 30 to 59 whose mothers in-law were born in another département. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
* Significant at the 10% level.

Table C.6
Preferences and Beliefs About Religion

Interpretation: higher values indicate disagreement with the statement

	Statement	Men	Women
1	A religious event is important for a newborn	0.44	0.43
		(0.40)	(0.41)
2	A religious marriage is important for those who marry	0.51	0.51
		(0.39)	(0.40)
3	A religious event is important for a funeral	0.36	0.35
		(0.38)	(0.39)
	Cultural values index (three-points scale)	1.30	1.29
		(1.03)	(1.05)
	Cultural values index (one-point scale)	0.43	0.43
		(0.34)	(0.35)
	Observations	1,143	1,649

Notes. This table presents summary statistics for the cultural beliefs variables related to religion constructed using the GSS dataset. Disagreement with the statement implies higher values. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

Table C.7
Preferences and Beliefs About Marriage

Interpretation: higher values indicate disagreement with the statement

	Statement	Men	Women
1	Marriage is not an outdated institution[a]	0.28	0.28
		(0.34)	(0.34)
2	Unmarried couple shouldn't live together if they do not intend to get married[b]	0.78	0.78
		(0.28)	(0.29)
3	Even if individuals in a couple are unhappy, they shouldn't divorce[c]	0.79	0.84
		(0.27)	(0.25)
4	Marriage is a lifelong commitment that should never be broken	0.44	0.43
		(0.38)	(0.39)
	Cultural values index (four-points scale)	2.28	2.34
		(0.81)	(0.82)
	Cultural values index (one-point scale)	0.57	0.58
		(0.20)	(0.20)
	Observations	1,139	1,646

Notes. This table presents summary statistics for the cultural beliefs variables related to marriage constructed using the GSS dataset. Disagreement with the statement implies higher values. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

[a] Original statement reversed. It originally reads: Marriage is an outdated institution.

[b] Original statement reversed. It originally reads: It is good for an unmarried couple to live together even if they do not intend to get married.

[c] Original statement reversed. It originally reads: If individuals are unhappy as a couple, they may divorce, even if they have children.

Table C.8
Preferences and Beliefs About the Family

Interpretation: higher values indicate disagreement with the statement

	Statement	Men	Women
1	To thrive, a woman must have children	0.31	0.37
		(0.32)	(0.36)
2	To thrive, a man must have children	0.33	0.40
		(0.34)	(0.35)
3	To grow up happy, a child needs a home with a mother and a father	0.11	0.16
		(0.20)	(0.25)
4	If parents divorce, it is better for the child to stay with the mother rather than the father	0.58	0.53
		(0.32)	(0.31)
5	A woman cannot have and raise a child by herself if she doesn't want a stable relationship with a man[a]	0.59	0.57
		(0.34)	(0.35)
	Cultural values index (five-points scale)	1.92	2.02
		(0.95)	(1.02)
	Cultural values index (one-point scale)	0.38	0.40
		(0.19)	(0.20)
	Observations	1,126	1,646

Notes. This table presents summary statistics for the cultural beliefs variables related to the family constructed using the GSS dataset. Disagreement with the statement implies higher values. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

[a] Original statement reversed. It originally reads: A woman can have and raise a child by herself if she doesn't want to have a stable relationship with a man.

Table C.9
Respondents with a Partner

Dependent variable	Cultural values index (one-point scale)				
	(1)	(2)	(3)	(4)	(5)
Military death rate	1.36***	1.22***	1.09**	1.14**	1.15**
	[0.35]	[0.45]	[0.47]	[0.47]	[0.47]
Female	0.02	-0.01	-0.02	-0.02	-0.02
	[0.01]	[0.04]	[0.04]	[0.04]	[0.04]
Military death rate × Female		0.22	0.27	0.25	0.31
		[0.24]	[0.24]	[0.25]	[0.25]
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
Father high social class	No	No	Yes	Yes	Yes
Mother education	No	No	Yes	Yes	Yes
Father education	No	No	Yes	Yes	Yes
Clusters					
Residence département	94	94	94	94	94
Birth département	86	86	86	86	86
Observations	1,808	1,808	1,808	1,808	1,808
Outcome mean	0.75	0.75	0.75	0.75	0.75

Notes. This table presents the OLS coefficients from estimating specification 3.8. 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 the individuals' départements of birth and départements of residence. The sample consists of internal migrants in a couple. The estimates are computed using the sample weights provided in the GSS dataset. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

Table C.10
Four-Questions Cultural Index

Dependent variable	Cultural values index (one-point scale)				
	(1)	(2)	(3)	(4)	(5)
Military death rate	0.88***	0.85***	0.77***	0.80***	0.81***
	[0.19]	[0.26]	[0.27]	[0.27]	[0.28]
Female	0.04***	0.03	0.02	0.03	0.02
	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]
Military death rate × Female		0.04	0.09	0.06	0.11
		[0.16]	[0.16]	[0.16]	[0.17]
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
Father high social class	No	No	Yes	Yes	Yes
Mother education	No	No	Yes	Yes	Yes
Father education	No	No	Yes	Yes	Yes
Clusters					
Residence département	95	95	95	95	95
Birth département	88	88	88	88	88
Observations	2,796	2,796	2,796	2,796	2,796
Outcome mean	0.64	0.64	0.64	0.64	0.64

Notes. This table presents the OLS coefficients from estimating specification 3.8. 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 the individuals' départements of birth and départements of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GSS dataset. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

*** Significant at the 1% level.

Table C.11
Interactions, Respondents with a Partner

Dependent variable	Cultural values index (one-point scale)				
	(1)	(2)	(3)	(4)	(5)
Military death rate	1.15***	1.20***	1.16***	1.15***	1.16***
	[0.21]	[0.21]	[0.21]	[0.22]	[0.23]
Partner present	-0.00	0.01	0.01	0.01	0.01
	[0.01]	[0.03]	[0.03]	[0.03]	[0.03]
Military death rate × Partner present		-0.07	-0.08	-0.07	-0.04
		[0.22]	[0.22]	[0.22]	[0.22]
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
Father high social class	No	No	Yes	Yes	Yes
Mother education	No	No	Yes	Yes	Yes
Father 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 the OLS coefficients from estimating specification 3.8. 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, and an indicator for whether the respondent owns her housing. Standard errors are clustered at the level of the individuals' départements of birth and départements of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GSS dataset. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level.

Table C.12
Religion, Marriage, and the Family

Dependent variable	Cultural values index (one-point scale)					
	Religion		Marriage		Family	
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate	-0.29	-0.31	0.16	0.07	-0.14	0.01
	[0.53]	[0.57]	[0.30]	[0.32]	[0.28]	[0.30]
Female	-0.01	-0.01	0.01	-0.00	0.02*	0.05*
	[0.02]	[0.06]	[0.01]	[0.02]	[0.01]	[0.03]
Military death rate × Female		0.03		0.13		-0.23
		[0.40]		[0.13]		[0.17]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Clusters						
Residence département	95	95	95	95	95	95
Birth département	88	88	88	88	88	88
Observations	2,840	2,840	2,807	2,807	2,751	2,751
Outcome mean	0.43	0.43	0.58	0.58	0.39	0.39

Notes. This table presents the OLS coefficients from estimating specification 3.8 with the religion, marriage, and family cultural indexes as outcomes. Standard errors are clustered at the level of the individuals' départements of birth and départements of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GSS dataset. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.
* Significant at the 10% level.

C.3 Robustness of Baseline Estimates

In this section, I present a series of robustness checks that support the credibility of the baseline estimates. I show that they are not sensitive to the choice of the regression model, to selective migration patterns, to potential measurement error in the assignment of military death rates, and that education and fertility choices to not mediate the relationship between WWI military fatalities and women's working behavior.

C.3.1 Alternative Specifications

The baseline coefficients are estimated through a linear probability model. This modeling choice does not affect the results. Panel A of Figure C.10 reports the estimates when using different probability models to estimate specification 3.1. Marginal coefficients evaluated at the mean of the data from a Probit model, a Logit model, and OLS coefficients are similar. Similarly, the estimates are similar when the outcome is an indicator for whether the individual is in the labor force, when widening age bounds to 25–59, and when including women of all marital statuses (see Figures C.11–C.13).

C.3.2 Selective Migration Patterns

To explore the extent to which selective in-migration patterns may affect the results, I compare individuals residing within the same local labor market. The censuses provide two ways of defining local labor market boundaries. First, they provide a constructed measure of the local labor market respondents reside in. These local labor markets—denominated Zones of Industrial and Urban Population (ZIUP) from 1962 to 1990, and Economic Zones (EZ) from 1999 to 2012—are constructed based on home-work migration patterns for each census.[1] As shown in Table C.13, ZIUPs are more numerous than EZs: depending on the census, the regression sample contains 600–800 ZIUPs with 70–800 observations per ZIUP on average,

1. See Appendix D for more details on how ZIUPs and EZs are constructed.

and 300 EZs with 2,000 observations per EZ on average.[2] Second, the censuses provide the city respondents reside in. From 1962 to 1999, this information is detailed at the level of the *commune*, France's smallest administrative level, and from 2006 to 2012, it is detailed at the level of the *canton-city*, a slightly higher aggregation level. Depending on the census, the regression sample contains 6,000–23,000 communes with 9–23 observations per commune on average, and 3,500 canton-cities with 200 observations per canton-city on average.[3] To assess the extent of selective in-migration, I replicate the baseline specification successively with local labor market and city fixed effects instead of the département of residence fixed effects (Panel C of Figure C.10). The coefficients are similar across specifications, suggesting little correlation between WWI military fatalities and in-migration sorting within destination départements. I also show that the results are unchanged when dropping the most urban départements from the analysis—the ones with Paris, Lyon, Marseille, and Nice (see Figure C.14).

To further assess whether labor-related migrations affect the results, I control for the relative attractiveness of individuals' origin and destination départements. I build two types of measures: one that is département specific, and one that is dyadic. The département-specific measures are the share of immigrants among the population residing in an individual's destination département, and the share of emigrants among the population born in her origin département. The first measure attempts to capture the pull force of destination départements, and the second measure the push force of origin départements. The dyadic measures are specific to each pair of départements. The first dyadic measure is the share of immigrants born in an individual's origin département among the population of immigrants in her destination département. It attempts to capture the pull force of destination départements specifically toward each origin département. Conversely, the second dyadic measure

2. Moreover, ZIUPs do not cover the full territory as some rural areas are not included in a ZIUP—84–96% of respondents in the regression sample reside in a ZIUP.

3. Communes are such a small level of aggregation that several thousand observations are singletons, i.e., they are the only observations in a given commune—this is the case for 3,000–8,000 observations depending on the census. These observations are effectively dropped in regressions using commune fixed effects.

is the share of emigrants in an individual's destination département among the population of emigrants born in her origin département. It attempts to capture the push force of origin départements specifically toward each destination département. Because labor-related migrations usually peak early in the life-cycle (White and Lindstrom, 2005), I build these measures relative to the time when individuals were aged 25.[4] Moreover, I build these measures relative to the female population of working age to better capture female labor-related migration dynamics.[5] Together with the bilateral distance between origin and destination départements, these four variables are likely to capture a substantial part of the bias introduced by labor-related migration patterns.

I also estimate the baseline specification on the subsample of internal migrants who were already present in their current département of residence in the previous census—the "one-and-a-half" generation.[6] This subsample may be less subject to biases due to selective migration as it contains individuals who migrated at least one decade earlier.

Overall, the bias introduced by labor-related migrations may not be as serious an issue as département of residence fixed effects control for the permanent relative attractiveness of a département, and because the concentration of population into départements with more dynamic labor markets—the more urban départements—has been low in the second half of the twentieth century. Instead, this type of labor-related migrations primarily occurred in the late nineteenth and early twentieth centuries (White, 1989). Moreover, World War I did not altered migration patterns across départements with varying levels of military death rates (see chapter 2). Panel D of Figure C.10 reports the results. Including the migration controls

4. The censuses do not provide information on the timing of migration except whether respondents migrated more than a decade before.

5. For the decades 1960 to 2010, these measures are calculated using the censuses 1962–2006. For earlier decades, I use information on bilateral migration flows between départements in the censuses of 1911 and 1946—these are the only censuses before 1962 for which this information is available. Because the administrative geography of the French territory underwent various modifications before 1962, some former départements cannot be mapped into newly created ones, such as the département of Seine-et-Oise. As a result, some respondents cannot be assigned migration controls, especially in the earlier censuses.

6. This information is not available in the censuses after 2008.

or estimating the baseline specification on the "one-and-a-half" generation of migrants only slightly decreases the estimates.[7] This suggests that selective migration is not a primary mechanism that can explain the patterns in the data. All the results are similar when the outcome is an indicator for whether the individual is in the labor force (see Figure C.15).[8]

C.3.3 Inaccurate Assignment of Military Death Rates

To relax the assumption that migrant's départements of birth correspond to their départements of origin, I replicate the analysis using the extended version of the labor force surveys 2005–2012, as they provide the départements of birth of respondents' parents. In particular, I restrict the sample to migrant married women whose parents were born in the same département as them. A typical respondent in this regression sample has parents who were born in the 1930s. As a result, it is all the more plausible to assume that the assignment of geographical origins traces back to the interwar period. I provide the results in Table C.14. They are in line with the ones obtained when using the censuses: they imply that women born—and both whose parents were born—in départements exposed high military death rates (20%) rather than to low military death rates (10%) were 8 percentage points more likely to be working between 2005 and 2012. This suggests that the potential inaccurate assignment of military death rates using the censuses only creates a slight attenuation bias in the baseline estimates.

A related potential concern is that the département of birth of a respondent may not correspond to the département in which she grew up. If socialization with the surrounding environment beyond own parents is an important driving mechanism, then assigning the département of birth as a respondent's cultural origin may underestimate the long-run impact of WWI military fatalities on women's working behavior. To explore the extent of this

7. For earlier censuses, the baseline estimates and those controlling for migration are not fully comparable as the sample is different; the migration controls are not defined for a substantive portion of the sample because of changes in the administrative geography of the French territory throughout the twentieth century (see footnote 5 on page 189).

8. The full set of results for both outcomes is available in table form in Appendix Tables C.21–C.46.

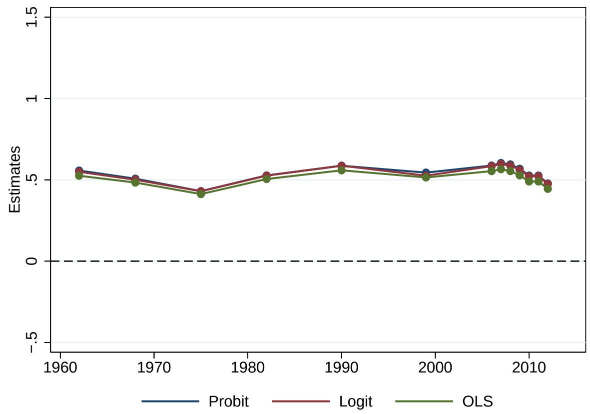
potential issue, I use information about where respondents were residing in the previous census—this information is only available in the censuses 1962–1999—and replicate the baseline analysis when including fixed effects for the département of residence in the previous census. This enables to effectively compare women with similar migration histories. I report the results in Figure C.16. They are nearly identical to the baseline estimates, suggesting that alternative migration histories do not bias the results.

C.3.4 Education and Fertility

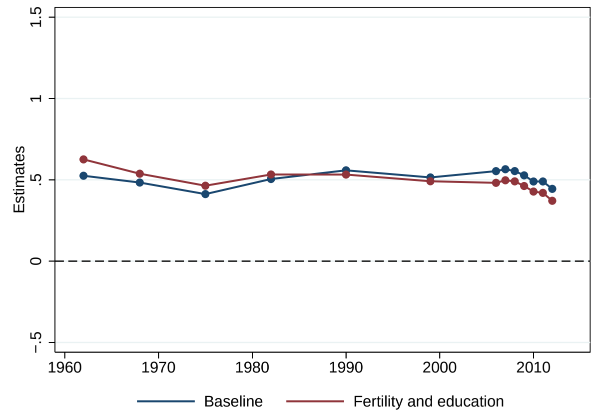
Labor market outcomes of married women are endogenous to their human capital investment and fertility decisions.[9] As a result, these decisions may confound the relationship between women's working behavior and WWI military fatalities. For instance, if women born in départements exposed to higher military death rates held more favorable views toward being a working wife, they may anticipate a longer career from the onset, and thus make larger human capital investments when young. These investments may in turn increase their likelihood to enter the labor force later in life because of higher wage draws. To examine the role of these potential channels, I augment the baseline specification by including indicators for women's educational attainment and controlling for their number of children.[10] These additional controls do not affect the results (Panel B of Figure C.10). This suggests that the long-run impact of WWI military fatalities was direct rather than mediated by education and fertility decisions. The coefficients from this specification imply that the labor force participation impact of being born in a département exposed to high military death rates rather than low military death rates is equivalent in magnitude to one third of the impact of graduating from high school, or one half of the impact of having one fewer child.

9. See Greenwood, Guner and Vandenbroucke (2017) for a recent review of family economics models.

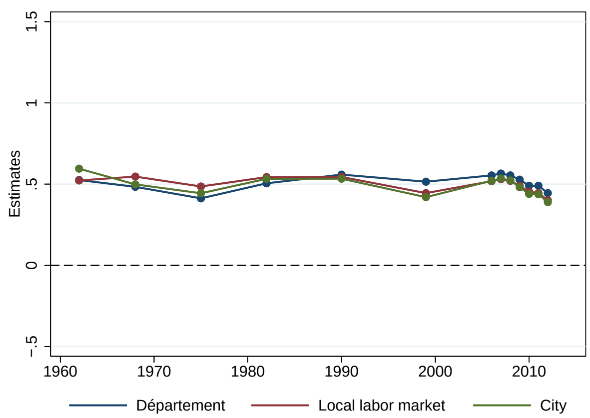
10. Educational attainment indicators consist of indicators for primary or lower secondary education (excluded), technical secondary education, high school, and higher education. The number of children correspond to the number of own children in the household aged 0 to 6.



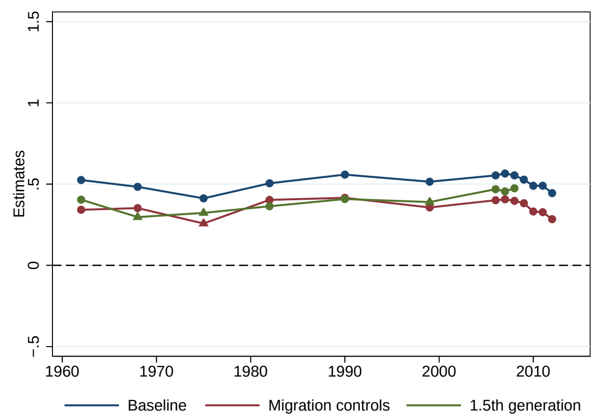
(A) Baseline Across Probability Models



(B) Fertility and Education Controls



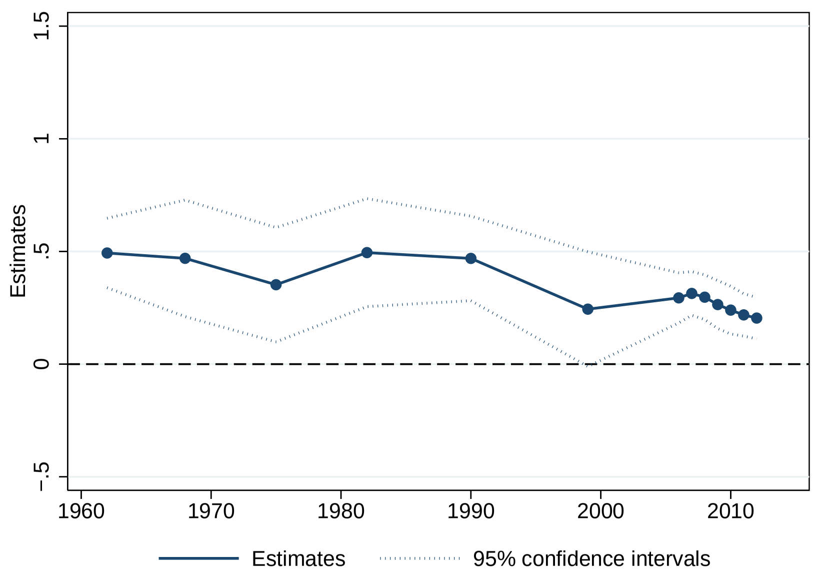
(C) Baseline Across Residence FE



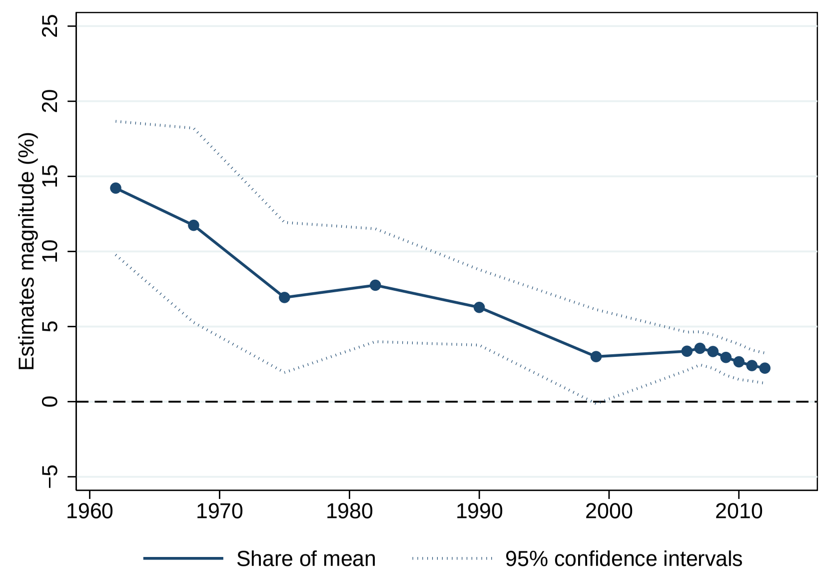
(D) Migration Controls

Figure C.10: The Impact of WWI Military Fatalities on FLFP, Robustness

Notes. Panel A reports the OLS coefficients from estimating specification 3.1 with three different probability models. For the Probit and the Logit models, I report the marginal coefficients evaluated at the mean of covariates. Panel B augments the baseline specification with educational attainment indicators (primary or lower secondary education (excluded), technical secondary education, high school, and higher education) and the number of own children in the household aged 0 to 6. Panel C reports the OLS coefficients from estimating specification 3.1 with successively département of residence fixed effects, local labor market fixed effects (ZIUP and EZ), and city fixed effects (commune and canton-city). Panel D restricts the sample to migrants who were residing in their département of residence in the previous census—this information is only available until the census of 2008. It also augments the baseline specification with the bilateral distance between origin and destination départements and with the département-specific and dyadic migration controls. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level. ▲ significant at the 5% level.



(A) Baseline Estimates



(B) Magnitude Relative to the Mean

Figure C.11: The Impact of WWI Military Fatalities on FLFP

Notes. Panel A reports the OLS coefficients from estimating equation 3.1. The dependent variable is an indicator for whether the individual is in the labor force. All regressions contain cohort, département of residence, and military region of birth fixed effects, as well as a set of historical controls measured at the level of individuals' départements of birth in 1911. They consist in the share of rural population, the share of the residing population born in the département, the female labor force participation rate, the total fertility rate, the share of girls aged 5–19 who go to primary or secondary school, and the average private 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 Appendix Table C.13 for details about sample sizes for each census year. Appendix Tables C.34–C.46 report the results for each census year separately. Panel B reports the magnitude of the coefficients from Panel A with respect to the outcome mean. The magnitude is interpreted as the share of the mean in the dependent variable explained by switching from being born in a département exposed to a military death rate of 10% to a département exposed to a military death rate of 20%. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

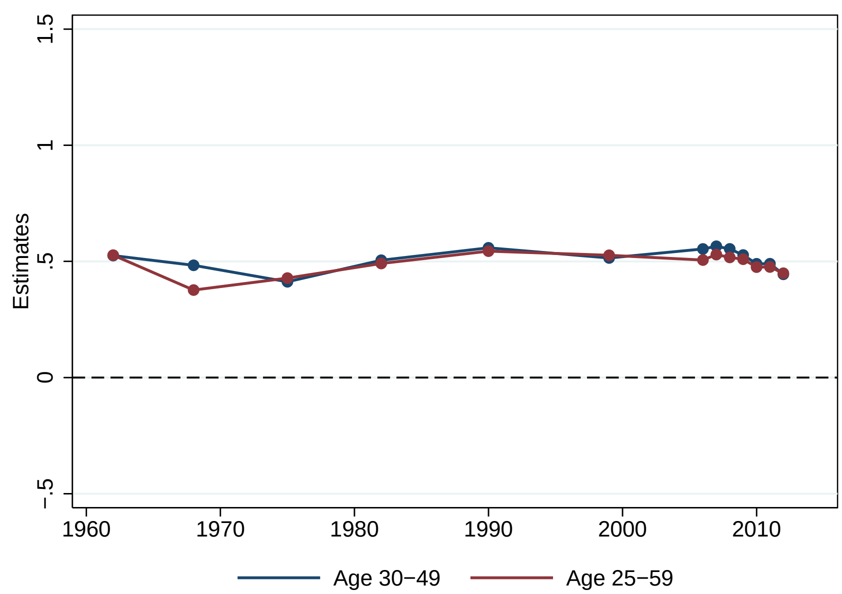
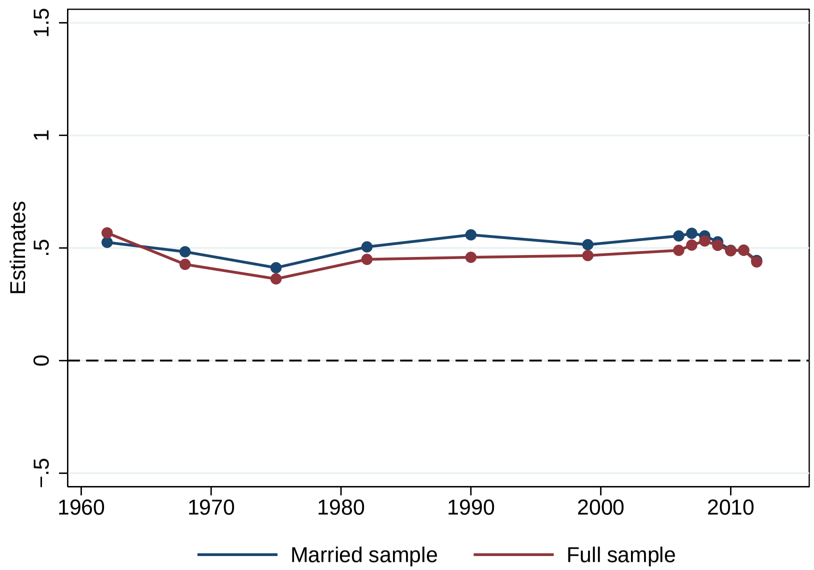
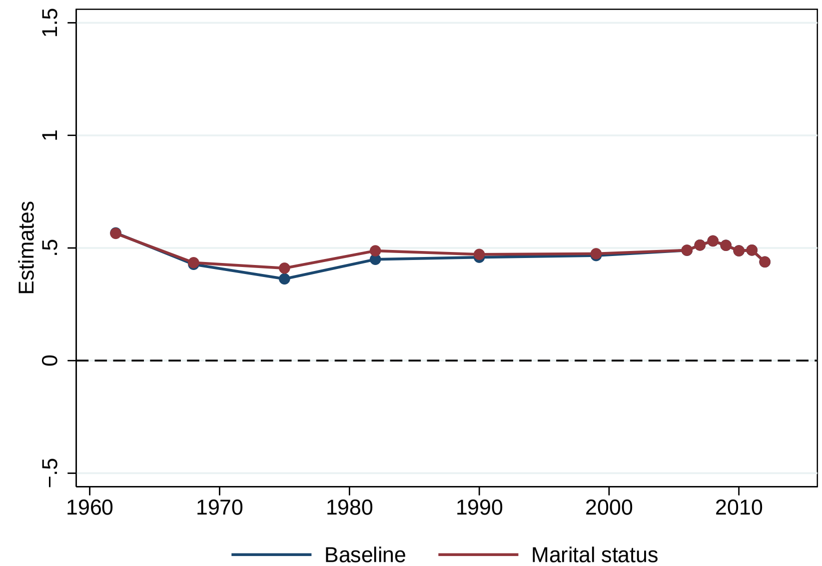


Figure C.12: Wider Age Bounds

Notes. This figure replicates the analysis of Figure 3.1 when using a wider age bounds: migrant married women aged 25 to 59 instead of migrant married women aged 30 to 49. See Figure 3.1 notes for more details. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.



(A) Married Versus Full Sample



(B) Marital Status Controls

Figure C.13: Women of All Marital Statuses

Notes. Panel A reports the OLS coefficients from estimating equation 3.1 on the sample of women of all marital statuses. It also reports the baseline estimates from Figure 3.1 for comparison. The dependent variable is an indicator for whether the individual is employed. The specification in panel B includes the following indicator variables for marital status: single (excluded), married, widowed, and divorced. Standard errors are clustered both at the level of individuals' départements of birth and départements of residence. The sample consists of migrant women aged 30 to 49. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

• significant at the 1% level.

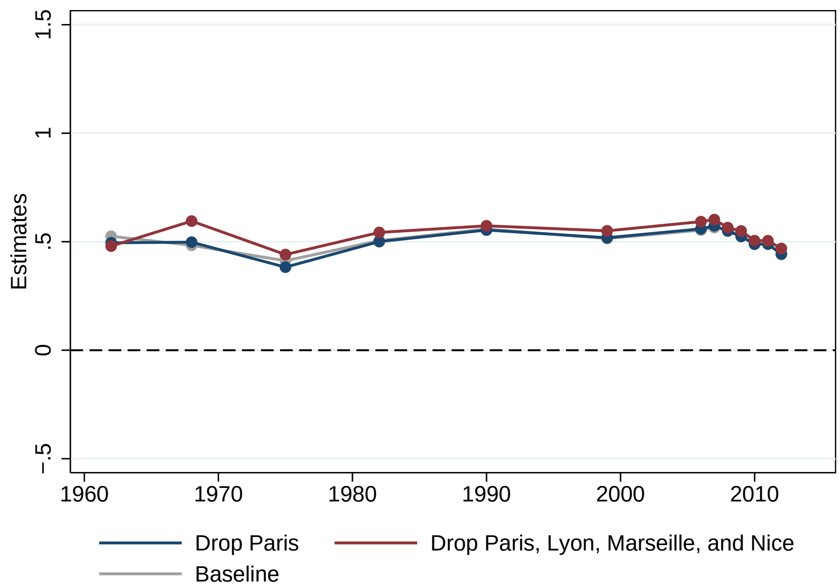
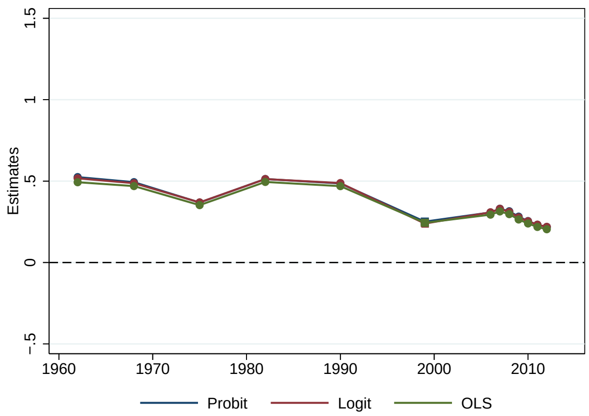
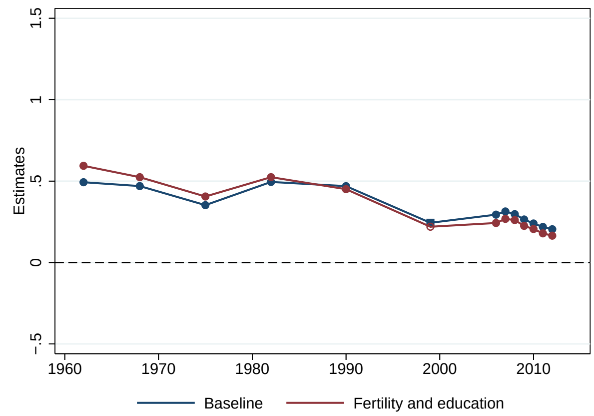


FIGURE C.14: DROP URBAN DÉPARTEMENTS

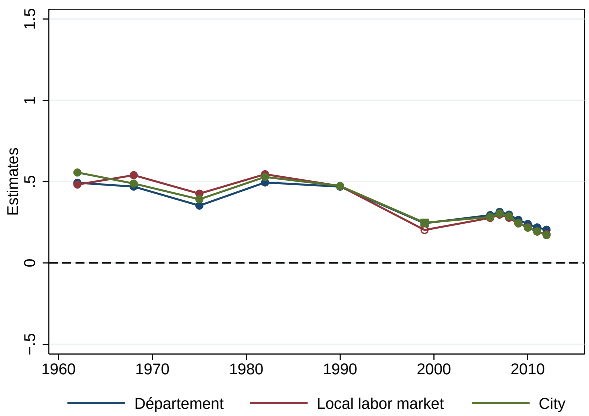
Notes. This figure replicates the analysis of Figure 3.1 when dropping the most urban départements: Paris (75, Paris), Rhône (69, Lyon), Bouches-du-Rhône (13, Marseille), and Alpes-Maritimes (06, Nice). See Figure 3.1 notes for more details. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.



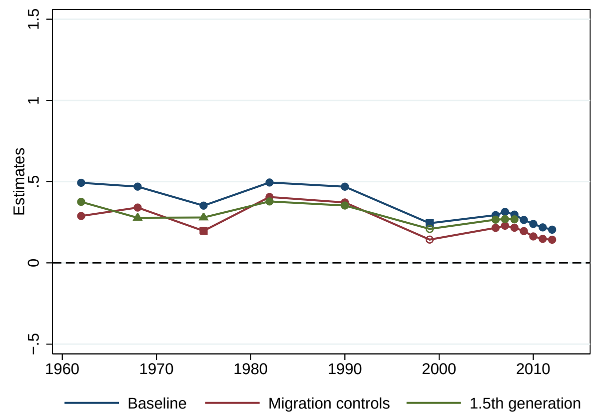
(A) Baseline Across Probability Models



(B) Fertility and Education Controls



(C) Baseline Across Residence FE



(D) Migration Controls

Figure C.15: The Impact of WWI Military Fatalities on FLFP, Robustness

Notes. The dependent variable is an indicator for whether the individual is in the labor force. Panel A reports the OLS coefficients from estimating specification 3.1 with three different probability models. For the Probit and the Logit models, I report the marginal coefficients evaluated at the mean of covariates. Panel B augments the baseline specification with educational attainment indicators (primary or lower secondary education (excluded), technical secondary education, high school, and higher education) and the number of own children in the household aged 0–6. Panel C reports the OLS coefficients from estimating specification 3.1 with successively département of residence fixed effects, local labor market fixed effects (ZIUP and EZ), and city fixed effects (commune and canton-city). Panel D restricts the sample to migrants who were residing in their département of residence in the previous census—this information is only available until the census of 2008. It also augments the baseline specification with the bilateral distance between origin and destination départements and with the département-specific and dyadic migration controls. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level. ▲ significant at the 5% level. ■ significant at the 10% level.

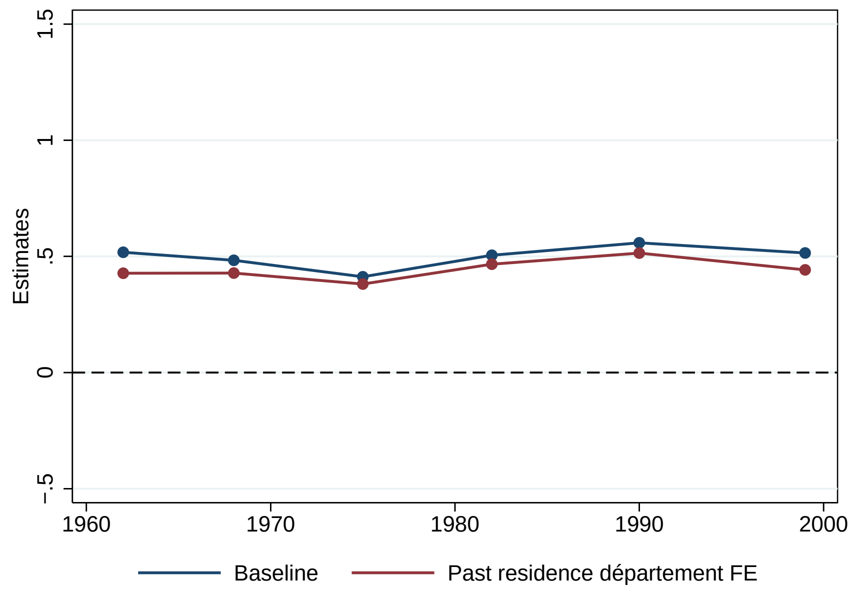


Figure C.16: Past Residence Département Fixed Effects

Notes. This figure replicates the analysis of Figure 3.1 when including fixed effects for the département of residence in the previous census. This information is only available in the censuses 1962–1999. Data from the censuses (1962–1999). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.

Table C.13
Residence Location Units

		A. Local labor markets				B. Cities			
Census	Obs	Def	Units	In sample	Obs/unit	Def	Units	Singletons	Obs/unit
1962	64,145	ZIUP	801	83.94	67	Com.	5,883	3,099	10
1968	419,366	ZIUP	790	88.40	469	Com.	17,636	7,489	23
1975	337,463	ZIUP	857	90.44	356	Com.	15,692	7,397	21
1982	464,979	ZIUP	859	92.96	503	Com.	20,625	6,413	22
1990	501,485	ZIUP	596	96.05	808	Com.	22,916	5,915	22
1999	106,067	EZ	331	100.00	320	Com.	11,276	8,387	9
2006	660,780	EZ	331	100.00	1,996	Cant.	3,575	1	185

Notes. This table describes the types of residence location units available in the censuses besides the département of residence. The sample consists of migrant married women aged 30 to 49. *In sample* corresponds to the share of observations in the original regression sample that reside in a ZIUP. *Com.* corresponds to *communes*, *Cant.* to *canton-cities*, and *Singletons* to the number of observations that are the only ones to reside in a given commune or canton-city. These observations are effectively dropped in the regressions using city fixed effects. Data from the censuses (1962–2006). See Appendix D for a definition of ZIUPs, EZs, communes, and canton-cities. The censuses 2007–2012 contain a similar number of households and units as the census of 2006. Acronyms: ZIUP = Zone of Industrial and Urban Population; EZ = Economic Zone; Obs = Observations; Def = Definition.

Table C.14
Parents and Daughters Born in the Same Département

Dependent variable	Employed					
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate	0.78**	0.72**	0.96***	0.86**	0.87**	0.82**
	[0.32]	[0.33]	[0.36]	[0.36]	[0.36]	[0.36]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Husband and household controls	No	Yes	No	Yes	No	Yes
Département of birth same as						
Mother's	Yes	Yes	No	No	Yes	Yes
Father's	No	No	Yes	Yes	Yes	Yes
Clusters						
Birth département	92	92	92	92	92	92
Residence département	92	92	92	92	92	92
Observations	73,675	73,675	70,205	70,205	51,386	51,386
Outcome mean	0.77	0.77	0.78	0.78	0.78	0.78

Notes. This table reports the OLS coefficients from estimating specification 3.1 on the extended version of the labor force surveys 2005–2012. All the regressions contain survey-year indicators. Husband and household controls include husbands' income, age, age squared, educational attainment, an indicator for whether the household owns its housing, and the number of rooms in the home. Standard errors are clustered at the level of individuals' départements of birth and residence. The sample consists of migrant married women aged 30 to 59 with at least one parent born in the same département as the respondent. The estimates are computed using the sample weights provided in the labor force surveys. Data from the extended labor force surveys (2005–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

C.4 The Role of World War II

In this appendix, I show that the military fatalities (section C.4.1) and war destructions (section C.4.2) from WWII play no role in the estimated long-run impact of WWI military fatalities on female labor force participation.

C.4.1 World War II Military Fatalities

Consider first WWII military death rates. Should these be correlated with WWI military death rates, part of the estimated long-run impact of WWI military fatalities on female labor force participation would be attributable to WWII military fatalities. While this is possible, the magnitude of WWII military fatalities relative to those from WWI implies that this part should be marginal at best. Indeed, about 115,000 French soldiers born in mainland départements died during WWII—ten times fewer than WWI military fatalities (1.3 million).[11]

To explore this possibility in more details, I collect the number of French soldiers who died as a result of WWII for each département from the *Mémoire des Hommes* (MDH) archive. Analogous to WWI military death rates, the WWII military death rate in a département is defined as the ratio of the number of deceased soldiers born in the département to its male population aged 15 to 44 in the census of 1936—the last census before the war. WWII military death rates range from 0.7% in Alpes-Maritimes to 3.8% in Finistère. The average WWII military death rate is 1.5%, the 25th percentile 1%, and the 75th percentile 2%. Overall, WWII military death rates are one order of magnitude lower than WWI military death rates.

I first analyze whether WWI and WWII military death rates are correlated. The system-

11. According to recent estimates in Lagrou (2002), 150,000 French soldiers died during WWII—slightly lower than the traditional estimate of 170,000 from the report of the *Commission Consultative des Dommages et des Réparations* (1951). This includes 40,000 French soldiers from Alsace-Lorraine forcibly enrolled in the *Wehrmacht* who died on the Eastern Front. Among these 150,000 military fatalities, 25,000 were from Overseas France.

atic variation in WWI military death rates across départements was essentially due to the policies implemented by the Ministry of War to sustain the industrial war effort. As a result of these policies, rurality was a strong predictor of WWI military death rates. I show that this was somewhat also the case for WWII military fatalities, although to a smaller extent.[12] I report the estimates from regressing WWII military death rates on pre-WWI characteristics in columns 3 and 4 of Table C.15. Columns 1 and 2 report estimates from analogous specification for WWI military death rates. Because at least part of the systematic variation in WWII military death rates across départements was due to similar factors than that in WWI military death rates, both measures are correlated: départements exposed to high WWI military death rates (20%) rather than to low WWI military death rates (10%) were exposed to 0.7 percentage point higher WWII military death rates—see column 5. While this correlation is statistically significant, including pre-WWI characteristics in column 6 renders it null. As a result, it is very unlikely that part of the estimated long-run impact of WWI military fatalities on female labor force participation is driven by WWII military fatalities.

To support this assertion, I directly estimate the impact of WWII military fatalities on female labor force participation. More precisely, I estimate specification 3.1 with WWII military death rates as the regressor instead of WWI military death rates. I report the results in Panel A of Figure C.17 along with the baseline estimates when using WWI military death rates as the regressor for comparison. None of the estimates relative to WWII are significant at conventional levels. Unsurprisingly, when including military death rates relative to both WWI and WWII in the specification, the estimates relative to WWI are identical to the baseline results (Panel B of Figure C.17).

12. About 650,000 French soldiers were affected to war factories at the mobilization in September 1939, representing 14% of mobilized soldiers—4.7 million (Garraud, 2005). This is comparable to the share of recalled soldiers into war factories during WWI.

Table C.15
WWI and WWII Military Death Rates

Dependent variable: military death rate	WWI		WWII			
	(1)	(2)	(3)	(4)	(5)	(6)
WWI military death rate					0.07***	-0.01
					[0.02]	[0.02]
Pre-WWI characteristics (1911)						
Share rural population	0.12***	0.11***	0.01*	0.01***		0.01***
	[0.01]	[0.01]	[0.00]	[0.00]		[0.00]
Share born in département	0.12***	0.16***	0.01**	0.01		0.01*
	[0.03]	[0.03]	[0.01]	[0.01]		[0.01]
Other characteristics	No	Yes	No	Yes	No	Yes
Départements	87	87	87	87	87	87
R^2	0.739	0.782	0.281	0.611	0.260	0.609
Outcome mean	0.16	0.16	0.02	0.02	0.02	0.02

Notes. This table reports the OLS coefficients from regressing WWI and WWII military death rates on various pre-WWI département characteristics. *Other characteristics* include the female labor force participation rate, the share of girls aged 5–19 in school, the total fertility rate, and the average personal wealth per inhabitant in thousand francs. All these variables are measured in 1911, except the average personal wealth which is measured in 1908. See Appendix D for details about variables sources and definitions. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

(A) WWI Versus WWII

(B) WWII Control

Figure C.17: The Impact of WWI and WWII Military Fatalities on FLFP

Notes. Panel A reports the OLS coefficients from estimating specification 3.1 separately with WWI military death rates and WWII military death rates as regressors. Panel B reports the OLS coefficients when using WWI military death rates as regressor and controlling for WWII military death rates. Standard errors are clustered at the level of individuals' départements of birth and residence. The sample consists of migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. See Appendix D for details about variables sources and definitions.

• significant at the 1% level.

C.4.2 World War II Destructions

Next, consider WWII destructions. Contrary to WWI, the destructions resulting from WWII affected most of the territory. While the combats in May–June 1940 mostly occurred in the North-East, the combats in 1944 affected both the South-East and the North-West. Although the empirical strategy uses département of residence fixed effects throughout, it could still be problematic if WWI military death rates were correlated with WWII destructions. First, the loss of physical capital in some départements could have implied a decline in the demand for labor in these départements relative to other département, biasing the estimated impact of WWI military fatalities on female labor force participation downward for women from these départements. Alternatively, the reconstruction effort in these départements could have implied an increase in the demand for labor, biasing the estimates upward. The net impact on the estimates would then depend on the relative intensity of war destructions vis-à-vis the reconstruction effort, and on the extent of the correlation with WWI military fatalities.

To analyze the potential role of WWII destructions on the estimated long-run impact of WWI military fatalities on female labor force participation, I collect data that approximate the extent of the destructions from WWII at the département level. In particular, I collect the share of a département's area that needed to be cleared from land mines, the share of a département's building that were partially or totally destroyed, and the share of a département's factories that were destroyed. The first two variables are from the *Commission Consultative des Dommages et des Réparations* (1951), and the third is from Flaus (1947). Table C.16 provides some summary statistics for the destruction measures.

Table C.17 presents correlations between WWI military death rates and these measures of WWII destructions. Départements with relatively more WWII destructions experienced relatively less WWI military fatalities. However, this correlation disappears when including pre-WWI characteristics in the regressions (see column 5). Still, even after these pre-WWI

Table C.16
Summary Statistics, World War II Destructions

	Mean	S.d.	Min	Max
Share land with mines	0.01	0.01	0.00	0.10
Share buildings partially destroyed	0.01	0.02	0.00	0.11
Share buildings totally destroyed	0.03	0.04	0.00	0.28
Share buildings destroyed	0.04	0.06	0.00	0.40
Share factories destroyed	0.01	0.02	0.00	0.12

Notes. This table reports summary statistics for WWII destructions across all 87 départements for which WWI military fatalities are available. *Share buildings destroyed* is the sum of the share of buildings partially and totally destroyed. See Appendix D for details about variables sources and definitions.

controls, the distribution of WWI military death rates appears to be correlated with the share of buildings destroyed in a département during WWII. However, this correlation is quantitatively small: départements that experienced low levels of building destructions during WWII (1%, or those at the 25th percentile) rather than high levels of building destructions during WWII (2%, or those at the 75th percentile) only experienced half an additional percentage point in WWI military death rates.

To further explore whether WWII destructions could bias the estimated long-run impact of WWI military fatalities on female labor force participation, I replicate baseline specification 3.1 and include measures of WWII destructions as controls. I report the results in Appendix Figure C.18. They imply that WWII destructions do not affect the baseline estimates.

Table C.17
WWI Military Death Rates and WWII Destructions

Dependent variable:	WWI military death rates				
	(1)	(2)	(3)	(4)	(5)
WWII destruction measures					
Share land with mines	-0.97***			-0.78**	0.11
	[0.30]			[0.35]	[0.12]
Share buildings destroyed		-0.09		0.04	-0.08*
		[0.06]		[0.07]	[0.04]
Share factories destroyed			-0.50**	-0.38*	-0.11
			[0.19]	[0.23]	[0.08]
Pre-WWI characteristics (1911)					
Share rural population					0.11***
					[0.01]
Share born in département					0.17***
					[0.03]
Other characteristics	No	No	No	No	Yes
Départements	87	87	87	87	87
R^2	0.129	0.010	0.094	0.152	0.795

Notes. This table reports the OLS coefficients from regressing WWI military death rates on WWII destructions measures and various pre-WWI département characteristics. *Other characteristics* include the female labor force participation rate, the share of girls aged 5–19 in school, the total fertility rate, and the average personal wealth per inhabitant in thousand francs. All these variables are measured in 1911, except the average personal wealth which is measured in 1908. See Appendix D for details about variables sources and definitions. Robust standard errors are in brackets.
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

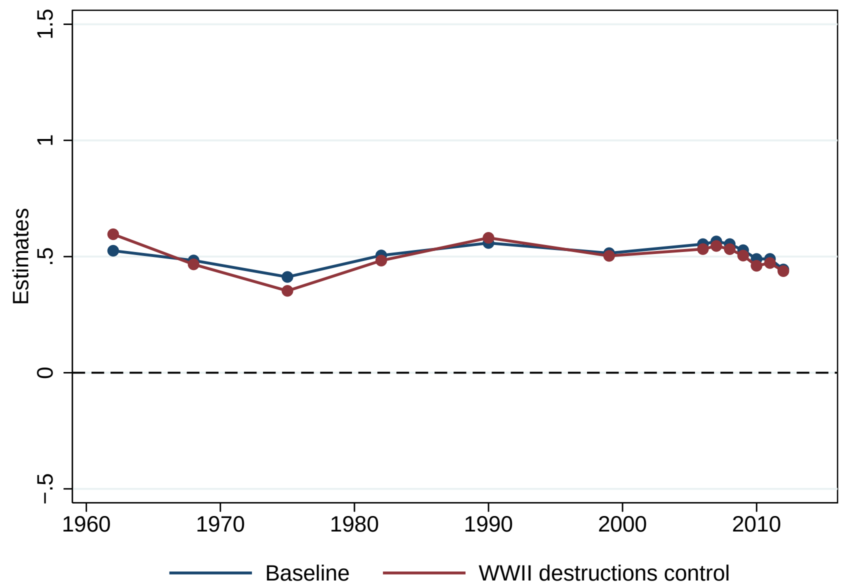


Figure C.18: Control for WWII Destructions

Notes. This figure reports the OLS coefficients from estimating baseline specification 3.1 and controlling for the following measures of WWII destructions: the share of land with mines, the share of buildings partially or totally destroyed during the war, and the share of factories destroyed during the war. Standard errors are clustered at the level of individuals' départements of birth and residence. The sample consists of migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.

C.5 Other Results

C.5.1 Alternative Outcomes

As discussed in section 3.1.4, fertility and education choices do not appear to mediate the relationship between WWI military fatalities and women's working behavior. To assess this possibility more directly, I estimate the baseline specification for various fertility and education outcomes (see Figures C.19 and C.20). As expected, women born in départements exposed to higher military death rates did not make different fertility or education choices.[13] Moreover, they do not marry at different rates (see Figure C.21). The results are similar when using the labor force surveys instead of the censuses (see Tables C.18 and C.19).

C.5.2 Household-Level Analysis

It is possible to match husbands and wives in the censuses, thereby enabling a household-level analysis. I estimate the baseline specification when including husband and household characteristics. Husband characteristics include husbands age and age squared, indicators for their educational attainment, and an indicator for whether they are employed.[14] Household characteristics include an indicator for whether the household owns its housing, the number of rooms in the home, and a measure of housing quality. These variables attempt to capture how wealthy a household is.[15] I report the results in Figure C.22. The estimates are similar to the baseline, suggesting that women born in départements exposed to higher military death rates did not choose husbands that differed along these characteristics. Furthermore, this did not generate substitution between wives' and husbands' market work as husbands of

13. I also ran analyses showing that women born in départements exposed to higher military death rates do not choose more technical curricula, or chose more male-biased occupations. These analyses are available upon request.

14. Educational attainment indicators include primary or lower secondary education (excluded), technical secondary education, high school, and higher education.

15. The censuses do not contain explicit wealth, income, or wage measures. See Appendix D for more details on how the measure of housing quality is constructed.

women born in départements exposed to higher military death rates are not more likely to be working (see Panel A of Figure C.23).[16] As a result, these households are slightly more likely to own their housing (see Panel B of Figure C.23).

C.5.3 Heterogeneity Across Categories of Women

To assess the extent of heterogeneity in the labor supply response to WWI military fatalities across categories of women, I estimate the baseline specification along with a set of interaction terms. I analyze heterogeneity along four types of characteristics: the number of children in the household, the level of education, the position in the life cycle, and the marital status. First, I explore whether women with more children respond more to WWI military fatalities. I augment the baseline specification with the number of children in the household together with an interaction term. I report the results in Panel A of Figure C.24. As expected, women with more children are less likely to be employed. However, their labor supply does not respond more to WWI military fatalities.[17] Similarly, I find no heterogeneity in the impact of WWI military fatalities on the labor supply of women aged 40 to 49 relative to those aged 30 to 39 (Panel C), or of married women relative to unmarried women (Panel D). However, the labor supply of high school graduates did respond more to WWI military fatalities from the 1960s to the 1980s: while women without a high school degree born in départements exposed to high military death rates (20%) rather than low military death rates (10%) were 4 percentage points more likely to be working on average between 1962 and 1982, those with a high school degree were 11 percentage points more likely to be working.

16. Figure C.23 reveals that the husbands of women born in départements exposed to higher military death rates are, however, more likely to be working in the 2000s. Nevertheless, the magnitude of the coefficients is very small at 0.1, suggesting that the husbands of women born in départements exposed high military death rates (20%) rather than to low military death rates (10%) were 1 percentage point more likely to be working between 2006 and 2012—about 94% of these men were employed during that period.

17. The labor supply of women with more children does respond slightly more to WWI military fatalities in the 2000s. However, this differential impact is small: while women with no children born in départements exposed to high military death rates (20%) rather than low military death rates (10%) were 4 percentage points more likely to be working on average between 2006 and 2012, those at the mean of the data (1.7 children) were 5 percentage points more likely to be working.

Nevertheless, this heterogeneous impact concerned very few women as only 14% of them were high school graduates during this period.

C.5.4 Cohort-Specific Estimates

I estimate the baseline specification separately on each decennial cohort present in the censuses—the cohorts 1910–1970—, where I pool all the censuses together. I include census-year fixed effects in all regressions. Table C.20 reports the results (see also Panel A of Figure C.25). Consistent with the baseline results, the estimates for each cohort are stable around 0.5 and significant at the 1% level. The magnitude of the long-run impact of WWI military fatalities relative to the mean nevertheless linearly declines across cohorts (see Panel B of Figure C.25).

C.5.5 Placebo Test Using the Male Sample

I replicate the baseline analysis using the sample of married men aged 30 to 49. Consistent with my interpretation, I find that while WWI military fatalities had a long-run impact on female labor force participation, they did not affect male labor force participation—the estimates are precisely zero (see Figure C.26).

C.5.6 Corroborative Evidence From the Labor Force Surveys (1982–2013)

To corroborate the results obtained with the censuses, I combine all thirty-two annual labor force surveys between 1982 and 2013. They provide respondents' départements of residence and départements of birth. These surveys have both drawbacks and advantages over the censuses. On the one hand, information about respondents' départements of birth is not available in the labor force surveys prior to 1982, while it is available from 1962 onwards in the censuses. Moreover, the sample size of the labor force surveys is smaller than that of the censuses: while most censuses are 20–25% samples of the population, the labor force surveys are 1.5–3% samples. On the other hand, the labor force surveys contain a wider range of labor market outcomes: besides the labor status of the respondent, they contain her weekly hours worked, whether she ever worked, the number of months since she has been working in her current firm, and her monthly wage rate.[18]

I pool all thirty-two labor force surveys and estimate the baseline specification on the sample of migrant married women aged 30 to 49, together with survey-year fixed effects. The results are reported in Table C.21. They are similar to those when using the censuses: for instance, the coefficient for the *Employed* outcome is 0.57 (standard error of 0.15) compared to an average coefficient of 0.52 in analogous regressions using the censuses 1982–2012.

The labor force surveys provide other interesting results. While they are more likely to be in the labor force, there is no evidence that women born in départements exposed to high military death rates are more likely to have been previously working: the coefficient on *Ever worked* is close to zero and not significant. Moreover, conditional on being working, women born in départements exposed to high military death rates (20%) rather than to low military death rates (10%) work 1.3 less hours per week (4% of mean hours), and remain 16 months longer in their firm (13% of mean months in firm). These results suggest that women born in higher death rate départements have a higher attachment to the labor force, but that this impact on the extensive margin does not translate into the intensive margin, as these women work shorter hours.

C.5.7 Unobserved Heterogeneity in Human Capital

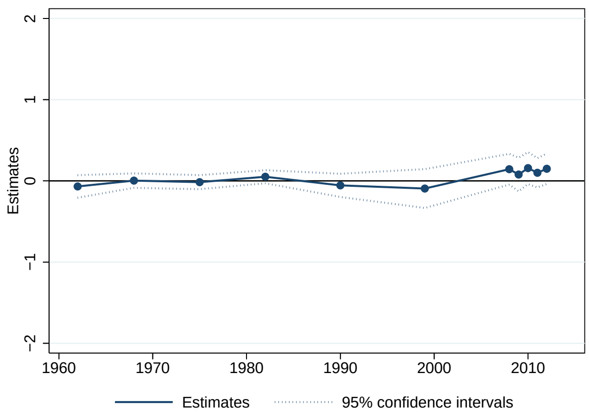
Although there is no evidence that WWI military fatalities had a long-run impact on women's educational attainment—so that heterogeneity *observed* in human capital cannot account for the results—, the results could be driven by heterogeneity in *unobserved* human capital. For instance, women born in départements exposed to higher military death rates could have better information about the payoffs from working and about labor market conditions in

18. Summary statistics are available in Appendix Table C.16.

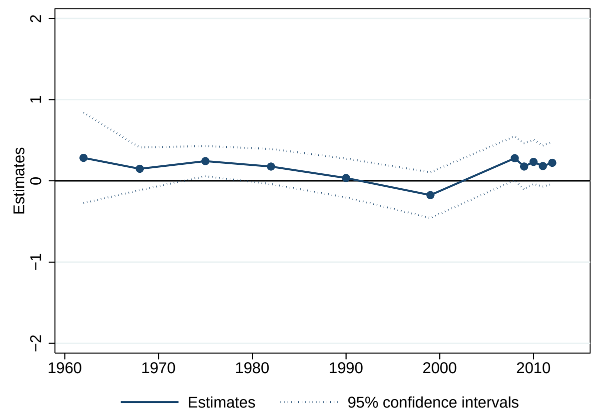
general, making them more likely to get a high wage draw and enter the labor force. To assess this possibility, I estimate the baseline specification with log monthly wage rates as the dependent variable on the restricted sample of working women using the labor force surveys 1982–2013.[19] I report the results in Table C.22. The coefficient on military death rates is close to zero and not significant. Controlling for measures of educational attainment does not alter the results. I replicate the analysis using a Heckman selection model where husbands' characteristics are used to control for selection into the labor force—husbands age and age squared, education level and employment status.[20] The results are similar to the ones obtained with the restricted sample. Overall, there is no evidence that heterogeneity in unobserved human capital helps explain the long-run impact of WWI military fatalities on women's working behavior.

19. Fernández and Fogli (2009) run a similar set of robustness checks when analyzing the role of origin country female labor force participation for the labor force participation of second generation immigrant women to the U.S.

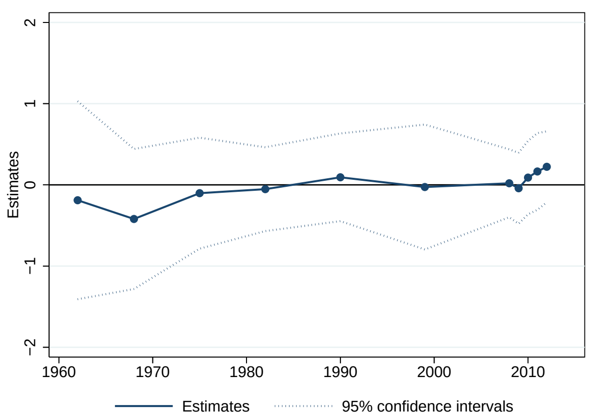
20. The results are similar when using the number of children in the selection equation.



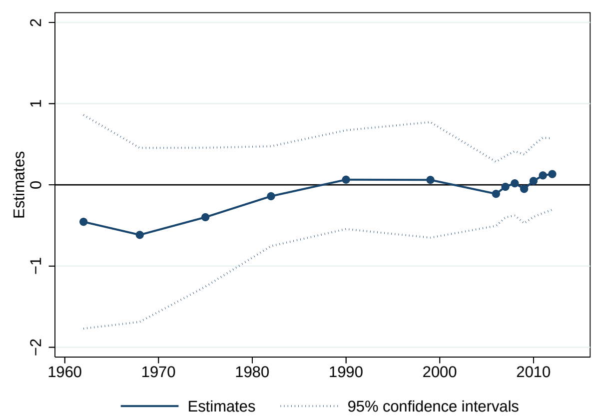
(A) Children Aged 0–2



(B) Children Aged 0–6



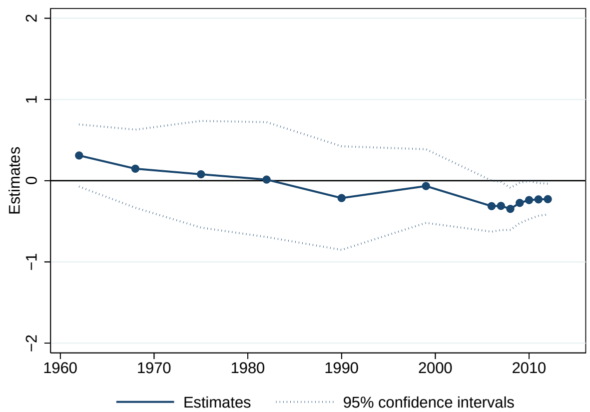
(C) Children Aged 0–16



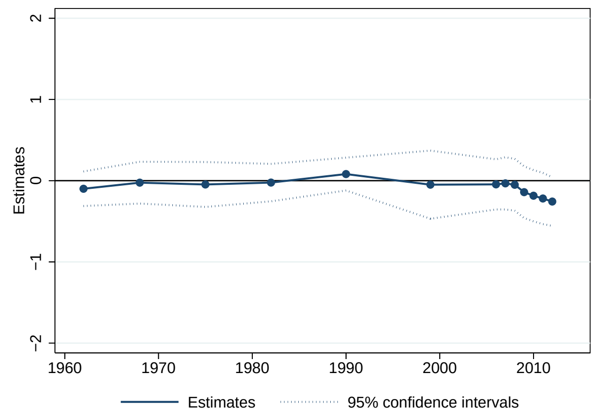
(D) All Children

Figure C.19: The Impact of WWI Military Fatalities on Fertility

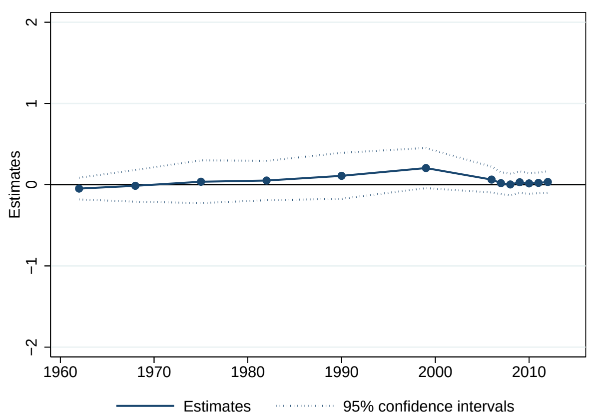
Notes. This figure presents the OLS coefficients from estimating equation 3.1 with the number of own children in the household as outcomes. The censuses of 2006 and 2007 do not provide the number of children by age, so they are excluded from panels A, B, and C. In panel A, the number of children is for ages 0–3 for the censuses of 1990, and 2008–2012. In panel C, the number of children is for ages 0–18 for the censuses of 2008–2012. Standard errors are clustered both at the level of the individuals' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.



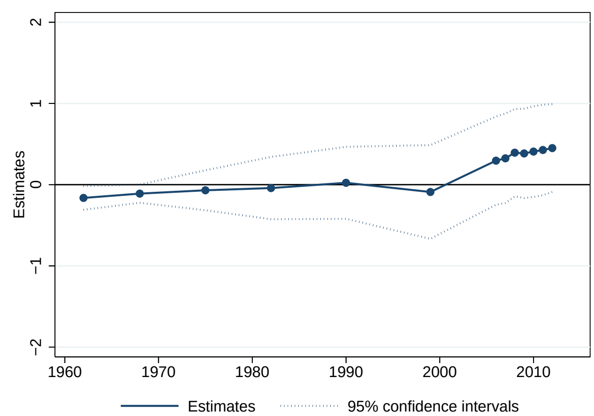
(a) Primary or Lower Secondary



(b) Technical Secondary



(c) High School



(d) Higher Education

Figure C.20: The Impact of WWI Military Fatalities on Education

Notes. This figure presents the OLS coefficients from estimating equation 3.1 with indicators for educational attainment as outcomes. Standard errors are clustered both at the level of the individuals' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

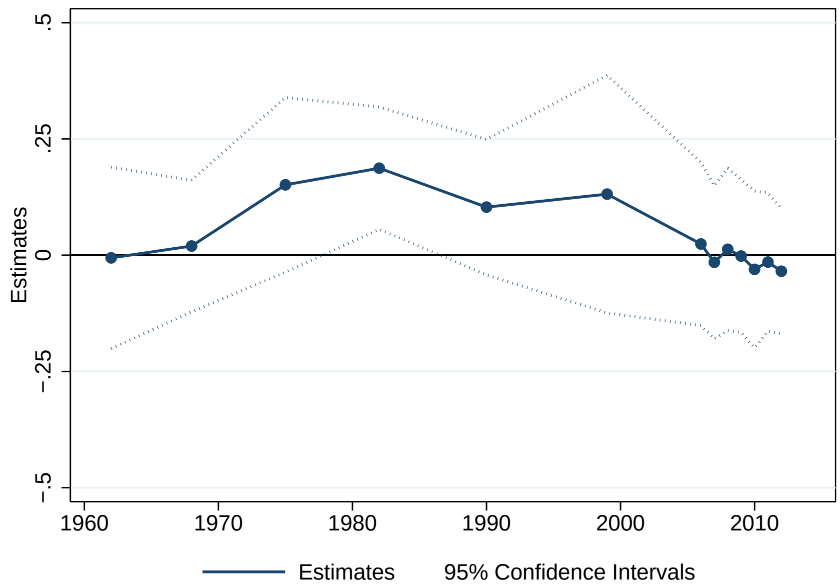


Figure C.21: The Impact of WWI Military Fatalities on Marital Status

Notes. This figure presents the OLS coefficients from estimating equation 3.1 with an indicator for being married as the outcome. Standard errors are clustered both at the level of the individuals' départements of birth and départements of residence. The sample consists of migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

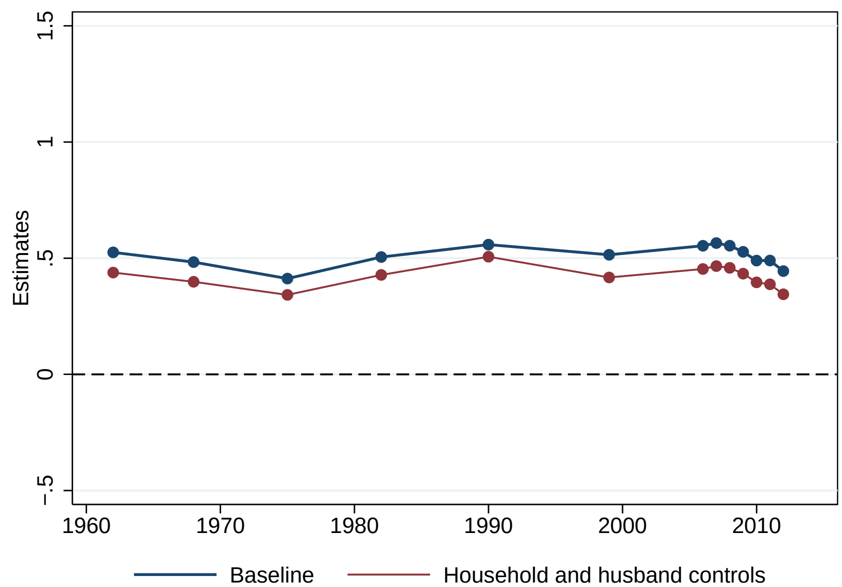
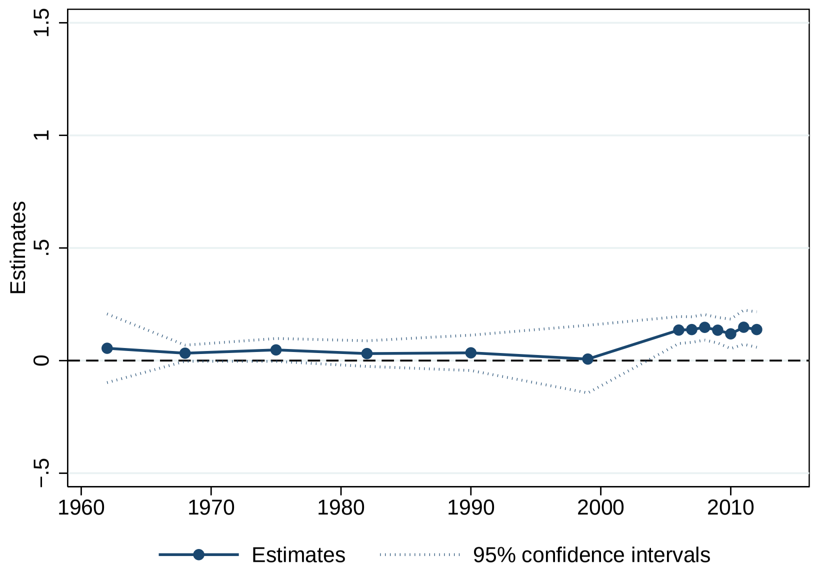
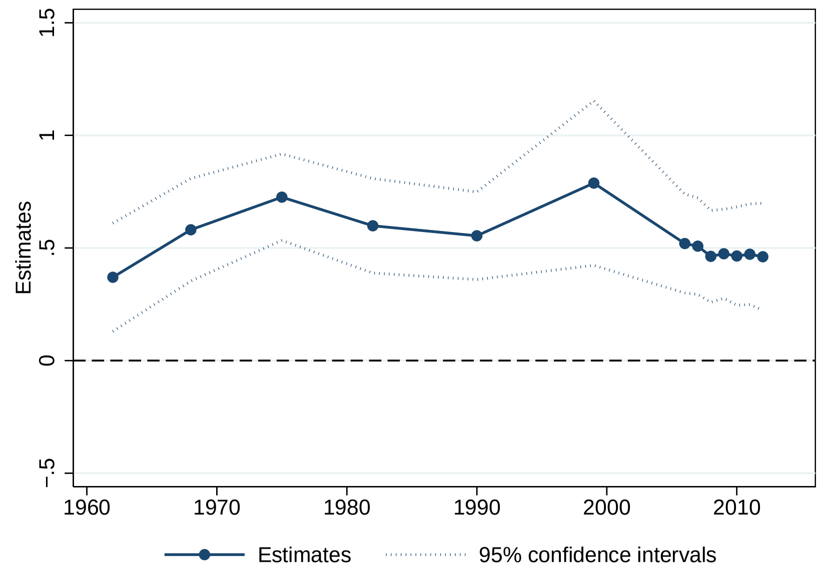


FIGURE C.22: HOUSEHOLD AND HUSBAND CONTROLS

Notes. This figure reports the OLS coefficients from estimating equation 3.1 when adding household and husband controls. Husband characteristics include husbands age and age squared, indicators for their educational attainment, and an indicator for whether they are employed. Household controls include an indicator for whether the household owns its housing, the number of rooms in the home, and a measure of housing quality. 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. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level.



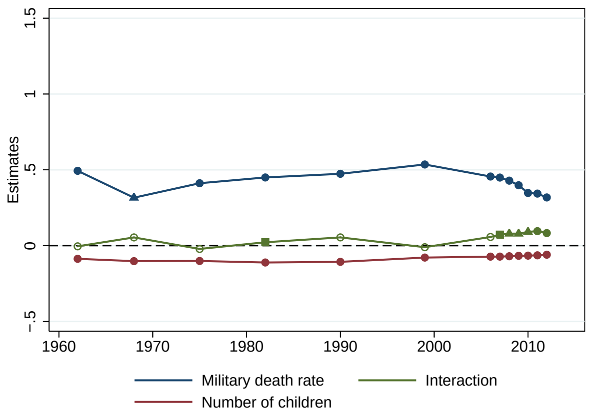
(A) Husband Employment



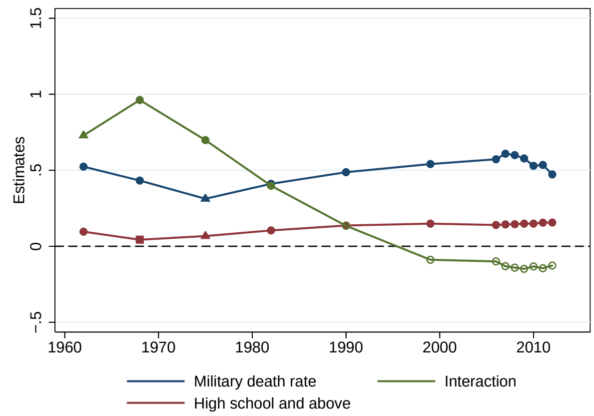
(B) Home Ownership

Figure C.23: Husband Employment and Home Ownership

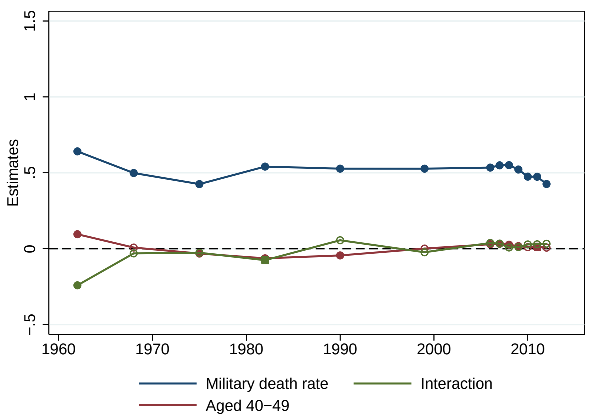
Notes. Panel A reports the OLS coefficients from estimating equation 3.1. The dependent variable is an indicator for whether the respondent's husband is working. This regression also controls for husbands' age and educational attainment. Panel B reports the OLS coefficients from estimating a similar specification. The dependent variable is an indicator for whether the household owns its housing. This regression also controls for husbands' age, educational attainment, and employment status. 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. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.



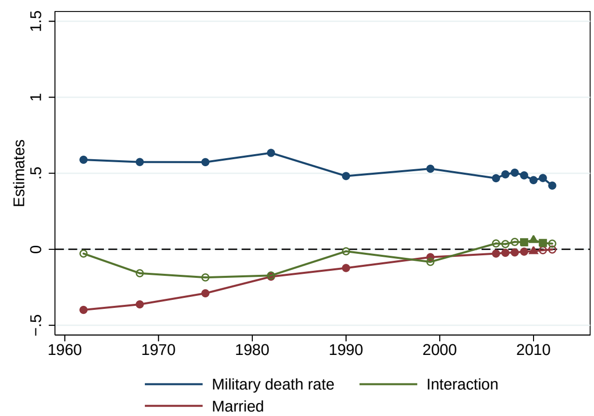
(A) Number of Children



(B) Education



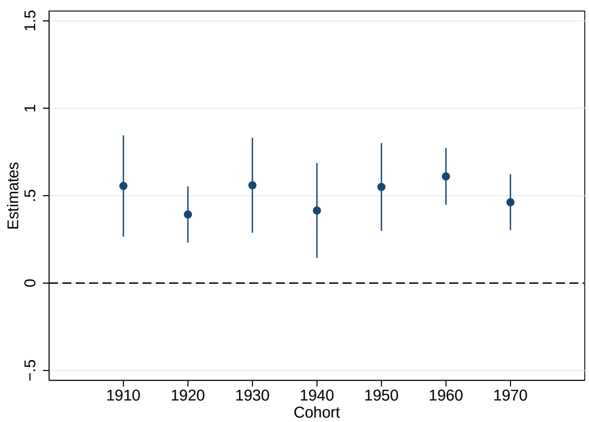
(C) Age Group



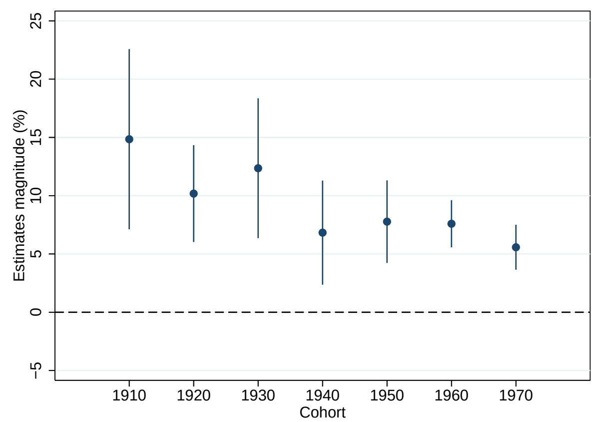
(D) Marital Status

Figure C.24: Heterogeneity Across Characteristics

Notes. This figure presents the results from estimating equation 3.1 together with interactions for various characteristics. In Panel A, the baseline specification is augmented with the number of own children in the household, and the interaction between the number of children and the military death rate exposure of the département of birth of the respondent. In panel B, the specification adds an indicator variable for whether the respondent is a high school graduate together with the interaction term; in panel C, the specification adds an indicator variable for whether the respondent is aged 40–49 together with the interaction term; in panel D, the specification adds an indicator variable for whether the respondent is married together with the interaction term. Standard errors are clustered both at the level of the respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49, except in panel D where the sample then consists of all migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
• significant at the 1% level. ▲ significant at the 5% level. ■ significant at the 10% level.



(A) Estimates



(B) Magnitude Relative to the Mean

Figure C.25: Decennial Cohort-Specific Estimates

Notes. Panel A reports the OLS coefficients from estimating equation 3.1 separately for each cohort on the pooled censuses 1962–2012, along with 95% confidence intervals around the estimates. All regressions include census-year fixed effects. The dependent variable is an indicator for whether the individual is working. 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 C.20 for details about sample sizes for each regression. Panel B reports the magnitude of the coefficients from Panel A with respect to the outcome mean. The magnitude is interpreted as the share of the mean in the dependent variable explained by switching from being born in a département exposed to a military death rate of 10% to a département exposed to a military death rate of 20%. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

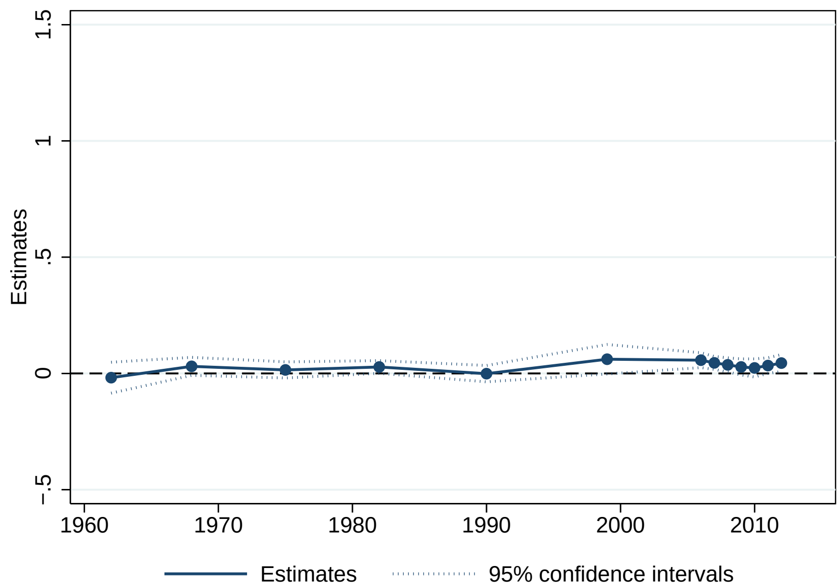


Figure C.26: Male Placebo

Notes. This figure presents the OLS coefficients from estimating equation 3.1 on the male sample. Standard errors are clustered both at the level of the individuals' départements of birth and départements of residence. The sample consists of migrant married men aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

Table C.18
The Impact of WWI Military Fatalities on Fertility

Dependent variable	Number of children			
Children age group	0–3	0–6	0–18	All
	(1)	(2)	(3)	(4)
Military death rate	-0.01	0.31	-0.61	-0.46
	[0.09]	[0.19]	[0.42]	[0.40]
Birth year FE	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes
Observations	247,317	247,317	247,317	247,317
Clusters				
Départements of birth	92	92	92	92
Départements of residence	92	92	92	92
Outcome mean	0.16	0.40	1.43	1.70

Notes. This table reports the OLS coefficients from estimating equation 3.1 for the number of children in the household as outcomes. All regressions include survey-year fixed effects. Standard errors are in brackets and are clustered both at the level of respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the labor force surveys. Data from the labor force surveys (1982–2013). See Appendix D for details about variables sources and definitions.

Table C.19
The Impact of WWI Military Fatalities on Education

Dependent variable	Educational attainment			
	Primary	Tech. sec.	High sch.	Higher ed.
	(1)	(2)	(3)	(4)
Military death rate	-0.33	0.13	-0.23	0.42
	[0.29]	[0.21]	[0.15]	[0.29]
Birth year FE	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes
Observations	246,664	246,664	246,664	246,664
Clusters				
Départements of birth	92	92	92	92
Départements of residence	92	92	92	92
Outcome mean	0.24	0.23	0.16	0.37

Notes. This table reports the OLS coefficients from estimating equation 3.1 for educational attainment as outcomes. *Primary*: primary education; *Tech. Sec.*: technical secondary education; *High sch.*: high school; *Higher ed.*: higher education. All regressions include survey-year fixed effects. Standard errors are in brackets and are clustered both at the level of respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the labor force surveys. Data from the labor force surveys (1982–2013). See Appendix D for details about variables sources and definitions.

Table C.20
Decennial Cohort-Specific Estimates

Dependent variable	Employed						
Cohort	1910	1920	1930	1940	1950	1960	1970
Military death rate	0.56***	0.39***	0.56***	0.42***	0.55***	0.61***	0.46***
	[0.15]	[0.08]	[0.14]	[0.14]	[0.13]	[0.08]	[0.08]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Censuses	1962–1968	1962–1975	1962–1982	1975–1990	1982–2009	1990–2012	2006–2012
Observations	30,347	319,798	512,126	552,815	601,109	2,121,343	2,135,687
Clusters							
Départements of birth	92	92	92	92	92	92	92
Départements of residence	92	92	92	92	92	92	92
Outcome mean	0.37	0.39	0.45	0.61	0.71	0.80	0.83

Notes. This table reports the OLS coefficients from estimating equation 3.1 separately for each cohort on the pooled censuses 1962–2012. All regressions include census-year fixed effects. Standard errors are in brackets and are clustered both at the level of respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level.

Table C.21
The Impact of WWI Military Fatalities on FLFP

Dependent variable	Employed	Active	Ever worked	Hours	Months in firm
	(1)	(2)	(3)	(4)	(5)
Military death rate	0.57***	0.45***	0.05	-12.6**	155***
	[0.15]	[0.14]	[0.05]	[5.4]	[48]
Birth year FE	Yes	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	Working	Working
Observations	247,317	247,317	245,742	173,337	181,312
Clusters					
Départements of birth	92	92	92	92	92
Départements of residence	92	92	92	92	92
Outcome mean	0.76	0.82	0.98	35.3	116

Notes. This table reports the OLS coefficients from estimating equation 3.1 across various labor outcomes. All regressions include survey-year fixed effects. Standard errors are in brackets and are clustered both at the level of respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the labor force surveys. Data from the labor force surveys (1982–2013). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. ** Significant at the 5% level.

Table C.22
The Impact of WWI Military Fatalities on Wage

Dependent variable	*Log* monthly wage rate					
	OLS			Heckman		
	(1)	(2)	(3)	(4)	(5)	(6)
Military death rate	-0.02	-0.29	-0.32	-0.06	-0.27	-0.30
	[0.40]	[0.25]	[0.22]	[0.36]	[0.24]	[0.22]
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth region FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes	Yes	Yes
Years of education	No	Yes	No	No	Yes	No
Education category FE	No	No	Yes	No	No	Yes
Observations	78,567	78,567	78,567	130,223	130,223	130,223
Censored observations				51,656	51,656	51,656
Clusters						
Départements of birth	92	92	92	92	92	92
Départements of residence	92	92	92	92	92	92
Outcome mean	8.41	8.41	8.41	8.41	8.41	8.41

Notes. This table presents the coefficients from estimating equation 3.1. All regressions include survey-year fixed effects. Education categories consist of no schooling (excluded), primary education, secondary education, and higher education. In columns 4–6, the selection equation includes the following husband characteristics: husband age and age squared, education level, and employment status. Standard errors are in brackets and are clustered both at the level of respondents' départements of birth and départements of residence. The sample consists of migrant married women aged 30 to 49. The estimates are computed using the sample weights provided in the labor force surveys. Data from the labor force surveys (1982–2013). See Appendix D for details about variables sources and definitions.

C.6 Homogamy in Military Death Rates

In this appendix, I provide evidence of homogamy in military death rates. That is, women born in départements exposed to high military death rates are more likely to marry with men born in départements exposed to high military death rates, and vice versa. For consistency with the rest of the analysis in this chapter, I restrict the sample to migrant married women aged 30 to 49. Using the censuses 1962–2012, I estimate the following specification:

$$\begin{aligned} \texttt{death\_rate}^{\texttt{husb}}_{ijhbrt} &= \beta\, \texttt{death\_rate}_b + \boldsymbol{\gamma}_1 \mathbf{X}'_i + \boldsymbol{\gamma}_2 \mathbf{X}'_{hj} + \boldsymbol{\gamma}_3 \widetilde{\mathbf{X}}'_{1911,b} + \boldsymbol{\gamma}_4 \widetilde{\mathbf{X}}'_{1911,h} \\ &+ \delta_r + \eta\, \texttt{Same}_{bh} + \mu\, \texttt{ldist}_{bh} + \varepsilon_{ijhbrt}, \end{aligned} \tag{C.1}$$

where $\texttt{death\_rate}^{\texttt{husb}}_{ijhbrt}$ is the military death rate exposure of the département of birth of husband h of wife i in household j. Vector $\mathbf{X}_{hj}$ contains the same set of husband and household characteristics as those used in section 3.1: husbands' age, age squared, indicators for their educational attainment, an indicator for their employment status, an indicator for housing ownership, the number of rooms in the home, and a measure for housing quality. Vectors $\widetilde{\mathbf{X}}_{1911,b}$ and $\widetilde{\mathbf{X}}_{1911,h}$ are the set of pre-war controls corresponding to wives' and husbands' départements of birth, respectively. Wives' and husbands' military death rates will be positively correlated as individuals born in the same département are more likely to marry with one another—this is the case for 17–37% of couples in the regression sample, with a downward trend over the period. To assess the extent of homogamy in military death rates beyond marriages between individuals born in the same département, I include an indicator variable ($\texttt{Same}_{bh}$) for whether spouses were born in the same département as well as the log distance between wives' and husbands' départements of birth ($\texttt{ldist}_{bh}$). This specification also includes fixed effect δ_r for individual i's département of residence.[21] I use three-way clustering and cluster standard errors at the level of wives' départements of birth,

21. Contrary to the analysis in section 3.1, I do not include military region of birth fixed effects $\mu_{1914,b}$ to allow for more variation in the set of potential matches between wives and husbands.

départements of residence, and also at the level of their husbands' départements of birth.

I report the results in Figure C.27. There is a positive correlation between spouses birth départements' military death rates: each additional percentage point in military death rates exposure of wives' départements of birth is associated with an increase of 0.27–0.50 percentage point in the military death rate exposure of their husbands', with a downward trend from 1962 to 2012. In section 3.3, I provide suggestive evidence that one potential reason behind such homogamy in military death rates is the more progressive views toward female labor held by women and men whose lineage was exposed to relatively more military fatalities.

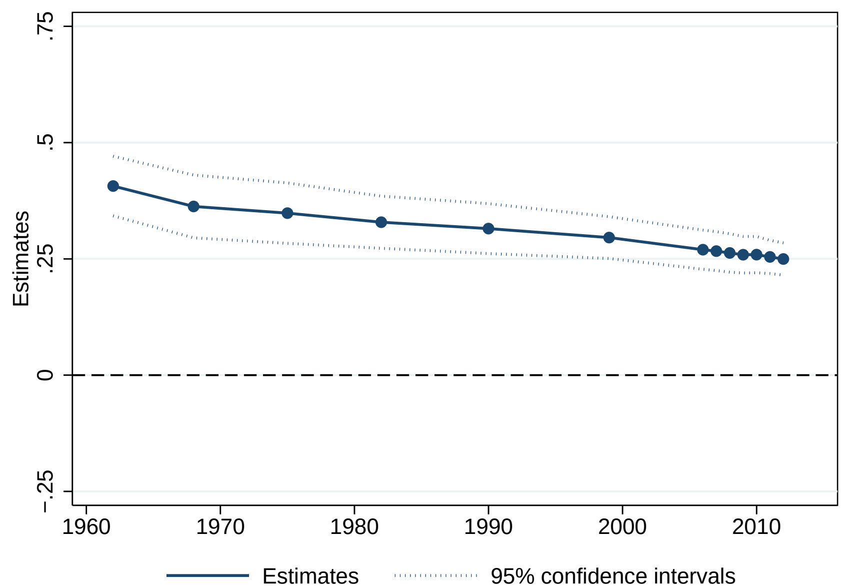


Figure C.27: Homogamy in Military Death Rates

Notes. This figure reports the OLS coefficients from estimating specification C.1. Standard errors are clustered at the level of wives' départements of birth, départements of residence, and also at the level of their husbands' départements of birth. The sample consists of migrant women aged 30 to 49. The estimates are computed using the sample weights provided in the censuses. Data from the censuses (1962–2012). See Appendix D for details about variables sources and definitions.

C.7 The Distribution of Household Tasks

The GSS survey contains questions about the distribution of household tasks for individuals that have a partner in the household: household chores (cooking, dish washing, grocery shopping, ironing, vacuuming), and child care (who dresses children, takes them to bed, stays with them when they are sick, plays with them, helps them with their homework, brings them to activities). Respondents were asked who performs these tasks: “always me”, “mostly me”, “as much me as my partner”, “mostly my partner”, “always my partner”. When the respondent is a woman, I assign a value of 0 to “always me”, and a value of 1 to “always my partner”, and use 0.25 point increments for responses in between. I use an opposite coding scheme when the respondent is a man. As a result, higher values indicate a more progressive distribution of tasks in the household—men doing a larger share of household chores. Next, I aggregate these statements and standardize them on a one-point scale. I report summary statistics relative to the regression sample used in section 3.3 for the household chores index in Appendix Table C.23, and for the child care index in Appendix Table C.24.[22] Appendix Table C.25 replicates the analysis in section 3.3 with both indexes as outcome variables. The results imply that although women are more likely to perform household tasks, WWI military fatalities had no impact on the distribution of household tasks in the household.

22. Interestingly, these tables reveal than men report doing more household tasks them women do.

Table C.23
Distribution of Household Chores

Interpretation: Higher Values Indicate that Women Do Less Chores

	Chore	Men	Women
1	Cooking	0.26	0.20
		(0.28)	(0.25)
2	Washing Dishes	0.39	0.33
		(0.29)	(0.28)
3	Do the Groceries	0.40	0.31
		(0.29)	(0.27)
4	Ironing	0.16	0.13
		(0.26)	(0.23)
5	Vacuuming	0.35	0.29
		(0.30)	(0.28)
	Household chores index (five-points scale)	1.57	1.26
		(0.91)	(0.82)
	Household chores index (one-point scale)	0.31	0.25
		(0.18)	(0.16)
	Observations	779	994

Notes. This table presents summary statistics for the distribution of household chores using the GSS dataset. Higher values indicate that women do less chores. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

Table C.24
Distribution of Child Care

Interpretation: Higher Values Indicate that Women Do Less Child Care

	Chore	Men	Women
1	Dressing children	0.33	0.28
		(0.20)	(0.23)
2	Putting children to bed	0.43	0.37
		(0.20)	(0.21)
3	Staying with children when sick	0.33	0.23
		(0.25)	(0.25)
4	Playing with children	0.47	0.43
		(0.15)	(0.18)
5	Aiding children with homework	0.40	0.37
		(0.20)	(0.23)
6	Bringing children to activities	0.41	0.34
		(0.23)	(0.25)
	Child care index (five-points scale)	2.38	2.01
		(0.73)	(0.84)
	Child care index (one-point scale)	0.48	0.40
		(0.15)	(0.17)
	Observations	281	399

Notes. This table presents summary statistics for the distribution of child care using the GSS dataset. Higher values indicate that women do less child care. Standard deviations are in parenthesis. The sample consists of French internal migrants born in metropolitan France. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.

Table C.25
The Impact of WWI Military Fatalities on Household Tasks

Dependent variable	Household tasks index (one-point scale)			
	Chores		Children	
	(1)	(2)	(3)	(4)
Military death rate	-0.24	-0.17	0.07	0.17
	[0.30]	[0.32]	[0.37]	[0.47]
Female	-0.07***	-0.06*	-0.08***	-0.06
	[0.01]	[0.03]	[0.01]	[0.04]
Military death rate × Female		-0.11		-0.13
		[0.21]		[0.25]
Birth year FE	Yes	Yes	Yes	Yes
Residence département FE	Yes	Yes	Yes	Yes
Pre-war controls (1911)	Yes	Yes	Yes	Yes
Clusters				
Residence département	94	94	94	94
Birth département	86	86	76	76
Observations	1,801	1,801	676	676
Outcome mean	0.28	0.28	0.44	0.44

Notes. This table presents the OLS coefficients from estimating specification 3.8 with the household chores and the child care indexes as outcomes. Standard errors are clustered at the level of the individuals' départements of birth and départements of residence. The sample consists of internal migrants. The estimates are computed using the sample weights provided in the GSS dataset. Data from the GSS (2005). See Appendix D for details about variables sources and definitions.
*** Significant at the 1% level. * Significant at the 10% level.

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