

## **Occupations after WWII: The Legacy of Rosie the Riveter**

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### ***Abstract***

WWII mobilization induced an increase in female labor supply, which persisted over time. Using Census micro data we study the qualitative aspects of this long term increase based on the occupations women held after the war. Almost three decades upon its end, we find that WWII had lasting effects on the occupational landscape. It entailed a significant shift towards “blue-collar” occupations, and in particular operatives and services, for women who were of working age during the war, and a decline in their likelihood of working in white-collar jobs and especially in the clerical sector. The effects spilled over to the next generation of women who were too young to be working at the time of the war. This cohort was instead more likely to be employed in clerical occupations, and less likely in lower-skill jobs. The lower educational attainment due to the draft, job experience and relatively higher wages in blue-collar sectors can largely account for the increased presence of the wartime *Rosies* in blue-collar jobs so long after the end of WWII.

***Keywords:*** WWII, occupations, Rosie the Riveter, United States, manpower mobilization

***JEL:*** N30, N42, J16, J24

## 1. Introduction

WWII led to the largest and most massive manpower mobilization in the US history, with more than 15 million men serving in the Armed Forces and overseas. The US became a major player in the war not only in providing manpower but also armaments, ships and airplanes and while the production of consumption durable goods declined to a halt, the manufacturing sector was a driving force in the war production. As a result, women were drawn to the labor market in large numbers and in various sectors, some of which were typically dominated by men.<sup>1</sup> War-related injuries of returning soldiers and the G.I. Bill that allowed many veterans to finish interrupted schooling or to further their education (Bound and Turner, 2002; Stanley, 2003) likely extended the period women remained in the labor market. Our question is how this large entry of women in the workforce affected their occupations in the postwar period, after the veterans returned.

The substantial increase in female labor market participation during the post-war years seems to suggest important changes in attitude towards working women.<sup>2</sup> Although it is unclear whether this increase can be attributed exclusively to the war, it is not surprising that some historians have considered WWII a “watershed” event that changed the economic outlook of women (Chafe, 1972). If it was so, did it permanently lead them into “better” occupations? Given that many women substituted for men, in many cases in the manufacturing sector, it is unclear whether they remained in these occupations or selectively left some to keep the ‘better’ ones, possibly white-collar occupations. Many women interrupted their studies and filled positions they would have not otherwise chosen, and by doing so they lost in education and work experience in more desirable occupations. Jaworski (2014) shows that WWII led many high school-age women to enter the labor market prior to graduation in male-typical

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<sup>1</sup> Prior to the war, married women were discouraged from working and in many cases there were policies in place not to hire or keep them once they married. These policies started to disappear in the early 1940s and had become very uncommon by the 1950s (Goldin, 1991).

<sup>2</sup> Fernandez, Fogli and Olivetti (2004) provide evidence that wartime work changed attitudes and preferences for work, as the sons of working women during WWII were more likely to have a working wife.

manufacturing occupations, thus interrupting their education. However, women may have also built work experience in occupations not normally available to them and in that sense opened the door to previously unavailable job opportunities. Finally, another scenario is that women exited the market once the men returned and the war did not significantly affect their long term occupational prospects (Schweitzer, 1980; Campbell 1984; Kossudji and Dresser, 1992).

Recent studies using individual micro data support the hypothesis that the war increased female labor market participation rates substantially (Goldin, 1991; Acemoglu, Autor and Lyle, 2004).<sup>3</sup> To the best of our knowledge, however, no micro-study has examined whether the war entailed permanent changes on the distribution of women across occupations. Goldin and Olivetti (2013) examine the effects of WWII on employment by educational attainment and find long-term effects that are almost exclusively driven by women with at least a high school degree. As the majority of women with at least a high school degree were employed in “white-collar” occupations, one could interpret this evidence as suggestive that WWII contributed to the expansion of female employment in professional/managerial and/or clerical sectors. This is in line with the popular presumption that after the war women left “*Rosie the Riveter*” occupations while they kept clerical, teaching and other “white-collar” jobs (Milkman, 1987; Kennedy, 1999; Goldin, 1991, Goldin, 1994).

Goldin (1991) using the Palmer surveys provides some information on the occupations that married women 35 to 64 years old in 1950, held during WWII. Comparison of the pre and the post-war employment shares shows that women not in the labor market in 1940 increased their presence in clerical and sales between 1944 and 1950, while decreased it in operatives and craft occupations. As her sample stops in 1950, no conclusions can be drawn from that survey about the long term effects of WWII on women’s occupations. Overall trends are consistent with this hypothesis: between 1940 and

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<sup>3</sup> Using the Palmer survey, Goldin (1991) finds that about half of the wartime female entrants left the labor market sometime after December 1944.

1960 women increased considerably their presence in clerical occupations, only negligibly in professional/managerial, while markedly decreased it in manufacturing. If we disaggregate by age group (Table 1), the picture that emerges, however, is different and suggestive of age-specific changes.<sup>4</sup> The share of women 35 to 54 years old (and likely treated by the war) employed in manufacturing remained fairly stable between 1940 and 1960; while in professional/managerial occupations it decreased by 21%.<sup>5</sup> These observations suggest that WWII might have entailed changes in the distribution of women across occupations and possibly across cohorts.

To study the medium and long term effects of the war on the occupations that women kept or more easily re-entered after the war, we use several cross sections of IPUMS micro data. We focus on women of working age during WWII. The latter were potentially directly “treated” by the war and according to Goldin and Olivetti (2013) WWII mobilization had lasting effects on their labor supply.<sup>6</sup> We also examine the effects on younger cohorts, the new entrants, who were too young to be working during the war. We consider across-states changes in five major occupation groups and use the share of 18 to 44 years old registered men who were drafted or enlisted for the war as a measure of the decline in male labor supply induced by WWII. Acemoglu et al. (2004), Fernandez et al. (2004), Goldin and Olivetti (2013) and Jaworski (2014) find significant links between this particular dimension of WWII, namely manpower mobilization, and women’s labor market (employment, work preferences) and educational outcomes.

Our strategy consists of combining several censuses, from 1930 to 1970, and use 1950, 1960 and

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<sup>4</sup> Henceforth, the terms “manufacturing” and “operatives” will be used interchangeably. The expression “male-dominated” is used henceforth to characterize occupations with typically higher employment shares of men relative to women. Operatives are one such example.

<sup>5</sup> Calculations in Table 1 are based on a sample of white women, born in the United States, employed at the survey date who reported an occupation. The reference population for our tabulations is the *employed* age-specific female population.

<sup>6</sup> In contrast to Goldin and Olivetti (2013), we will not study the long term impact of WWII on female employment across occupations by the level of educational attainment of the respondent. This is because the latter can be endogenous to the war, especially for the younger women in the cohort that we examine. For more recent evidence on the impact of WWII on female education see Jaworski (2014).

1970 year interaction terms to allow mobilization rates to have different effects over time. Our main specification covers the period 1940 to 1970, where 1940 is the pre-treatment year. Our robustness check adds 1930 to control for pre-treatment trends. We compare the occupational response to the war in 1950, 1960 and 1970 of women 25 to 64 years old to the response of women of the same age in the pre-treatment period. We subdivide them in four age groups, each covering women 10 years apart, so that there is no overlap across decades. This way we can examine the effects of the war by cohort over time: women 25 to 34 years old in 1950 will be 35 to 44 in 1960 and 45 to 54 in 1970. The same grouping also allows us to explore whether WWII had a long term impact on the occupations of women who were too young to be working during the war, such as 25 to 34 years old women in 1970.

The main finding is that cohorts aged 35 to 54 in 1950 and 1960 who were born in states with higher mobilization rates, and thus were more likely to have held war jobs, were also more likely to be in blue-collar occupations (as in operatives and services) over their work life in 1950, 1960 and 1970 than in clerical or in professional/ managerial occupations.<sup>7</sup> They were also more likely not to participate in the market than being in clerical or professional/managerial occupations. Our findings are robust to including 1930 to control for pre-war trends. These results seem to counter the idea that WWII was a watershed event or that it improved women's occupational standing. They also suggest that women may not have altogether left *Rosie the Riveter* occupations and that the war decreased their chances of working in white-collar jobs. Moreover, we find no evidence that the increased presence of women in "blue-collar" positions relative to clerical was accompanied by a "matching" entry of same age *men* in clerical occupations or by their "matching" exit from operatives or services. Hence, it does not seem that any of the patterns we documented for women were due to an occupation-specific crowding-out induced by the return of the veterans.

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<sup>7</sup> Occupations in the service sectors were low-skill and varied from housekeeping, attendants in hospitals or other institutions, bartenders to beauticians.

In the second part of the paper, we examine possible channels via which the war may have affected women occupations so long after. Was the increase in the share of women working as operatives or in services the result of interrupted education during the war? Although this should not explain the results for older women who had already completed their education prior to the war, it could explain some of the effects on the cohorts who may have entered the labor market prior to graduating from high school or finishing college. Jaworski (2014) shows that female war workers interrupted their studies and many went back to school in the 1960s. To understand the potential role of schooling, we include individual education (highest grade completed) as a covariate. While the shift towards blue-collar occupations remains, education can almost entirely explain the increased propensity of these cohorts to remain out of the labor force in 1950 or 1960 as opposed to enter white-collar jobs, where education is a binding constraint. This is consistent with the finding that mobilization entailed lower educational attainment. Our estimates provide suggestive evidence that these women returned to school later in life. However, we do not find that the additional acquired education significantly modified their long term occupational standing. Overall, therefore, education may explain the lower presence of women in white-collar jobs but not their higher presence in blue-collar jobs.

A factor that may have contributed to the persistent WWII-linked shift towards blue-collar occupations of this cohort is the relative attractiveness of wages in these sectors during and after WWII and/or work experience accumulated during the war. The huge war-production effort demanded large manpower that had to attract labor both from non-vets and women who may have never worked in the manufacturing sector. A patriotic shift as in Doepke (2015) could in part explain a shift in the labor supply of women for given wages, but given the large demand and the immediateness of the war production requirements, it is likely that relative wages in the manufacturing sector increased and that these increases remained at least in part after the war. Once the war production was over, the economy

had to restart producing consumer durables and non-durables. This and the experience accumulated in these sectors to the detriment of the experience women could have accumulated in white-collar occupations, may have contributed to the across-age persistent shift to blue-collar work. To test this hypothesis, we examine the impact of WWII mobilization on the gender wage gap in different sectors and on the relative wage of women in the operative or other sectors versus the clerical sector. We find that in states with higher mobilization rates, our focal cohort groups experienced significant and persistent wage premiums relative to men in blue-collar occupations, while the opposite is true in professional and managerial jobs. When we examine the wages of women in operatives, services and professional/managerial occupations relative to the wages in the clerical sector, we find a striking and persistent pattern: wages in blue-collar occupations are persistently higher than in clerical in all decades, while wages in professional and managerial jobs are significantly lower. This suggests that initial conditions (higher wages due to the war) and work experience may have played an important role in the blue-collar versus white-collar bias.

Finally, our results suggest that the relative “clustering” of wartime *Rosies* in services and operatives implied an increase in the likelihood that younger generations of workers, 25 to 34 in 1970, filled-in clerical positions. This younger cohort, who turned working age only after WWII’s end, was also more educated and hence possibly better qualified to undertake such higher-skill jobs.

The remainder of the paper is organized as follows. Section 2 presents the data and descriptive statistics and Section 3, the econometric methodology. Section 4 presents our main results. Section 5 examines the two channels proposed: education and changes in wages. Section 6 discusses the long term implications of the war for the occupational choices of younger cohorts, who could not have worked during the war. Finally, Section 6 concludes.

## 2. Data and Descriptive Statistics

Our main data sources are the 1930 to 1970 1 percent IPUMS files (Ruggles et al. 2010). We restrict the analysis to white women or men born in the United States and not residing in institutional group quarters; sampling weights are used throughout. Following Acemoglu et al. (2004), Fernandez et al. (2004), Goldin and Olivetti (2013), we also employ state-level WWII mobilization rates for registered men 18 to 44 years old in order to capture the potential impact of this particular channel on occupational attainment.<sup>8</sup> The latter reflects cross-state variation in the reduction in the labor supply of men who were drafted to serve in the Armed Forces. As in Fernandez et al. (2004) and in Goldin and Olivetti (2013), we use the state of birth as the reference state to establish a link between the mobilization rate of men and women’s occupational presence. We consider five occupation groups (OCC1950): professional and managerial (henceforth “professional/ managerial”), clerical, operatives and crafts (henceforth “operatives”), services and other. The latter is a residual category which includes sales, laborers and farmers. We also consider two aggregates: “white-collar” for the first two occupation groups and “blue-collar”, for the remaining.<sup>9</sup>

Our panels span four to five decades, from 1940 to 1970 (baseline) or from 1930 to 1970 (robustness). We consider four age groups: 25 to 34, 35 to 44, 45 to 54 and 55 to 64 years old. For each of these groups we pool together women of the same age born in different decades. For the 35 to 44 group, we pool the 1926-1935 cohort in 1970, the 1916-1925 cohort in 1960, the 1906-1915 cohort in 1950 and the 1896-1905 cohort in 1940. When, in a robustness analysis, we use the 1930 to 1970 panels,

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<sup>8</sup> Among these papers, Acemoglu et al. (2004) document a significant link between mobilization rates and female employment between 1940 and 1950. Fernandez et al. (2004) find that WWII, captured by manpower mobilization, had long term effects on female labor force participation through a change in attitudes towards working women. Jaworski (2014) shows that the same channel also had important implications for female educational attainment. Fishback and Cullen (2013) find instead no substantial impact of the war spending – another aspect of WWII – on the overall local economic activity between 1939 and 1958 or on female employment between 1940 and 1950 (neither in the aggregate nor separately in manufacturing where most of the contracts were implemented). Hence, it appears that in terms of its potential impact, manpower mobilization is a relevant measure of the influence of WWII on female labor markets.

<sup>9</sup> We did not include occupations that were not present in the census in all decades. One example is accounting.



we also pool the 1886-1805 cohort in 1930. We proceed similarly for the other three age groups. Our focal groups include women who were 15 to 34 years old in 1940 (35 to 54 years old in 1960). These are women who could have entered the labor market in 1942 just after the official entry of the U.S. in the war. The second group of interest is the post-WWII cohort, too young to be working during the war; these women were 25 to 34 years old in 1970.

Since we have four groups and several decades, we can follow their occupational response as they age. We can “catch” women born between 1915 and 1924 (35 to 44 old in 1960), when they are 25 to 34 years old in 1950 and when they are 45 to 54 years old in 1970 and see whether the effects we find are persistent or transitory. This will provide the full picture of the impact of the war on the type of occupation women held after it was over. Women 25 to 34 years old in 1970 were younger than 6 in 1942, some of them not yet born, and most of them too young to have been directly affected by the war.

Table 1 begins the analysis by presenting female employment shares in 1930, 1940 and 1960 and across four main occupation groups and by age. Between 1940 and 1960, the clerical sector experienced the greatest expansion, while services uniformly contracted. The increased participation in clerical work and the declining presence in services of women 35 to 54 years in 1940 and 1960 appear to be a continuation of a pre-existing trend, particularly in the case of clerical employment.<sup>10</sup> Female participation in professional/managerial occupations remained overall stable during the same period as the increased presence of younger women was counteracted by the exit of the older. While the share of women working in operatives and crafts declined in the postwar period, the age-specific statistics show that this was primarily driven by the younger women. The employment shares of the older workers, the

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<sup>10</sup> As discussed in Goldin (2006), one of the main elements that characterize the transitional era in the labor market from the late 1920s to 1950 is the increased demand for office and clerical workers. Before 1930, few and especially married women were working and the occupations they were confined to were mostly in manufacturing and services. They were stigmatized as these jobs were viewed as dirty, dangerous, repetitive and long in duration. After 1930, the participation of women (and especially of the married) in paid work increased substantially as did their employment in clerical-type positions. These jobs required higher education, were shorter-hours, “nicer” and in general were perceived as more “respectable” jobs.

*Rosies* of WWII, experienced instead a mild decline after a moderate increase between 1930 and 1940.

Table 2 follows Acemoglu et al. (2004) in dividing states into three groups on the basis of WWII mobilization rates and calculating the means of female occupation shares in each group in 1940 and 1960. This exercise serves to preliminary detect whether there is any systematic correlation between WWII mobilization rates and pre-WWII (1940) female occupational shares. As the raw data tabulations in Table 2 suggest, there are no substantial systematic differences in occupational shares across low, medium and high mobilization states. We will, however, further address concerns pertaining to identification and the role of pre-existing trends in subsequent sections.

### 3. Econometric Specification

To examine the long term impact of WWII on the likelihood that a woman  $i$  in state  $s$  in year  $t$  is present in occupation  $k$  (as opposed to the baseline occupation  $\bar{K}$ ), we pool all cross sections from 1940 to 1970 and estimate multinomial logit models of the following structure:

$$y_{iskt} = \log \left( \frac{\pi_{iskt}}{\pi_{ist\bar{K}}} \right) = \sum_{t=1950}^{1970} (\beta_{1t} * Mob_s * d_t + \beta_{2t} * d_t + \beta_{3t} * X_{s,1940} * d_t) + \beta_{4t} * D_{ijst} + \varepsilon_{iskt} \quad (1)$$

In a robustness exercise, we additionally pool the 1930 cross section. This model treats participation to each occupation group as a choice among multiple alternatives and takes into account the overall underlying occupational structure, which is likely varying over time. We estimate two main versions of specification (1). In the first one, being out of the labor force is considered as a choice, and is our reference category.<sup>11</sup> In the second one, we focus on the currently employed population and study the choice among various occupations as a function of WWII mobilization. In this case, the reference category is “clerical”.

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<sup>11</sup> Mulligan (1998), using data from a March 1944 national longitudinal survey conducted by the BLS, shows that industrial or occupational switches by women between December 1941 and March 1944 were fairly unimportant. Instead sizeable shifts from out of the labor force and into *particular* occupation groups took place outnumbering any switches between broadly defined industries.

*Mob* is the mobilization rate of men in the woman's state of birth  $s$ . The variable of interest is the interaction of *Mob* with a time dummy  $d_t$  (for each decade after 1940). The coefficient  $\beta_{1t}$  measures whether in states with higher mobilization rates during WWII women experienced greater long term changes in their likelihood of being present in different occupations relative to the reference group.  $X$  is a vector of 1940 state covariates that control for labor demand or other factors that could be potentially correlated with mobilization rates as well as with the decision of women to work in a particular type of occupation. These are the share of males who were farmers, the share of non-white males and male average education. Additionally, we include the 1940 share of males employed in various occupations as well as their employment share in defense-related industries.<sup>12</sup> The latter will explicitly account for initial cross-state differences in the demand for female labor in occupations/industries directly related to the war.

Employment in 1940 in defense-related industries could reflect pre-existing state defense spending differences. During the war, the U.S. massively converted its industrial base to produce armament and war related goods. This production represented nearly two thirds of all Allied military equipment used in WWII (Herman, 2012). It is possible, then, that the regions experiencing this substantial transformation relied differentially on female workforce for production compared to the less affected areas. Moreover, while no profession received a blanket deferment, local draft boards had in practice a great deal of discretion and were allowed to provide exemptions from the draft on the basis of the relevance of the registrant's occupation for the country. Men necessary in their civilian activity, from national defense to farming, received a lot of deferments. For instance, engineers and scientists were critical for war industries, while lawyers were in demand for intelligence tasks in the military and for their legal training in the military justice system (Elder, Dechter and Hiromi, 1999). In sum, occupational

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<sup>12</sup> To define defense industries we follow Acemoglu et al. (2004). Defense industries correspond to IPUMS 1950 industry codes 326–88. The same set of 1940 state covariates have been used by Acemoglu (2004) and by Goldin and Olivetti (2013).

expertise was an important criterion for military induction and therefore pre-war state differences in male occupational distributions likely affected both mobilization rates and the demand for female labor across occupations.

All aggregate controls are matched on the basis of the individual's state of birth and are interacted with 1950, 1960 and 1970 year dummies.  $D$  is a vector of individual characteristics which includes dummies for age, state of birth, and state of residence in order to account for cross-state migration.  $d_t$  is a dummy for the year  $t=1950, 1960, 1970$  and any individual covariate, with the exception of state effects, is interacted with these time effects. Year effects control for unobservable factors that can systematically influence occupational shares uniformly across cohorts and states. Finally, standard errors are clustered by year and state of birth.

The identification strategy we employ essentially relies on variation in draft rates and occupational participation within states over time in order to gauge the effect of WWII on the presence of women across occupations. This methodology controls for any time invariant state characteristics that might be systematically correlated with mobilization rates as well as with the outcomes of interest. The identifying assumption is that conditional on all covariates as well as state and year fixed effects, mobilization rates are random. In addition to state and year fixed effects, we also include in (1) a set of Census division-year interactions and consider this augmented model as our benchmark (baseline specification). These terms will sweep out between-division variation and therefore estimates will be based on variation solely within each division over time. This is a flexible way of accounting for changes in underlying division-level factors that trend arbitrarily over time and which could systematically bias our baseline estimates of mobilization.<sup>13</sup>

#### **4. Occupations and WWII**

The estimates from specification (1) are presented in Tables 3a and 3b. Columns (1) to (4) report

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<sup>13</sup> Results are similar if these interaction terms are not included and are available upon request.

the estimates of the mobilization coefficients ( $\beta_{it}$ ) across decades for women 25 to 64 years old, grouped in four age brackets. Each column reports the results for one of the age groups. The reference category is “out of the labor force”. Columns (5) to (8) present the results for the same age groups when the sample is restricted to the currently employed population, with clerical occupations being the omitted category.

The results overall do not suggest that WWII led to improvements in the occupational status of women, who were directly treated by the war, by increasing their presence in white-collar jobs. Instead, they indicate that it permanently tilted the distribution for the cohorts who were directly “treated” towards lower-skill, “brawn-intensive” jobs. The estimates show a remarkable and consistent pattern across the years whereby in high draft states cohorts born between 1906 and 1925 (women 35 to 54 years old 1960) were more likely to be out of the labor force than in white-collar occupations (left side of Tables 3a and 3b) and conditionally on being employed (right side of Tables 3a and 3b), more likely to be in service, operative and other blue-collar type sectors than in clerical occupations. These results are striking as they are similar for a broad cohort of women and show that higher mobilization rates led to a systematic bias towards blue-collar and away from white-collar occupations. In addition, these effects are persistent over time; in many cases persisting to 1970 when this cohort is 45 to 64 years old. Some of these effects also apply to the immediately older cohorts, born between 1896 and 1905 (and 55 to 64 years old in 1960). They are also more likely to be out of the labor force than in clerical or professional/managerial occupations or blue-collar occupations in general (see Tables 3a, 3b).

Women born between 1906 and 1915 (35 to 44 years old in 1950) already in 1950 show a markedly higher likelihood to be in services than out of the labor force or than being in clerical occupations. It is plausible that some of them left war-related manufacturing occupations when the men returned and entered the service sector.<sup>14</sup> On the contrary, women born between 1916 and 1925 (25 to

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<sup>14</sup> Indeed, as shown subsequently in Tables 4a and 4b, most men 35 to 64 years old in 1950 had occupied operative-type jobs. Their presence in these occupations could have led to a crowding-out of women towards other blue-collar jobs.

34 years old in 1950) in 1950 were more likely to be in operative and clerical occupations than out of the labor force and it is only later that they increase their presence in the service sector.<sup>15</sup> This is the only group and only year in which the war increases their likelihood of being in clerical occupations. One possible explanation is that younger women had characteristics that led them to be more suitable to white-collar occupations (for instance a larger share of them had graduated from high school than the older cohort), but they exited the labor market afterwards to raise families.<sup>16</sup>

We do several robustness tests. First, to assess the role of pre-existing trends, we augment the baseline sample with another pre-WWII year, the 1930 cross section, and subsequently re-estimate (1). We consider again two reference categories: being out of the labor force and clerical work when studying the employed population. The definition of labor force participation is different before and in/after the 1940 Census (variable “labforce”), while employment status (variable “empstat”) also presents comparability issues for the same time periods. With these caveats in mind, our new estimates based on the extended sample confirm our previous conclusion: manpower mobilization favored a long term shift either towards out-of the labor force (all women) or towards blue-collar jobs (currently employed women). The estimates of these regressions are reported in Appendix Tables A1 and A2. The results are robust and in some cases stronger than the ones reported in Tables 3a and 3b.

We have also performed other sensitivity tests, which are available upon request. First, our main findings remain robust when southern states are excluded from the baseline sample. In fact, when excluding the south, the bias towards manufacturing and services becomes even stronger especially

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<sup>15</sup> Goldin (1991) using data from the Palmer surveys also documents high shares of female workers in operatives and crafts during the 1940s and in 1950. She also highlights the remarkable persistence of the wartime occupational patterns she establishes up until 1950, when her sample ends.

<sup>16</sup> The share of women that had graduated from high school in 1940 by age group is: 48% for women 18 to 24 years old, 41% for women 25 to 34, 31% for women 35 to 44, 25% for women 45 to 54 years old. In other words, younger market entrants during the war were more educated than older women, who could have already been working in 1940 or entered the market when the war began.

among the older cohorts (45 to 54 years old in 1950, 1960 and 1970).<sup>17</sup> Second, rather than lumping sales positions in the category of “other” occupations, we considered it as a separate, additional category. This again did not influence our main conclusions. Third, we control for the economic conditions prevailing during the Great Depression (between 1930 and 1933) to see whether the effects we attribute to WWII are not due to the dramatic conditions that preceded it and that may have also affected mobilization rates.<sup>18</sup> The results are again very similar to the ones reported in Tables 3a and 3b.

## 5. Discussion

Was the increased presence of women in blue-collar occupations (relative to clerical) and their lower presence in white-collar occupations (relative to remaining out of the labor force) due to crowding-out from returning vets? To understand this, we re-estimate specification (1) by age group for men of working age during the war.<sup>19</sup> The crowding-out hypothesis would imply a decrease in the probability that men work in blue-collar occupations and an increase in the probability they work in white-collar occupations. The results are reported in Tables 4a and 4b. As can be seen, there are no significant effects beyond 1950 on men of working age during the war, except for the very old for whom we find an increased persistent presence in blue-collar jobs. This seems to reject the hypothesis that the shift towards blue-collar occupations and away from white-collar work found for women was the result of men being significantly more present in white-collar occupations in high draft states. Next, we discuss two possible alternative mechanisms via which the war may have affected female occupational choices: education and wages/work experience.

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<sup>17</sup> For women 25 to 34 in 1960, their higher presence in blue-collar jobs relative to no participation or to clerical work (conditional on employment) disappears when excluding southern states. Similarly, for women 25 to 34 in 1950, 1960 and 1970 mobilization has no effect on their propensity to be in clerical jobs relative to out of the labor force when southern states are excluded from the baseline sample.

<sup>18</sup> We measure economic conditions during the Great Depression using the average business failure rate between 1930 and 1933. See Bellou and Cardia (2014) for more details on this indicator.

<sup>19</sup> We use same set of covariates as for women with the exception of the 1940 state shares of men in various occupations. We do control, however, for the 1940 male shares in defense-related industries.

## 5.1 Education

During the war over two-thirds of high-school age women in the labor force were not attending school, interrupting education that could have led to higher wages in white-collar occupations (Jaworski, 2014). They took up mostly low skill jobs, such as in manufacturing and services, which did not require a high school diploma.<sup>20</sup> The lack of higher education as well as the return of the veterans could have limited their long term labor market options. As, however, some of these women returned to school after 1960 (Jaworski, 2014), the adverse effects of the war were mitigated and their initial occupational choices could have been reconsidered. In this section, we address whether the education channel identified by Jaworski (2014) could explain the predominance of women in blue-collar jobs in high mobilization states. We also explore whether the subsequent return to school of some of the wartime *Rosies* implied long term revisions in their initial occupational choices.

To do so, we re-estimate specification (1) including as covariates a measure of education, the highest grade achieved, and its interaction with a year dummy. By omitting education from (1), we essentially ascribed all of the obtained results to the war mobilization variable. Our hypothesis is that, if the inclusion of the education terms wipes out the significance of blue-collar versus white-collar occupations, then the mechanism is education. If not, both wages and job experience could potentially explain the continued reliance on blue-collar work. We address this mechanism in greater detail in the next section.

Tables 5a and 5b report the results. Note that in 1950 education was only recorded for the sample line respondents and hence for 1950 we use a reduced sample along with the appropriate sampling weights. For comparison purposes we re-estimate the baseline regressions with the sampling weights for 1950 as in Tables 3a and 3b we used all women and not just sample line respondents. On the left we

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<sup>20</sup> Jaworski (2014) reports that among women 14 to 19 in 1944 and not in school, 40.7% were employed in manufacturing, 19.9% in finance and service, 16.8% in retail trade, 4.5% in agriculture and the remaining in other sectors.



report the baseline estimates which do not include education covariates and on the right, the augmented model that controls for individual education. The left panel of Tables 5a and 5b reports the results where the excluded variable is out of the labor force, while the right panel reports the results where the excluded variable is being employed in the clerical sector.

There are three main conclusions that can be drawn from these tables. First, the lower educational attainment obtained in states with higher draft rates seems to explain the declined presence of 35 to 44 years old women (in 1950, 1960 and 1970) in white-collar occupations relative to no market participation. By comparing column (2) with column (5) which controls for education, we see that the estimates become non-significant and are in absolute terms lower than when we don't control for education (see the solid line oval circles). Ignoring the negative correlation between the war and educational attainment leads to an overestimate of the negative impact of the war on white-collar employment. Education may also explain the lower presence in professional/managerial occupations for women 25 to 34 years in 1950. Overall, these results support Jaworski's (2014) findings on the implications of WWII mobilization on the educational attainment of the treated cohorts.

Second, while in 1950 and 1960 education largely explains the effect of mobilization on the decision of these cohorts to enter the market *versus* being in a white-collar occupation, this effect disappears when tracking the same cohorts a decade later (when they are 45 to 54 years old in 1960 and 1970 respectively). This can be seen by comparing the results circled by the dotted-line oval circles in Figures 5a and 5b. A decade later, education does not explain the negative impact of the war on the likelihood of being in white-collar occupations as the estimates including or not including individual education are very similar and both significant and negative. The estimates suggest that the negative relation between educational attainment and the draft considerably weakened within a decade, possibly because these cohorts returned to school to complete their education. The fact that we find a lower

probability of women being in white-collar occupation for the same cohorts in 1960 and 1970 after controlling for education, suggests that the acquisition of more education did not translate into a higher likelihood of being in white-collar occupations.<sup>21</sup>

Third, education cannot explain the increased reliance on blue-collar work (services and operatives). It is possible that this persistent pattern reflects instead the role of acquired work experience or of higher demand and wages that made such jobs a relatively more attractive outlet for low-skill workers.

## 5.2 Wages and Work Experience

Education may not be the whole story, particularly blue-collar occupations and for older women. The occupation-specific wartime experience they had accumulated along with the fact that many veterans furthered their education through the GI Bill, which likely improved their marketable skills, could have extended presence of women in the “Rosie the Riveter” jobs they initially occupied during the war. In this section, we examine the medium and long run effects of WWII mobilization on the relative attractiveness of different occupations, as captured by the prevailing wages. This may be another mechanism that influenced the occupational choices of women as a result of the war.

First, we examine whether the war changed the wages of women relative to those of men across occupations to see whether WWII induced a market premium for women to enter male-typical jobs. We, then, study whether due to the war, women were paid relatively better in blue-collar relative to white-collar occupations (and in particular clerical jobs) and whether, if there was such a war-related premium, this persisted over time. More specifically, we estimate specifications of the following general form:

$$\ln w_{ikst} = \sum_{t=1950}^{1970} (\beta_{1t} * Mob_s * d_t * Female_i + \beta_{2t} * d_t + \beta_{3t} * X_{s,1940} * d_t + \beta_{4t} * D_{ist} * d_t + \beta_{5t} * Mob_s * d_t) + \beta_{6t} * D_{ist} + \beta_{7t} * Female_i + \varepsilon_{ikst} \quad (2)$$

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<sup>21</sup> Higher education, however, could imply higher wages within their own occupational group.

$$\begin{aligned}
\ln w_{ikst} = & \sum_{t=1950}^{1970} (\beta_{1t} * Mob_s * d_t * Occ_{ik} + \beta_{2t} * d_t + \beta_{3t} * X_{s,1940} * d_t + \beta_{4t} * D_{ist} * d_t + \beta_{5t} \\
& * Mob_s * d_t) + \beta_{6t} * D_{ist} + \beta_{7t} * Occ_{ik} + \varepsilon_{ikst} \quad (3)
\end{aligned}$$

The dependent variable is the logarithm of real weekly wage of individual  $i$  working in occupation  $k$  in state  $s$  and year  $t$ . As before, vector  $X$  includes the 1940 state covariates described in the data section, vector  $D$  includes individual-specific controls (dummies for age, education, state of residence and state of birth) and  $d_t$  is a dummy variable, which takes the value of 1 if in year  $t$  and 0 if in 1940. Both specifications also include division-year interactions. Specification (2) is estimated by occupation (operatives, services, professional/managerial, clerical) and age group (25 to 34, 35 to 44, and 45 to 54) on a sample of white men and women who worked at least 20 weeks in the previous calendar year. Female is an indicator for whether the individual is a woman. Specification (3) is also estimated by occupation and age group on a sample of white women who worked at least 20 weeks in the previous calendar year.  $Occ_k$  is 1 if the individual is employed in occupation  $k$  (operatives, services, professional/managerial) and 0 if in clerical. The coefficients of interest in both specifications describing the relevant premiums are  $\beta_{1t}$ . As in the baseline analysis, here we also use the 1940, 1950, 1960 and 1970 cross sections.

Table 6 presents results from specification (2), where the variable of interest is the gender wage gap. As can be seen, in states with higher mobilization, there is a significant earning gap that favors women in services and operatives in 1950. From a cohort perspective, women 35 to 44 in 1950 faced a war-related positive premium in blue-collar jobs that persisted as they aged. There is also a significant premium for older women in professional/managerial occupations. However, remarkably, there is no premium for clerical occupations, or for younger women in professional/managerial jobs. Both effects are consistent with the previously documented war-induced occupational patterns for these cohorts.

Table 7 reports estimates of specification (3), where the dependent variable is the wage gap for

women in various occupations relative to clerical. Both across age groups in a given year and within cohorts over time, operatives and service occupations offer a market premium relative to clerical occupations that persists across decades and does not decrease in intensity. This suggests that work experience and/or wages premiums that relatively favored blue-collar jobs during the war, did not die out but persisted unabated. This may be the result of acquired work experience or wage stickiness. Instead, professional/managerial occupations had a negative or a non-significant WWII-induced premium over clerical occupations.

In sum, our results suggest that female blue-collar workers were paid overall better relative to men and relative to women in other white-collar occupations in high mobilization states long after WWII.

### ***5.2 WWII post-WWII labor market entrants***

The increased female employment in lower skill occupations in states with higher manpower mobilization more than a decade after the war's end is interesting and naturally generates the question of whether the war also permeated the occupational choices of younger generations of workers. To answer this question, Tables 3a and 3b present the results for 25 to 34 years old women. Women in this age bracket in 1970 were respectively 3 to 12 years old in 1943 and too young to be working during the war. Hence, their occupational choices over time could have only been indirectly affected by this event.

The estimates reported in Tables 3a and 3b (Columns 1 and 5) indicate that in 1970 in high mobilization states younger women significantly increased their presence in operatives and clerical occupations relative to remaining out of the workforce. Furthermore, conditional on market participation, they were also more likely to be present in clerical jobs relative to any other occupation but operatives. The persistently higher wages in operative-type jobs (relative to clerical) in high draft states likely attracted new labor market entrants towards these jobs (Table 7). Interestingly, assuming

that older and younger workers are substitutes in production, the higher presence of young women in clerical employment “matches” the relative (and war-related) absence of older women and men from such jobs.<sup>22</sup> Younger and probably better-educated workers filled-in clerical positions that the older were less likely to be present in or qualify for. This indirect effect reveals that the war may have eventually contributed to the trend towards expanding clerical employment among the younger, which is so pronounced in the aggregate data (Table 1).

## 7. Conclusion

The war led to an important increase in the participation of women in the labor market, which persisted in the long run. In this paper, we study the qualitative implications of WWII on the labor markets by examining its long term impact on female employment across occupations.

For women who were of working age during the war, we find that the large scale manpower mobilization entailed a long term shift away from “white-collar” work and towards either “blue-collar” employment or out of the labor force. The persistent draft-related presence in manufacturing and services suggests that some of the wartime *Rosies* may not have entirely abandoned or may have re-entered male-typical occupations or other low-skill occupations. Much younger generations, in states that were more exposed to mobilization, had instead a higher likelihood of working in “white-collar” clerical jobs.

We show that, for the cohorts that were of working age during the war, the lower entry in white-collar occupations relative to being out of the labor force can be explained by their lower educational attainment due to mobilization. Even though some of these women returned to school later on, this seemingly did not entail any long term changes in their occupational standing. We also find that wage increases in blue-collar jobs to attract women to traditional male occupations, led to an increase in work

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<sup>22</sup> This notion of competition and substitutability between young and old cohorts of women is also found in Doepke, Hazan and Maoz (2015). However, the authors’ theoretical model links fertility decisions to heterogeneous patterns of labor supply of younger and older women due to WWII, without deriving predictions about changes in the occupational distribution.

experience in blue-collar sectors to the detriment of experience in white-collar occupations. The wage-differential between blue-collar and white-collar jobs persisted over several decades.

All things considered, our analysis suggests that the war had no “watershed” effects on the occupational standing of the wartime cohorts, as it increased their presence in occupations, which are typically considered as lower-skill, “brawn-type”.

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**Table 1: Employment Shares by Occupation & Age**

Age Groups	Prof/Managerial			% Change 1940-1960	Clerical			% Change 1940-1960	Operatives/Crafts			% Change 1940-1960	Services			% Change 1940-1960
	1930	1940	1960		1930	1940	1960		1930	1940	1960		1930	1940	1960	
<b>18-54</b>	0.203	0.164	0.168	2%	0.318	0.294	0.367	25%	0.179	0.238	0.181	-24%	0.158	0.193	0.141	-27%
<b>18-34</b>	0.188	0.131	0.147	12%	0.382	0.323	0.461	43%	0.178	0.25	0.152	-39%	0.13	0.190	0.122	-36%
<b>35-54</b>	0.236	0.233	0.183	-21%	0.18	0.237	0.3	27%	0.183	0.214	0.202	-6%	0.218	0.197	0.155	-21%

Shares of white women working in each of these occupations over all employed women.

**Table 2: Female Occupation Shares in Low, Medium and High Mobilization Rate States, All Education Groups: 1940-1960**

	<u>Females 35 to 54 years old in 1960</u>							
	1940				1960			
	Low	Medium	High	All	Low	Medium	High	All
Operatives/Crafts	0.228 (0.419)	0.186 (0.389)	0.230 (0.421)	0.211 (0.407)	0.220 (0.414)	0.172 (0.377)	0.225 (0.417)	0.202 (0.401)
Professional/Managerial	0.226 (0.418)	0.233 (0.422)	0.228 (0.420)	0.229 (0.420)	0.185 (0.388)	0.184 (0.387)	0.180 (0.384)	0.183 (0.387)
Clerical	0.195 (0.396)	0.248 (0.432)	0.253 (0.435)	0.233 (0.423)	0.253 (0.435)	0.330 (0.470)	0.307 (0.461)	0.300 (0.458)
Services	0.190 (0.392)	0.205 (0.403)	0.182 (0.386)	0.194 (0.395)	0.167 (0.373)	0.155 (0.362)	0.144 (0.350)	0.155 (0.362)
Other	0.136 (0.343)	0.112 (0.315)	0.094 (0.292)	0.114 (0.318)	0.128 (0.334)	0.116 (0.321)	0.107 (0.309)	0.117 (0.322)

Note: Statistics describe shares of women working in a given occupation relative to the employed population in the woman's age group. Sampling weights are used to calculate averages. Low-mobilization states (rate less than 45%): Georgia, Louisiana, N. Dakota, N. Carolina, S. Dakota, S. Carolina, Wisconsin, Alabama, Arkansas, Mississippi, Virginia, Tennessee, Kentucky, Indiana, Michigan, and Iowa. Medium mobilization states (rate between 45% and 49%): Missouri, Texas, Maryland, Delaware, Vermont, Illinois, New Mexico, Nebraska, Minnesota, Florida, Ohio, West Virginia, New York, Wyoming, and Oklahoma. High mobilization states (rate greater than 49%): Kansas, Montana, Connecticut, Arizona, Colorado, New Jersey, Idaho, California, Maine, Washington, Pennsylvania, Utah, New Hampshire, Oregon, Rhode Island, Massachusetts .



**Table 3a: The impact of WWII on female employment across occupations (panel: 1940-1950-1960-1970)**

	All				Employed			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Options:</u>	<i>Base: Out of Labor force</i>				<i>Base: Clerical</i>			
	25-34	35-44	45-54	55-64	25-34	35-44	45-54	55-64
<u>Operatives/Crafts</u>								
mobilization*1950	3.768 (1.463)***	-1.710 (1.589)	-1.967 (3.001)	-5.295 (4.171)	-0.120 (1.442)	0.640 (2.054)	0.863 (3.141)	-7.464 (4.654)*
mobilization*1960	4.674 (1.608)***	0.837 (1.589)	-1.003 (2.854)	-4.597 (3.339)	3.883 (1.500)***	3.379 (2.087)*	6.187 (2.866)**	1.706 (3.556)
mobilization*1970	5.960 (1.792)***	-0.819 (1.822)	0.512 (2.918)	-1.605 (3.479)	4.240 (1.614)***	1.496 (2.293)	8.500 (2.827)***	2.153 (3.422)
<u>Services</u>								
mobilization*1950	0.664 (1.657)	4.746 (1.543)***	3.623 (2.329)	1.540 (2.943)	-2.990 (1.962)	7.610 (2.076)***	5.539 (3.094)*	-0.667 (5.017)
mobilization*1960	0.510 (1.344)	1.342 (1.322)	3.689 (2.186)*	-1.380 (2.236)	0.011 (1.821)	3.679 (1.632)**	9.314 (2.870)***	4.493 (4.269)
mobilization*1970	-4.132 (1.443)***	-0.992 (1.379)	0.649 (2.295)	5.188 (2.331)**	-6.455 (1.687)***	0.637 (1.676)	7.010 (2.904)**	7.919 (4.147)*
<u>Professional/Managerial</u>								
mobilization*1950	-3.555 (1.919)*	-3.298 (1.509)**	-2.288 (2.296)	1.230 (3.012)	-7.269 (2.001)***	-0.403 (2.165)	-0.146 (2.667)	-1.285 (4.270)
mobilization*1960	-2.734 (2.093)	-4.942 (1.351)***	-5.206 (2.177)**	-6.091 (2.346)***	-3.625 (1.990)*	-2.771 (1.888)	1.070 (2.510)	-0.482 (3.505)
mobilization*1970	-0.877 (1.794)	-4.914 (1.312)***	-5.192 (2.224)**	-6.083 (2.354)***	-3.717 (1.751)**	-3.485 (1.832)*	1.647 (2.530)	-3.328 (3.327)
<u>Clerical</u>								
mobilization*1950	3.690 (1.317)***	-2.949 (1.661)*	-2.405 (2.225)	2.068 (3.530)				
mobilization*1960	1.038 (1.250)	-2.419 (1.345)*	-6.440 (2.052)***	-6.163 (2.481)**				
mobilization*1970	2.792 (1.353)**	-1.646 (1.371)	-7.041 (2.092)***	-3.523 (2.403)				
<u>Other</u>								
mobilization*1950	-0.600 (1.669)	-0.764 (1.892)	4.097 (2.892)	-0.526 (2.488)	-4.672 (1.925)**	1.891 (2.674)	7.189 (3.128)**	-3.698 (4.460)
mobilization*1960	1.073 (1.641)	-0.587 (1.817)	-0.324 (2.378)	-5.699 (2.146)***	-0.376 (1.969)	1.763 (2.443)	6.612 (2.542)***	0.309 (3.325)
mobilization*1970	-2.116 (1.863)	-2.537 (2.043)	1.825 (2.458)	-3.744 (2.098)*	-4.901 (1.941)***	-0.788 (2.471)	9.572 (2.444)***	-0.268 (3.190)
Observations	390343	355883	287258	207142	117499	118788	105753	61362

Note: Coefficients from a multinomial logit regression (specif. 1). Other 1940 state covariates: male share farmers, non-whites, male average education, male share in defense industries, male shares in operatives, services, clerical and professional/managerial occupations, fixed effects for age, state of birth, state of residence, year. Sample includes white women, born in the U.S, who were 25-64 years old in 1940, 1950, 1960 and in 1970. Standard errors (parentheses) account for clustering on state of birth and census year. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels.

**Table 3b: The impact of WWII on female employment across white and blue collar occupations (panel: 1940-1950-1960-1970)**

	All				Employed			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b><u>Options:</u></b>	<i>Base: Out of Labor Force</i>				<i>Base: White-Collar</i>			
	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>	<b>55-64</b>	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>	<b>55-64</b>
<b><u>White-Collar</u></b>								
mobilization*1950	1.396 (1.236)	-3.017 (1.262)**	-2.306 (1.915)	1.750 (2.558)				
mobilization*1960	-0.219 (1.303)	-3.278 (1.035)***	-5.791 (1.791)***	-5.994 (1.848)***				
mobilization*1970	1.366 (1.246)	-2.798 (1.053)***	-5.992 (1.841)***	-4.523 (1.872)**				
<b><u>Blue-Collar</u></b>								
mobilization*1950	1.478 (1.144)	0.078 (1.021)	1.374 (1.967)	-1.088 (1.857)	-0.078 (1.317)	2.813 (1.573)*	3.909 (1.719)**	-2.792 (2.764)
mobilization*1960	2.525 (1.050)**	0.476 (0.934)	0.689 (1.947)	-3.108 (1.299)**	2.901 (1.26)**	3.861 (1.356)***	6.648 (1.545)***	3.124 (2.174)
mobilization*1970	0.562 (1.262)	-1.790 (1.202)	1.088 (2.058)	1.084 (1.457)	-0.159 (1.222)	1.400 (1.510)	7.446 (1.481)***	5.852 (2.078)***
Observations	390343	355883	287258	207142	117499	118788	105753	61362

Note: See notes to Table 3a.

**Table 4a: The impact of WWII on male employment across occupations**  
(panels: 1940 to 1970)

	Employed		
	(1)	(2)	(3)
<b><u>Options:</u></b>		<i>Base: Clerical</i>	
	<b>35-44</b>	<b>45-54</b>	<b>55-64</b>
<b><u>Operatives/Crafts</u></b>			
mobilization*1950	1.677 (0.887)*	4.214 (0.981)***	2.728 (1.245)**
mobilization*1960	-0.052 (0.919)	1.457 (0.796)*	0.856 (1.041)
mobilization*1970	-0.864 (0.986)	0.988 (0.680)	3.353 (1.057)***
<b><u>Services</u></b>			
mobilization*1950	0.790 (1.246)	0.709 (1.132)	2.779 (2.201)
mobilization*1960	-0.758 (1.218)	1.634 (1.019)*	1.518 (1.823)
mobilization*1970	0.009 (1.163)	-0.233 (0.992)	2.567 (1.830)
<b><u>Professional/Managerial</u></b>			
mobilization*1950	-0.041 (1.063)	1.585 (0.986)*	1.400 (1.450)
mobilization*1960	-0.175 (0.988)	-0.216 (0.931)	-0.064 (1.301)
mobilization*1970	-0.240 (1.070)	-1.683 (0.794)	0.312 (1.304)
<b><u>Other</u></b>			
mobilization*1950	-0.055 (0.950)	1.922 (1.188)*	1.427 (1.414)
mobilization*1960	-2.239 (0.918)**	-0.364 (0.924)	0.849 (1.069)
mobilization*1970	-4.085 (1.065)***	-2.193 (1.184)*	0.547 (1.271)
Observations	318839	253982	154833

Note: Coefficients from a multinomial logit regression (specif. 1). Other 1940 state covariates: male share farmers, non-whites, male average education, male share in defense industries, male shares in operatives, services, clerical and professional /managerial occupations, fixed effects for age, state of birth, state of residence, year. Sample includes white men, born in the U.S, who were 35-64 years old in 1940, 1950, 1960 and in 1970. Standard errors (parentheses) account for clustering on state of birth and census year. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels.

**Table 4b: The impact of WWII on male employment across occupations**  
(panels: 1940 to 1970)

	Employed		
	(1)	(2)	(3)
<b><u>Options:</u></b>		<i>Base: White-Collar</i>	
<b><u>Blue-Collar</u></b>	<b>35-44</b>	<b>45-54</b>	<b>55-64</b>
mobilization*1950	1.247 (0.447)***	2.172 (0.594)***	1.427 (0.940)
mobilization*1960	-0.370 (0.449)	1.398 (0.499)***	1.149 (0.839)
mobilization*1970	-1.366 (0.537)**	1.617 (0.558)***	2.498 (0.921)***
Observations	318839	253982	154833

Note: See notes to Table 4a.

**Table 5a: The impact of WWII on female employment across occupations & education (panel: 1940-1950-1960-1970, with slwt for 1950)**

	Baseline without education covariates			Baseline with education covariate			Baseline without education covariates			Baseline with education covariate		
	All			All			Employed			Employed		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b>Options:</b>	<i>Base: Out of Labor force</i>			<i>Base: Out of Labor force</i>			<i>Base: Clerical</i>			<i>Base: Clerical</i>		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
<b><u>Operatives/Crafts</u></b>												
mobilization*1950	3.481 (1.873)*	3.293 (1.799)*	0.435 (3.251)	2.967 (1.851)*	3.191 (1.804)*	0.793 (3.215)	-0.403 (2.181)	5.918 (2.287)***	5.237 (3.441)	-0.750 (1.938)	6.040 (2.219)***	5.873 (3.455)*
mobilization*1960	4.850 (1.767)***	0.713 (1.649)	-0.993 (2.952)	4.731 (1.725)***	0.676 (1.614)	-0.952 (2.926)	4.004 (1.643)**	3.235 (2.255)	6.228 (2.922)**	3.157 (1.566)**	3.961 (2.056)*	6.585 (2.955)**
mobilization*1970	6.355 (1.887)***	-1.079 (1.880)	0.565 (2.982)	5.891 (1.894)***	-1.285 (1.908)	0.427 (2.950)	4.780 (1.771)***	1.322 (2.372)	8.673 (2.859)***	4.153 (1.517)***	1.578 (2.266)	8.006 (2.823)***
<b><u>Services</u></b>												
mobilization*1950	-0.007 (2.046)	10.556 (2.153)***	-0.020 (2.651)	-0.117 (2.141)	10.463 (2.170)***	0.152 (2.631)	-3.694 (2.664)	14.246 (2.424)***	3.383 (3.647)	-3.652 (2.592)	13.945 (2.683)***	3.802 (3.689)
mobilization*1960	0.724 (1.380)	1.258 (1.471)	3.630 (2.288)	1.161 (1.498)	1.396 (1.572)	3.735 (2.320)*	0.268 (1.903)	3.694 (1.769)**	9.336 (2.896)***	-0.592 (2.125)	3.789 (2.038)*	9.523 (2.940)***
mobilization*1970	-3.941 (1.557)***	-1.125 (1.467)	0.627 (2.380)	-3.556 (1.714)**	-0.733 (1.582)	0.646 (2.398)	-6.147 (1.908)***	0.607 (1.714)	7.165 (2.908)**	-6.283 (2.084)***	0.924 (2.049)	6.617 (2.867)***
<b><u>Professional/Managerial</u></b>												
mobilization*1950	-5.402 (2.331)**	-4.278 (1.877)**	-1.349 (2.609)	-2.386 (2.542)	-2.128 (2.016)	-3.458 (2.935)	-9.368 (2.725)***	-0.889 (2.413)	2.614 (3.170)	-7.253 (3.271)**	-0.054 (2.401)	2.273 (3.444)
mobilization*1960	-2.744 (2.159)	-4.936 (1.519)***	-5.329 (2.337)**	-1.138 (2.260)	-2.973 (1.741)*	-5.096 (2.640)**	-3.579 (2.098)*	-2.735 (1.999)	1.073 (2.558)	-1.479 (2.317)	-1.789 (2.056)	1.440 (2.854)
mobilization*1970	-0.944 (1.875)	-4.943 (1.472)***	-5.316 (2.330)**	-0.097 (2.001)	-2.835 (1.667)*	-5.123 (2.580)**	-3.532 (2.013)*	-3.465 (1.941)*	1.707 (2.629)	-2.210 (2.274)	-1.846 (2.000)	2.071 (2.894)
<b><u>Clerical</u></b>												
mobilization*1950	3.734 (1.820)**	-3.549 (1.965)*	-4.342 (2.462)*	4.796 (1.809)***	-2.888 (2.031)	-5.385 (2.395)**						
mobilization*1960	0.961 (1.338)	-2.477 (1.460)*	-6.488 (2.002)**	1.500 (1.375)	-1.847 (1.549)	-6.608 (1.946)**						
mobilization*1970	2.645 (1.489)*	-1.747 (1.491)	-7.144 (2.015)**	3.072 (1.473)**	-1.077 (1.554)	-7.076 (1.932)**						
<b><u>Other</u></b>												
mobilization*1950	1.876 (1.574)	3.095 (2.411)	5.172 (3.357)	1.997 (1.535)	3.371 (2.385)	4.826 (3.331)	-2.159 (2.259)	6.121 (3.296)*	10.428 (3.925)***	-2.455 (2.199)	5.811 (3.396)*	10.465 (4.072)***
mobilization*1960	1.131 (1.667)	-0.801 (1.929)	-0.157 (2.378)	1.291 (1.640)	-0.502 (1.896)	-0.182 (2.399)	-0.431 (2.096)	1.611 (2.595)	6.904 (2.676)***	-1.400 (2.276)	1.523 (2.677)	6.667 (2.762)**
mobilization*1970	-2.031 (1.829)	-2.649 (2.129)	2.071 (2.521)	-1.886 (1.806)	-2.323 (2.094)	2.076 (2.523)	-4.714 (1.956)**	-0.743 (2.623)	9.995 (2.631)***	-5.461 (1.991)***	-0.954 (2.611)	9.337 (2.714)***
Observations	298609	276505	242172	298609	276505	242172	96308	99221	94567	96308	99221	94567

Note: see notes to Table 3a.

**Table 5b: The impact of WWII on female employment across occupations & education (panel: 1940-1950-1960-1970, with slwt for 1950)**

	Baseline without education covariates			Baseline with education covariate			Baseline without education covariates			Baseline with education covariate		
	All			All			Employed			Employed		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b><u>Options:</u></b>	<i>Base: Out of Labor force</i>			<i>Base: Out of Labor force</i>			<i>Base: Clerical</i>			<i>Base: Clerical</i>		
	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>
<b><u>White-Collar</u></b>												
mobilization*1950	0.960 (1.578)	-3.814 (1.520)**	-2.920 (2.070)	2.766 (1.629)*	-2.564 (1.651)	-4.571 (2.139)**						
mobilization*1960	-0.226 (1.358)	-3.262 (1.159)**	-5.897 (1.857)**	0.781 (1.444)	-2.070 (1.328)	-5.957 (1.903)**						
mobilization*1970	1.314 (1.290)	-2.802 (1.176)**	-6.137 (1.840)**	2.083 (1.378)	-1.511 (1.312)	-6.081 (1.829)**						
<b><u>Blue-Collar</u></b>												
mobilization*1950	1.679 (1.404)	4.969 (1.283)**	1.461 (2.098)	1.393 (1.388)	4.902 (1.331)**	1.561 (2.097)	0.627 (1.851)	8.358 (1.810)**	4.636 (2.074)**	-0.962 (1.739)	7.718 (2.117)**	5.630 (2.519)**
mobilization*1960	2.722 (1.137)**	0.410 (1.042)	0.695 (1.990)	2.796 (1.105)**	0.430 (1.087)	0.705 (1.985)	2.983 (1.385)**	3.778 (1.585)**	6.778 (1.573)**	0.949 (1.638)	3.402 (1.782)*	6.831 (2.002)**
mobilization*1970	0.836 (1.291)	-1.919 (1.224)	1.092 (2.088)	0.737 (1.315)	-1.880 (1.308)	1.003 (2.082)	0.072 (1.253)	1.298 (1.576)	7.635 (1.502)**	-1.555 (1.397)	0.742 (1.816)	7.107 (1.863)**
Observations	298609	276505	242172	298609	276505	242172	96308	99221	94567	96308	99221	94567

Note: See notes to Table 3a.

**Table 6: WWII mobilization and gender wage differentials across occupations**

<b>Dependent variable: Log-weekly real wage</b>			
<b>Female = 1 if a woman in the given age group, = 0 if otherwise</b>			
	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>
<i>occ_j=operatives</i>			
mobilization*1950*female	0.112 (0.050)**	0.186 (0.063)***	0.254 (0.054)***
mobilization*1960*female	-0.180 (0.054)***	-0.028 (0.057)	0.101 (0.049)**
mobilization*1970*female	-0.277 (0.048)***	-0.104 (0.056)*	0.021 (0.047)
Observations	116263	109413	88765
<i>occ_j=services</i>			
mobilization*1950*female	0.276 (0.072)***	0.430 (0.081)***	0.400 (0.067)***
mobilization*1960*female	-0.332 (0.050)***	0.024 (0.053)	0.180 (0.049)***
mobilization*1970*female	-0.325 (0.061)***	-0.127 (0.069)*	0.122 (0.049)***
Observations	17574	19342	20763
<i>occ_j=prof/man</i>			
mobilization*1950*female	-0.035 (0.052)	0.078 (0.072)	0.316 (0.090)***
mobilization*1960*female	-0.317 (0.041)***	-0.449 (0.050)***	-0.097 (0.064)
mobilization*1970*female	-0.242 (0.038)***	-0.592 (0.052)***	-0.414 (0.062)***
Observations	60935	59249	50840
<i>occ_j=clerical</i>			
mobilization*1950*d_occj	0.019 (0.050)	0.015 (0.039)	0.023 (0.068)
mobilization*1960*d_occj	-0.216 (0.040)***	-0.218 (0.034)***	-0.088 (0.055)
mobilization*1970*d_occj	-0.395 (0.038)***	-0.504 (0.042)***	-0.305 (0.054)***
Observations	47570	42466	37470

Note: Coefficients from a linear regression (see specif. 2). Other 1940 state covariates: male share farmers, non-whites, male average education. Other covariates: individual education, fixed effects for age, state of birth, state of residence, year. Sample includes white women and men, born in the U.S, who worked more than 20 weeks in the previous year and were employed at the survey date. Standard errors (parentheses) account for clustering on state of birth and census year. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels.

**Table 7: WWII and wage differentials across occupations relative to clerical****Dependent variable: Log-weekly real wage****d\_occj = 1 if currently employed in occ\_j, = 0 if currently employed in clerical**

	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>
<i>occ_j=operatives</i>			
mobilization*1950*d_occj	0.387 (0.041)***	0.504 (0.055)***	0.507 (0.061)***
mobilization*1960*d_occj	0.330 (0.044)***	0.588 (0.051)***	0.537 (0.047)***
mobilization*1970*d_occj	0.449 (0.048)***	0.698 (0.059)***	0.677 (0.052)***
Observations	43749	43675	40001
<i>occ_j=services</i>			
mobilization*1950*d_occj	0.559 (0.078)***	0.517 (0.061)***	0.631 (0.071)***
mobilization*1960*d_occj	0.153 (0.055)***	0.399 (0.052)***	0.508 (0.052)***
mobilization*1970*d_occj	0.426 (0.050)***	0.586 (0.053)***	0.718 (0.055)***
Observations	37384	36836	35865
<i>occ_j=prof/man</i>			
mobilization*1950*d_occj	-0.234 (0.051)***	-0.186 (0.065)***	-0.145 (0.082)*
mobilization*1960*d_occj	-0.128 (0.040)***	-0.091 (0.052)*	0.093 (0.063)
mobilization*1970*d_occj	0.209 (0.038)***	0.116 (0.052)**	0.168 (0.065)***
Observations	44467	41056	39484

Note: Coefficients from a linear regression (see specif. 3). Other 1940 state covariates: male share farmers, non-whites, male average education. Other covariates: individual education, fixed effects for age, state of birth, state of residence, year. Sample includes white women, born in the U.S, who worked more than 20 weeks in the previous year and were employed at the survey date. Standard errors (parentheses) account for clustering on state of birth and census year. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels.



## Appendix:

**Table A1: The impact of WWII on female employment across occupations (panel: 1930-1940-1950-1960-1970)**

	All				Employed			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Options:</u>	<i>Base: Out of Labor force</i>				<i>Base: Clerical</i>			
	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>
<u>Operatives/Crafts</u>								
mobilization*1950	3.858 (1.347)***	-0.393 (1.547)	-1.452 (2.374)	-4.970 (3.423)	0.051 (1.390)	1.293 (1.806)	-1.215 (2.745)	-6.394 (4.300)
mobilization*1960	4.735 (1.600)***	2.108 (1.692)	-0.524 (2.281)	-4.257 (2.340)*	3.947 (1.382)***	3.966 (1.890)**	4.106 (2.478)*	2.829 (3.090)
mobilization*1970	6.096 (1.812)***	0.465 (1.889)	0.998 (2.313)	-1.293 (2.558)	4.319 (1.489)***	2.100 (2.037)	6.438 (2.424)***	3.219 (2.914)
<u>Services</u>								
mobilization*1950	1.796 (1.649)	5.375 (1.391)***	5.648 (1.773)***	0.769 (2.515)	-1.936 (1.851)	7.174 (1.937)***	5.398 (2.373)**	-0.826 (4.396)
mobilization*1960	1.657 (1.381)	1.899 (1.196)	5.577 (1.614)***	-2.187 (1.706)	0.960 (1.842)	3.209 (1.505)**	9.127 (2.093)***	4.240 (3.466)
mobilization*1970	-2.943 (1.435)*	-0.428 (1.309)	2.491 (1.801)	4.383 (1.843)**	-5.449 (1.697)***	0.205 (1.623)	6.776 (2.168)***	7.630 (3.290)**
<u>Professional/Managerial</u>								
mobilization*1950	-3.200 (1.551)**	-1.712 (1.403)	-1.652 (1.748)	3.162 (2.828)	-6.999 (1.778)***	0.377 (1.944)	-2.127 (2.368)	1.245 (4.161)
mobilization*1960	-2.371 (1.748)	-3.377 (1.140)***	-4.621 (1.568)***	-4.128 (2.063)**	-3.432 (1.714)**	-1.994 (1.726)	-0.916 (2.178)	2.037 (3.253)
mobilization*1970	-0.511 (1.377)	-3.360 (1.148)***	-4.592 (1.646)***	-4.097 (2.086)**	-3.536 (1.549)**	-2.704 (1.637)*	-0.306 (2.190)	-0.807 (3.074)
<u>Clerical</u>								
mobilization*1950	3.616 (1.192)***	-2.394 (1.525)	-0.199 (1.977)	1.549 (3.481)				
mobilization*1960	1.031 (1.230)	-1.864 (1.222)	-4.268 (1.803)**	-6.689 (2.391)***				
mobilization*1970	2.832 (1.419)**	-1.093 (1.261)	-4.871 (1.854)***	-4.036 (2.272)*				
<u>Other</u>								
mobilization*1950	0.197 (1.586)	-0.130 (1.910)	1.751 (2.500)	1.034 (2.707)	-4.035 (1.744)**	1.647 (2.661)	1.642 (3.172)	-2.076 (4.772)
mobilization*1960	1.879 (1.531)	0.076 (1.855)	-2.611 (1.820)	-3.942 (2.371)*	0.366 (1.860)	1.449 (2.397)	1.231 (2.560)	2.077 (3.649)
mobilization*1970	-1.189 (1.896)	-1.806 (2.125)	-0.391 (1.961)	-1.964 (2.382)	-4.174 (1.923)**	-1.028 (2.448)	4.247 (2.476)*	1.473 (3.576)
Observations	458198	412971	327974	233675	132621	128800	112138	64792

Note: Coefficients from a multinomial logit regression (specif. 1). Other 1940 state covariates: male share farmers, non-whites, male average education, male share in defense industries, male shares in operatives, services, clerical and professional/managerial occupations, fixed effects for age, state of birth, state of residence, year. Sample includes white women, born in the U.S, who were 35-54 years old in 1960 and in 1940. Standard errors (parentheses) account for clustering on state of birth and census year. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels.

**Table A2: The impact of WWII on female employment on white and blue collar occupations (panel: 1930-1940-1950-1960-1970)**

	All				Employed			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b><u>Options:</u></b>	<i>Base: Out of Labor Force</i>				<i>Base: White-Collar</i>			
	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>
<b><u>White-Collar</u></b>								
mobilization*1950	1.386 (1.014)	-2.055 (1.150)*	-0.887 (1.480)	3.039 (2.417)				
mobilization*1960	-0.164 (1.198)	-2.330 (0.861)***	-4.413 (1.340)***	-4.641 (1.682)***				
mobilization*1970	1.459 (1.165)	-1.861 (0.925)**	-4.610 (1.423)***	-3.213 (1.678)*				
<b><u>Blue-Collar</u></b>								
mobilization*1950	2.106 (1.106)*	1.289 (1.028)	1.852 (1.340)	-0.990 (1.665)	0.513 (1.205)	2.848 (1.510)*	2.843 (1.510)*	-4.085 (2.562)
mobilization*1960	3.145 (1.072)***	1.643 (0.999)*	1.114 (1.346)	-2.982 (1.094)***	3.430 (1.180)***	3.845 (1.209)***	5.606 (1.306)***	1.843 (1.904)
mobilization*1970	1.230 (1.294)	-0.621 (1.225)	1.513 (1.501)	1.222 (1.317)	0.355 (1.094)	1.403 (1.318)	6.393 (1.237)***	4.554 (1.757)***
Observations	458198	412971	327974	233675	132621	128800	112138	64792

Note: See notes to Table 3a.