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ABSTRACT

This paper presents intergenerational evidence in favor of the hypothesis that a significant factor explaining the increase in female labor force participation over time was the growing presence of men who grew up with a different family model--one in which their mother worked. We use differences in mobilization rates of men across states during WWII as a source of exogenous variation in female labor supply. We show, in particular, that higher WWII male mobilization rates led to a higher fraction of women working not only for the generation directly affected by the war, but also for the next generation. These women were young enough to profit from the changed composition in the pool of men (i.e., from the fact that WWII created more men with mothers who worked). We also show that states in which the ratio of the average fertility of working relative to non-working women is greatest, have higher female labor supply twenty years later.

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1. Introduction

In Fernández, Fogli and Olivetti (2002) we explored the idea that the family can be an important agent of preference formation and that, in particular it could be an important factor in explaining the evolution of women's labor force participation over time. Specifically, we argued that a significant determinant of the increase in women's involvement in the formal labor market was the increasing number of men who, over time, grew up in a family in which their mother worked. Men who were brought up by a working mother, we showed, were significantly more likely to be married to women who worked. Hence, it could be that the increased presence of this new type of man–one that grew up with a working mother–makes it more palatable to be a working woman and, we speculated, to therefore invest more in market skills.[1]

Our empirical evidence, however, was all cross-sectional and aimed at showing that the positive correlation between the working behavior of a man's mother and that of his wife was not driven by other factors such as religion, education, geography or social networks. It did not investigate the critical dynamic implications of our theory, namely, that exogenous variations in the proportions of men brought up by working women would have implications for the following generation's labor force participation. In this paper we now turn to the intergenerational evidence.[2]

The objective of this companion paper is to quantify the effect of our preference formation mechanism on the rise of female labor supply, by exploring the intergenerational consequences of two different sources of variation in the proportion of men brought up by working mothers. We first make use of idiosyncratic differences across US states in the impact of WWII on married women's labor supply to provide exogenous variation in the proportion of men raised by working mothers. We analyze the effect of WWII on the labor supply of the 1930-35 cohort of women, a cohort that was too young to be directly affected by the war, but that was the right age to be affected by the change in the available pool of men a few decades later. We contrast the indirect effect of the war on this cohort with its direct effect on older cohorts and show that although the direct effect

[1] See Goldin (1990) for an extensive account of the historical evolution of women's role in the society.

[2] Standard explanations for the increase in women's labor supply rely mostly on technological factors. See for example Greenwood, Seshadri, and Yorukoglu (2004) and Goldin and Katz (2002). Pencavel (1998) and Smith and Ward (1985) study the role of changes in the wage structure in explaining female labor supply. They find that wages cannot explain a large proportion of the observed changes.

of WWII faded for the older cohorts over time, its indirect effect on the younger cohort persisted. By the time the cohorts reach the age of 45-50, there is no longer a direct effect of the war on the older cohorts' labor supply whereas the indirect effect on the 1930-35 cohort is still present and strong: we find that a 10% higher mobilization rate is associated with 3.3 additional weeks worked by 45-50 years old women in 1980, which represents almost 16% of the total increase in weeks worked on average by this age group between 1940 and 1980.

Our second source of variation comes from differences across US states in the average fertility of working relative to non-working women. Our theory implies that, for a given level of female labor supply, states with higher ratios in the average fertility of working relative to non-working women should have greater female labor supply the following generation. We examine the relationship between this measure of relative fertility and next generation's female labor supply across US states over several decades and show that the correlation in the data is positive and significant as predicted by the theory.

2. World War II

World War II can be usefully viewed as providing an "exogenous" shock to female labor supply. As men were mobilized to serve in the war, women increased their labor force participation markedly. In 1940, only 28% of women over age 15 participated in the labor force. By 1945 this figure exceeded 34%.[3]

Acemoglu, Autor and Lyle (2004) argue that variations in the importance of this shock across states—captured by differentials in the mobilization rate of men across states—can be used to provide exogenous variation in women's labor supply. Their empirical strategy is to use WWII mobilization rates as the first-stage regression in an analysis of the effects of the increase in female labor supply on the wage structure. In this paper we also make use of the variation provided by differences in mobilization rates on female labor supply across states. Unlike these authors, however, we are interested in identifying the effects of this variation on the labor supply of women many years later and, most importantly, we wish to identify the "echo" effect that this variation should have, according to our theory, for the cohort of women who were young enough during WWII to be affected by the change in the available pool of men in the next generation.

[3] See Blau, Ferber and Winkler (2002). Goldin (1991) shows that half of the women who entered the labor force during the war period had exited the labor force by 1950, still leaving a large increase in participation.

The basic logic of our exercise is as follows. World War II directly affected the work behavior of women during the war years. As we will show, the differential effect of the war did not fade immediately; rather it lingered for several decades in the work behavior of those women who were old enough in the 1940s to be directly affected by the war. As these women aged, however, the effect of the war on their work behavior appears to have slowly faded. By the time these women reach the age of 45-50, there does not appear to be a differential effect of the war on their labor supply. A younger generation of women—those born in 1930-35 (who were thus 7-12 years old in 1942)—was too young to be directly affected by the war, but not too young to be affected by the change in their mothers' work behavior. As we show, the war affected this cohort's labor supply as well. Most importantly, although the effect of WW2 faded for the older cohorts, its influence on the labor supply of this later cohort persisted. This is an effect that our theory would predict, as the change in these women's labor supply did not depend on whether they worked during the war, but rather on the expectations they formed, then and after, as to the return to investing in market skills. The return to becoming a working woman had increased, according to our hypothesis, since more boys had been raised by a working mother.

We investigate our hypothesis in several steps. The first step is to show that, as posited, the mobilization rate of men during World War II had a positive effect on the labor supply of the mothers of the 1930-35 cohort. The second step is to trace out the echo effect of the war over the life cycle of the 1930-35 cohort by contrasting the indirect effect of the war on the labor supply of this cohort with the direct effect of the war on older cohorts at the same age.

2.1. The Data Set

We use data from the one-percent Integrated Public Use Microsample (IPUMS) of the decennial Census for the decades 1940 to 1980.[4] We restrict our attention to white married women belonging to the following three age groups: 25-30, 35-40, and 45-50. We exclude women living in farms or working in agricultural occupations, as well as those living in group quarters (e.g. prisons, and other group living arrangements such as rooming houses and military barracks).[5]

[4] In particular, we use the general 1% sample for 1940 and 1950 and the 1960. For the 1970 we use the 1% State Sample (Form 1) and for the 1980 we use the 1% Metro Sample (Sample B).

[5] We exclude the following occupations (based on the 1950 Census definition): farmers (owners and tenants), farm managers, farm foremen, farm laborers as wage workers, farm laborers as

Our primary measure of female labor supply is the number of weeks worked in the previous year. In 1960 and 1970, Census information on weeks worked is reported in intervals (1-13 weeks, 14-26 weeks, 27-39 weeks, 40-47 weeks, 48-49 weeks and 50-52 weeks). For these decades we compute our measure of weeks worked by assigning the midpoint of each interval. For 1940, 1950 and 1980 we use the information on actual number of weeks worked that is available in the Census.[6] For 1950, information on weeks worked is only available for sample line persons, hence we use the appropriate sample line weights in the analysis. For the remaining decades we use the appropriate person weights that indicate the number of people in the population that each sampled individual represents. The summary statistics for our sample are reported in the Appendix. Since we assign mobilization rates by women's state of birth, we exclude women born outside the US as well as those born in Alaska and Hawaii since these were not states until the 1950s.

Our mobilization rate variable is the same used in Acemoglu, Autor and Lyle (2004).[7] They use published tables from the Selective Service System (1956) and construct men's mobilization rates during WWII as the fraction of the 18 to 44 years old registered males in a state who were drafted for war.[8] Mobilization rates varied substantially across states, from less than 42% in Georgia, the Dakotas and the Carolinas, to more than 52% in Washington, Pennsylvania, New Hampshire, Oregon, and Massachusetts. The state differences in war mobilization reflect a variety of factors. The Selective Service's guidelines for deferments were based on marital status, fatherhood, essential skills for civilian war production, and temporary medical disabilities, but also left considerable discretion to the local boards. Farm employment, in particular, was a major cause of deferment as maintaining food supply was considered essential to the war effort. In Table I we report various characteristics of states by level of mobilization rate (low, medium,

unpaid family workers, and farm service laborers as self-employed.

[6] In the 1940 Census respondents were required to report this information in terms of "equivalent full-time weeks." It was up to respondents to determine precisely what "full-time" meant, though enumerators were instructed to suggest that 40 hours was a good round figure. In essence, respondents were to estimate how many hours they had averaged per week, multiply this figure by 52 weeks, then divide by 40 (See Census codebook).

[7] We thank the authors for making the data available to us.

[8] Since all men in the age bracket 18-44 were registered, their mobilization rate variable represents the fraction of men in this age range who have served. Mobilization rates for Nevada and Washington D.C. are not available (the former because it saw large population changes during this time period).

and high). As seen in this table, the mobilization rate was higher in states with higher average male education, with lower percentage black, and with lower proportion of the male population that were farmers. The average mobilization rate is .474 with a standard deviation of .035.

To attempt to control for systematic variation in the mobilization rate, our regressions include the 1940 fraction of non-white men aged 13 to 44, the 1940 fraction of men between the ages of 13 to 44 who are not farmers and the 1940 average education of men in this same age group.[9] As shown in Acemoglu et al., after controlling for these factors and for other non-economic components (such as the age composition and the number of german-born men) there is still some thirty per cent variation of mobilization rates across states that is left unexplained and which is attributed to idiosyncratic strategies followed by local registration boards.[10]

2.2. Model Specification and Results

We now describe our analysis of the impact of WWII on the working behavior of married women. Our analysis pools married women born in 1930-35 with married women from earlier cohorts and contrasts the indirect effect of the war on the 1930-35 cohort with the direct effect of the war on the earlier cohorts. For a meaningful comparison, we look across cohorts at the same age (i.e., we take their labor supply in the decade in which they reach the specified age).

We run the following basic regression:

$$w_{ist} = X'_{ist}\beta_1 + \gamma_t \widetilde{X}'_{ist}\beta_{2t} + \gamma_t e'_s \beta_{3t} + \alpha_t \gamma_t m_s + d_s + \gamma_t + \varepsilon_{ist} \qquad (2.1)$$

where w_{ist} measures weeks worked by woman i born in state s at time t, X'_{ist} represents a set of individual characteristics: age dummies, state of residence dummies, and husbands' state of birth dummy. In $\widetilde{X}'_{ist}$ the age dummies are interacted with a year effect γ_t (for each decade following 1940). We also include a year dummy, a state dummy, d_s, and the aforementioned set of state-level 1940 economic variables (farmers, non-whites, and average education) interacted with the year dummy.

Our variable of interest is the interaction of the mobilization rate variable, m_s, assigned by female state of birth, with the time dummy, γ_t. The coefficient α_t measures whether states with higher mobilization rates during WWII experienced

[9] Men who are 13 in 1940 would be 18 in 1945 and therefore part of the draft target group.

[10] See Table 4 in Acemoglu, Autor, and Lyle (2004).

a larger increase in female labor supply in decade t. Since the key variable on the right-hand side only varies by state and year, all the standard errors we report in this experiment are corrected for clustering at the state-year level.

In 1935, the average age of a white woman giving birth was 26.8.[11] Thus, we study the mothers of our cohort of interest (1930-35) by examining the labor supply of married women born in 1903-1908. We run a regression similar to the one specified in (2.1), pooling the observations for the mothers' cohort with that of the cohort born ten years earlier. Instead of assigning variables by state of birth, however, we assign them by state of residence since this is more likely to correspond to the state where the woman lived during WWII. As the 1903-08 cohort was 42 to 47 years old in 1950, we pool 42-47 years old in 1940 with the same age group in 1950. Table II reports the results.

As shown in the table, we obtain a point estimate for α of 19.6. This implies that a 10% increase in the mobilization rate is associated with an increase in female employment for this age group of 1.96 weeks between the beginning and the end of the 1940 decade. To interpret the magnitude of this effect, note that white married women of this age were working on average 6.7 weeks in 1940. Hence this number represents an increase of around 30% in their labor supply. Thus, we conclude that the women most likely to have children in 1930-35 significantly increased their labor supply substantially more in those states in which the mobilization rate of men was greater. These states, therefore, would have had a greater increase in the proportion of men brought up by working mothers.

We now turn to the analysis of the labor supply of our cohort of interest: women born in 1930-35. We proceed similarly to what we did for the mothers' cohort, by pooling the 1930-35 cohort with preceding ones at a given point in their life cycle, but assigning variables by state of birth. Our results are reported in Table III.

We start by examining cohorts at the age of 25-30 (and thus pool our cohort in 1960 with the 1920-25 cohort in 1950 and the 1910-15 cohort in 1940). As shown in column 1 of panel A, the coefficient on the mobilization rate interacted with 1950 is positive (and almost significant at the 10% level). We would interpret this as the direct effect of the war on the women born in 1920-25, as they were close to their early 20s during the war. What we call the "indirect" effect of the war can be seen in the coefficient on the mobilization rate interacted with 1960. The 1930-35 cohort was too young to be affected directly by the war, but not too

[11] Calculated from the Statistical Tables on Births: Live Births by Age of Mother and Race: United States, 1933-1998 (National Center for Health Statistics web page).

young to be affected by the fact that they had more working mothers. As our theory predicts, the coefficient on the mobilization rate in 1960 is positive and significant, showing that this cohort was also affected, albeit indirectly, by the war.

The next two columns in panel A of Table III repeat this regression with some modifications. The second column includes dummies for the state of residence and for the husband's state of birth. Of course, the state of birth of a woman's husband is an endogenous variable (in the sense that she chooses whom to marry and this may be a relevant characteristic), as is her state of residence. The question is whether a woman born in a particular state, with a given mobilization rate, formed her expectations about the proportion of men with working mothers in that state, or in her current state of residence. This depends on when she moved, among other things. As this is something we cannot determine, we find it of interest to run our regression both including and omitting these controls. The third column also includes these variables but restricts the sample to those women whose state of residence is the same as their state of birth. This allows us to not worry about what should be the "correct" mobilization rate for women who moved. In all regression specifications, the mobilization rate is positive (and almost significant) in 1950 and it is positive and significant in 1960. Note that the coefficient of 26 implies that a 10% increase in the mobilization rate increased this age group's labor supply by 2.6 weeks, an increase of some 25% over the 8.8 weeks that women of this age group were working in 1940.

Panels B and C in Table III repeat the same exercises as above for the ages of 35-40 and 45-50. As before, the first column does not include state of residence and husband state of birth dummies and the third column is restricted to women who reside in the same state as their state of birth.

Panel B shows that both the 1910-15 and the 1920-25 cohorts worked more at the age of 35-40 (i.e., in 1950 and 1960, respectively) in states that had higher mobilization rates. This represents the direct effect of the war on these cohorts. As shown by the third entry in the columns, the indirect effect of the war is also present: the 1930-35 cohort also worked more in 1970 in states with higher mobilization rates. It is interesting to note that already at this point we can see the fading direct effect of the war as shown in the decrease in the coefficient that accompanies the mobilization rate from 1950 to 1960. The coefficient on the mobilization rate in 1970 in the third column implies that an increase in the mobilization rate of 10% accompanied a 2.2 weeks increase in the labor supply of women of age 35-40 in 1970. As women of that age were working on average 7.4

weeks in 1940, this implies an increase of almost 30 percent.

Lastly, panel C examines women at the age of 45-50. As by the time women reach this age it is more likely they no longer reside in their state of birth (indeed, our sample of women decreases by a third), we will concentrate on the results reported in the third column. As shown, there was a direct effect of the war on women from the 1900-05 cohort in 1950. However, unlike the other cases, the effect of the war has basically completely worn off by the time the next two cohorts (1910-15 and 1920-25) reach 45 to 50, in 1960 and 1970, respectively. The coefficient on the mobilization rate is insignificant. The result is dramatically different for our 1930-35 cohort: in 1980 the effect of the war on women is again positive, statistically significant, and quantitatively important. Women of this age worked around 3.3 weeks more in 1980 than in 1940 in states with a 10% higher mobilization rate; this is an increase of almost 60% relative to the 5.5 weeks worked on average by this age group in 1940.

To explore our last result in greater depth, we next pool our 45-50 years old women two cohorts at a time, and examine the effect of the mobilization rate in explaining the variation in female labor supply in the later of the two cohorts. This approach allows us to examine the incremental effect of the war on the later of the cohorts under comparison. It also allows the state of birth effect to change with the pair of cohorts examined.

As shown in Table IV, the pattern is similar to that obtained in Table III. That is, there is a positive and significant effect of the war on 45-50 years old women in 1950 (i.e., on the 1900-05 cohort in 1950), there is no additional effect of the war in 1960 relative to 1950 (i.e. on the 1910-15 cohort in 1960), there is no additional effect of the war in 1970 relative to 1960 (i.e., on the 1920-25 cohort in 1970), and lastly there is a positive, significant, and quantitatively important additional effect of the war in 1980 relative to 1970 (i.e., on the 1930-35 cohort in 1980). This last result shows that not only does the variation in the mobilization rate help to explain the labor supply of 45-50 years old women in 1980 relative to 1940 (as shown in Table III), but it also helps explain the labor supply of women this age in 1980 relative to 1970. That is, at this point the indirect effect of the war is sufficiently large relative to the direct effect, that it significantly explains the labor supply of the 1930-35 cohort relative to the 1920-25 cohort. The value of 20 of the mobilization coefficient in 1980 implies that a 10% higher mobilization rate is associated with a 2 weeks increase in the average number of weeks worked by 45-50 years old married women in 1980. Given that married women of this age were working on average 21.8 weeks in 1970, this represents around a 9% increase

in the number of weeks worked.[12]

We conclude from the evidence above that WWII directly affected the labor supply of older cohorts and indirectly affected a younger cohort. This younger cohort was too young to have changed its labor supply in direct response to the war. Nonetheless, it witnessed a permanent increase in its labor supply that varied across states with the mobilization rate of men. Our hypothesis is that this was a response to the increase in the number of men brought up by working mothers. The indirect effect of the mobilization rate on this particular cohort's labor supply is present at all points in the life cycle that we have examined, which also distinguishes it from the direct effect of the war which appears to fade as the earlier cohorts age.

Our analysis of the direct and indirect effects of the war also allows us to provide a rough estimate of the intergenerational effect that, according to our model, stems from having more sons brought up by working mothers. In particular, the ratio of the coefficient on the mobilization rate of the younger generation (the indirect effect) to the same coefficient for the mothers' generation (the direct effect), can be interpreted as the effect of an exogenous increase in the labor supply of married women on next generation's female labor supply. This ratio is 1.67, which implies that if married women of the age to have young children exogenously increase their labor supply by one week, we expect an increase in the labor supply of the next generation of approximately 1.67 weeks.[13] It follows that the amplification mechanism deriving from the intergenerational channel is quantitatively large.[14]

2.3. Alternative Interpretations

Our interpretation of the results obtained from our WWII analysis can be challenged by three alternative hypotheses. We next turn to a discussion of these and show that our explanation dominates these alternatives.

A first competing explanation is that the intergenerational effect we observe

[12] We find similar results when we run this regression exercise for the entire sample of white married women with and without state of residence and husband state of birth dummies.

[13] We compute this number by dividing the coefficient obtained for the younger generation by 19.64 (the coefficient obtained for the older generation from Table II). The magnitude of the numerator depends on the age and specification, of course. Using the coefficient obtained when they are 45-50 years old in the third specification in Table III, we get 1.67.

[14] One should expect the size of this effect to decrease over time, as the economy approaches a steady state.

is brought about by working mothers affecting their daughters directly. A second hypothesis is that society was most transformed in those states with higher mobilization rates, making it easier for women to work in those states in the future. Although our dynamic empirical results alone cannot distinguish between our hypothesis and these alternatives, the cross-sectional evidence presented in our earlier work indicates that our dynamic effect results, at least in large part, from the effect of working women on their sons. It is primarily to examine the possibility that the intergenerational effect works from mothers to daughters directly that we turn to the "Female Labor Force Participation and Marital Instability" (FLFPMI) data set.[15] This data set has the couple, rather than the individual, as the unit of analysis and contains background information for both husband and wife. It makes therefore possible to study a married woman's working behavior as a function of her own mother's working behavior at the time she was growing up. From this analysis we are able to conclude that the effect of the working behavior of a woman on her daughter's working behavior appears to be negligible. Moreover, in Fernández, Fogli and Olivetti [2002] we show that the effect of the working behavior of a woman's mother in law on the probability that she works is quantitatively large, suggesting that, in addition to any societal norms, the family plays an important role.[16] Furthermore, as our results for women 45-50 years old demonstrates, the effect of WWII on the work behavior of women this age disappeared in the 1960s and 1970s (that is, for cohorts born in 1910-15 and 1920-25), only to resurface again in the 1980s for our 1930-35 cohort. It is hard to think why changes in societal norms would give rise to this pattern.

A last possibility is that our dynamic results are really the consequences of the GI Bill. The GI Bill subsidized college education for WWII veterans. Male college enrollment jumped by more than 50 percent from the pre-war (1939) level of 1.3 million to over 2 million men in 1946. Approximately 1 in 8 veterans attended college. If the number of men attending college increased by most in those states with the highest rate of mobilization, and if women "followed" men into college, then the positive correlation between the greater tendency of women from the 1930-35 cohort to work and the mobilization rate of men across states could simply be a consequence of how this cohort increased its education differentially across states.

To examine the validity of this alternative hypothesis, we perform the following

[15] To our knowledge, in the past this dataset has been used only by sociologists.

[16] From 24 to 32 percentage points depending on the dataset and definition of work that we use.

two exercises. First, we examine the correlation between the increase in the average education of women in a state and that state's mobilization rate. Comparing the average education of white women born in a given state in 1920-25 relative to those born a decade later in 1930-35, we find that, averaging across states, average education increased by .53 years, from 11.15 to 11.68 years.[17] The correlation between a state's change in average female education and its mobilization rate is negative and insignificant, independently of whether we assign education by a woman's current state of residence or whether we restrict our sample to women born in the same state as which they reside. Computing the partial correlation after controlling for the 1940 conditions in the state, in the same way as before, changes the sign of the correlation to positive, but likewise is statistically insignificant. Thus, the results of this first exercise make it doubtful that our findings are driven by the GI Bill.

To dispel any remaining doubts, we redid our WWII exercise controlling directly for a woman's level of education (an endogenous variable). Note that our theory also implies a positive relationship between mobilization rates and female education: a woman is likely to find additional education more attractive if she is planning to work in the market.[18] Thus, even if once we controlled for education the effect of mobilization rates on working became insignificant, this in itself would not be evidence against our theory. On the other hand, finding a significant effect of the mobilization rate variable on female labor supply even after controlling for education is evidence in favor of our theory. It shows that the effect of the mobilization rate does not go solely through education, which it would in the case of the GI Bill.

The last column in Table III repeats the regression for the specification in column three, but also includes a set of education dummies as well as these dummies interacted with a year dummy. Education is measured as the highest grade of school attended or completed by the respondent and falls into one of 9 possible categories.[19] As can be seen, the results are very similar to the ones in the pre-

[17] We calculate women's education in the decade the cohort reaches 35-40 years, i.e., 1960 and 1970, respectively for the earlier and later cohort. Education is measured as the highest grade of school attended or completed by the respondent. This variable is topcoded at 6 years of college education (so all individuals with more than 6 years of college are assigned 18 years of education).

[18] Of course market skills and education are not synonymous. In fact, when we control for female education in our cross-sectional regression, we still find that men with working mothers are more likely to work. Hence the effect does not run solely through education.

[19] The nine categories are: none or preschool, grade 1 to 4, grade 5 to 8, grade 9, grade 10,

vious column, with exactly the same pattern of positive and significant results, and quantitatively similar magnitudes. This allows us to conclude that increased education is not what is driving our results.

3. Fertility Ratio

An interesting implication of our theory is that, ceteris paribus, states in which working women have more children relative to non-working women should have greater female labor supply in the next generation. This follows from the fact that, everything else equal, the larger is the average fertility of working relative to non-working women (hereafter denoted the "fertility ratio" for short), the larger will be the proportion of men in the following generation whose mothers worked. If our theory is correct, this should make investing in market skills more attractive for women in the next generation, thereby increasing female labor supply.

In this section we examine the relationship between the fertility ratio across states and female labor supply twenty years later. We regress various measures of female labor supply on a set of individual-level characteristics (age and marital status) and on two state level variables that are assigned to women by their state of birth. For this exercise we restrict attention to women whose state of birth coincides with her state of residence and pool data from the 1960, 1970, and 1980 Census. We use the following specification:

$$L_{ist} = X'_{ist}\beta_1 + \alpha_1 L_{st-20} + \alpha_2 \left(\frac{f_\omega}{f_n}\right)_{st-20} + d_s + \gamma_t + \varepsilon_{ist}$$

In this regression L_{ist} measures the labor supply of a 25-30 years old woman born in state s at time t. X_{ist} represents a set of individual characteristics: age dummies and marital status dummies and both variables interacted as well with time dummy. All the regressions also include state of birth dummy d_s and a time dummy γ_t.

There are two state-level variables. The first, L_{st-20}, is the twenty-years-lagged average labor supply of women 30 to 35 years old, assigned by the individual's state of birth. This variable is introduced in order to control for the "initial" level of female labor supply in each state. To examine our thesis, we used three alternative definitions of labor supply. The first, labor force participation (LFP), is an indicator variable that takes the value of one if a woman was in the labor force

grade 11, grade 12, 1 to 3 years of college, 4 plus years of college.

in the week before the interview (Census definition) and equals zero otherwise. The second, Positive Hours, is an indicator variable that equals one if a woman worked a positive number of hours over the past week, and equals zero otherwise. Lastly, Weeks Worked, is the same variable we used in our WWII analysis: it indicates how many weeks a woman worked in the previous year.

The second state-level variable, $\left(\frac{f_\omega}{f_n}\right)_{st-20}$, is our variable of interest. It is the twenty-year-lagged ratio of the average fertility of working women relative to that of non-working women in the individual's state of birth. This variable is calculated as the ratio of the average number of own children living in the household of 30-35 years old working women (f_ω) relative to the same average for 30-35 years old non-working women (f_n). The definition of a "working woman" used to construct the fertility ratio varies to concord with the definition we are using for the dependent variable (and for L_{st-20} as well).[20] We expect that, conditional on the same level of female labor supply, states characterized by a higher relative fertility ratio of working to non-working women at a point in time should also be characterized by a higher labor supply of women twenty years later.

It is interesting to note that, independently of the definition of working woman adopted, the average fertility ratio has been increasing over time for all definitions of working woman. It went from an average across states of 0.34 in 1940 to 0.62 in 1960. Furthermore, at any point in time the variance in fertility ratios across states is quite large. In 1940, the fertility ratio ranged from a minimum of .18 in Montana to a maximum of .63 in South Carolina, by 1960 it ranged from a minimum of .28 in the District of Columbia and Delaware to a maximum of .78 for Mississippi. The mean across states and time periods is .49 with a standard deviation of .13.[21]

Table V reports the results of our regression analysis. For all definitions of working women, we find a positive and significant relationship between women's working behavior and the average fertility ratio of working relative to non-working women twenty years earlier. The magnitude of the effect of fertility on future female labor supply seems to be very similar across all definitions. In particular, an increase by one standard deviation in the average fertility ratio is associated with, twenty years later, an increase of 1.7 percentage points in LFP (i.e., an

[20] For the definition "weeks worked" we used whether a woman had worked a positive number of weeks in the previous year, however, as the first is a continuous variable. Similar results were obtained when we used alternative definitions to construct the fertility ratio.

[21] The numbers given here are for the LFP definition of a working woman. Similar means and variances are obtained using the alternative definitions.

increase of about 3.5% over its sample mean of 44 percent), an increase of .58 weeks per year in weeks worked (i.e., an increase of 3.3.% over its sample mean of 17.6 weeks), or with an increase in the proportion of women with positive hours of 1.4 percentage points (an increase of around 3.2% over its sample mean).[22]

An important shortcoming of our analysis, of course, is that we are unable to identify an exogenous source of variation in the fertility ratio.[23] Nonetheless, the positive correlation between the fertility ratio and female labor force participation twenty years later constitutes suggestive evidence that favors our hypothesis.

4. Conclusion

This paper provides empirical evidence consistent with the dynamic model developed in Fernández, Fogli, and Olivetti (2002). It explores the dynamic consequences of two different sources of variation in the proportion of men brought up by working mothers. We use variation in the WWII mobilization rates of men across US states to provide exogenous variation in the magnitude of the shock that the war provided to female labor supply. We show that the mobilization rate had a positive impact on the labor supply of women most likely to have young children during this period. This impact of WWII finds an echo many decades later in the labor supply of women who were too young to have been directly affected by the war, but who would have been affected by the implied change in the composition of the future marital pool–the cohort born in 1930-35. We show that whereas the direct effect of the war on older cohorts fades over time, the indirect effect of the war persists in the work behavior of the 1930-35 cohort during its life cycle. We also provide a rough estimate of the magnitude of the intergenerational channel: we find that an increase of one week in the average female labor supply leads to an increase of 1.67 weeks worked in next's generation female labor supply.

Our second source of variation is provided by differences across states in their relative fertility ratios. We analyze the effect of variations in the ratio of the

[22] Our results are similar if we do not restrict the sample to women who reside in the same state as their state of birth.

[23] It may be argued that the same factors that cause the fertility ratio to be higher in one state relative to another, may also make it more attractive for young women to work more in that state twenty years later. The simplest version of this critique, however, is taken care of by controlling for the state's lagged female labor supply alongside its lagged fertility rate (and by including a state fixed effect). Hence if, for example, one state has better child-care services than another, making it easier for women both to work and to have children, this should be captured by controlling for female labor supply.

average fertility of working relative to non-working women on next generation's female labor supply. For a given level of female labor supply, variations in this ratio imply variations in the proportion of children raised by working mothers in the population and, accordingly to our theory, should generate different levels of female labor force participation in the next generation. We examine this relationship across states for several decades, and show that a positive correlation exists in the data, even after controlling for the state's initial labor supply and a state fixed effect: an increase by one standard deviation in the average fertility ratio is associated with an increase of 1.7 percentage points in women's labor force participation twenty years later.

We consider our paper to be a contribution to a small but growing literature that is interested in examining how attitudes (or preferences), social norms, or culture influence the evolution of the economy. We are especially interested in attempting to assess the quantitative significance of what are often considered to be rather "fuzzy" variables, whose existence is often implicitly recognized but rarely quantified. These variables, however, may play a significant role in many economic phenomena, from female education and labor dynamics to fertility, consumption, and investment decisions, and thus are too important to be neglected. In particular, we have shown that there is a quantitatively important link between the proportion of men with working mothers and women's propensity to work. We think that studying the evolution of the family and its interaction with the economy may be fertile ground for future research in this area.

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TABLE I

STATE AGGREGRATES IN LOW, MEDIUM, AND HIGH MOBILIZATION RATE STATES

	low	medium	high
Percent Mobilization 1940-1947	44	47.5	51.3
	(1.4)	(1)	(1.9)
Share Farmers 1940	37.1	22.9	14.5
	(12.9)	(11.1)	(11.1)
Share Non-White 1940	18.8	7.5	2.8
	(16.2)	(7.3)	(3.2)
Average Years Schooling 1940	7.78	8.76	9.3
	(1.04)	(.61)	(.468)
Number of observations	16	16	15

Means and standard errors (in parentheses). The mobilization rates vary from a minimum of 41.2% to a maximum of 54.5%. We construct the low-mobilization category to include the 16 states where the mobilization rate was less than equal to 45.4%: GA, ND, NC, SD, SC, WI, LA, AL, AR, MS, VA, TN, KY, IN, MI, IA. The medium-mobilization category includes the 16 states where mobilization rates where above 45.4% and below 49%: MO, TX, NE, MN, MD, DE, VT, IL, FL, NM, OH, WV, NY, WY, OK, KS. The high mobilization category includes the 15 states where mobilization rates where greater than equal to 49%: MT, CT, AZ, CO, NJ, ID, CA, ME, WA, PA, UT, NH, OR, RI, MA. Mobilization rates are from Acemoglu, Autor and Lyle (2004). They represent the fraction of of 18 to 44 years old males who were drafted for war between 1940 and 1947. Average years of education refers to years of completed education. The share of farmers, of non-white and the average years of schooling represents state averages computed for males 13 to 44 in 1940. Census sample weights used for the calculations.

TABLE II

IMPACT OF WWII ON LABOR SUPPLY OF 42-47 YEARS OLD MARRIED WOMEN

Dependent variable is "Weeks Worked"	
	1940&1950
1940 mobilization rate x year	19.64**
	(8.71)
1940 share male non-white x year	-2.37
	(4.66)
1940 share male farmer x year	6.12***
	(1.79)
1940 male avg years educ x year	.218
	(.483)
Year	-6.80
	(6.01)
N. obs.	32,347
Adjusted R^2	0.03

Robust standard errors in parentheses account for clustering at the state-year level. Estimation results are for a regression that pools 42 to 47 years old women across two cohorts: the 1903-1908 cohort in 1950 and the 1893-1898 cohort in 1940. The dependent variable, weeks worked, is regressed on the mobilization rate variable (interacted with a 1950 dummy) assigned by the woman's state of residence. We also control for state fraction of male farmers, the state fraction of non white males, and the state average education of males in 1940. All the 1940 variables (interacted with the 1950 dummy) are assigned by the woman's state of residence. All specifications include state of residence dummies, a 1950 year dummy, age dummies, and the latter interacted with a 1950 dummy. Data are from Census IPUMS one percent sample for both years. For the 1950 they refer to the sample line subsample. The regression is weighted by census sampling weights. Our sample consists of 42 to 47 years old white married women residing in mainland U.S. states excluding Nevada and DC, not living in institutional quarters, not living in farms or working in agricultural occupations. *Significance at 10% level. **Significance at 5% level. ***Significance at 1% level.

TABLE III

IMPACT OF WWII MOBILIZATION RATES ON LABOR SUPPLY OF MARRIED WOMEN

Dependent variable is "Weeks Worked"

	Panel A: 25 - 30			
	(i)	(ii)	(iii)	(iv)
1940 mobilization rate x 1950	18.11	17.29	21.68	22.59
	(11.05)	(10.99)	(14.50)	(14.24)
1940 mobilization rate x 1960	22.71**	19.06*	26.68*	26.39*
	(11.30)	(11.12)	(15.1)	(15.15)
Year 1950	-11.23*	-11.49*	-19.44**	-17.06**
	(6.26)	(6.16)	(7.51)	(8.19)
Year 1960	-5.58	-3.24	-11.73*	-14.54*
	(5.89)	(5.72)	(7.02)	(7.47)
St. of residence&husband's st. of birth		yes	yes	yes
Education				yes
N. obs.	75,748	73,710	50,146	50,146
Adjusted R^2	0.01	0.015	0.016	0.027
	Panel B: 35 - 40			
	(i)	(ii)	(iii)	(iv)
1940 mobilization rate x 1950	25.25***	23.67***	33.02***	34.49***
	(8.36)	(7.92)	(9.99)	(10.28)
1940 mobilization rate x 1960	18.34***	18.17***	22.55***	24.74***
	(6.76)	(6.29)	(7.89)	(8.22)
1940 mobilization rate x 1970	14.24*	14.78**	22.01**	25.12***
	(8.07)	(7.51)	(8.74)	(8.64)
Year 1950	-2.25	-1.12	-11.88	-20.55***
	(5.87)	(5.63)	(7.79)	(7.90)
Year 1960	-3.76	-3.12	-7.30	-16.73**
	(4.91)	(4.75)	(6.73)	(6.81)
Year 1970	1.79	.99	-6.19	-7.58
	(6.02)	(5.65)	(7.87)	(9.02)
St. of residence&husband's st. of birth		yes	yes	yes
Education				yes
N. obs.	112,125	109,864	71,018	71,018
Adjusted R^2	0.039	0.045	0.05	0.05

Panel C: 45 - 50				
	(i)	(ii)	(iii)	(iv)
1940 mobilization rate x 1950	12.59	17.92	27.98*	26.17*
	(11.39)	(11.59)	(14.79)	(14.79)
1940 mobilization rate x 1960	11.47	16.22*	15.44	15.33
	(9.24)	(9.29)	(12.54)	(12.59)
1940 mobilization rate x 1970	3.25	8.99	13.77	15.96
	(8.56)	(8.75)	(12.31)	(12.23)
1940 mobilization rate x 1980	17.26*	21.72**	32.89**	33.07**
	(10.18)	(10.76)	(14.78)	(14.78)
Year 1950	-14.55	-17.96**	-27.31**	-26.23**
	(9.59)	(9.44)	(13.21)	(13.08)
Year 1960	.52	-2.09	-7.95	-11.71
	(6.53)	(6.44)	(10.39)	(10.81)
Year 1970	9.50	5.07	1.82	-8.88
	(6.84)	(6.79)	(10.27)	(10.59)
Year 1980	8.18	5.01	-1.84	-7.01
	(7.46)	(7.60)	(11.39)	(11.80)
St. of residence&husband's st. of birth		yes	yes	yes
Education				yes
N. obs.	129,899	126,715	80,261	80,261
Adjusted R^2	0.087	0.091	0.098	0.11

Robust standard errors in parentheses account for clustering at the state-year level. Panel A pools 25-30 years old women across cohorts by taking the 1930-1935 cohort in 1960, the 1920-1925 cohort in 1950 and the 1910-1915 cohort in 1940; panel B pools 35-40 years old women across cohorts by taking the 1930-1935 cohort in 1970, the 1920-1925 cohort in 1960, the 1910-1915 cohort in 1950 and the 1900-1905 cohort in 1940; panel C pools 45-50 years old women across cohorts by taking the 1930-1935 cohort in 1980, the 1920-1925 cohort in 1970, the 1910-1915 cohort in 1960, the 1900-1905 cohort in 1950 and the 1890-1895 cohort in 1940. The dependent variable, weeks worked, is regressed on the mobilization rate variable (interacted with year dummies) assigned by the woman's state of birth. We also control for state fraction of male farmer, the state fraction of non white male, and the state average education of males in 1940. All the 1940 variables (interacted with year dummies) are also assigned by the woman's state of birth. All specifications include state of birth dummies, a year dummy, age dummies, and the latter interacted with a year dummy. Specification (ii) also includes state of residence dummies and husband's state of birth dummies. Specification (iii) restricts the sample to women who were born in the same state they reside in. Specification (iv) includes eight education dummies.and their interaction with year dummies. Education is measured as the highest grade of school attended or completed by the respondent. Data are from Census IPUMS one percent sample for all years. For the 1950 they refer to the sample line subsample. All specifications are weighted by census sampling weights. Our sample consists of the age groups we study for white married women born in mainland U.S. states excluding Nevada and DC, not living in institutional quarters, not living in farms or working in agricultural occupations. *Significance at 10% level. **Significance at 5% level. ***Significance at 1% level.

TABLE IV

IMPACT OF WWII MOBILIZATION RATES ON LABOR SUPPLY OF 45 TO 50 MARRIED WOMEN

Dependent variable is "Weeks Worked"				
	1940&1950	1950&1960	1960&1970	1970&1980
1940 mobilization rate x year	16.48**	-11.66	-2.10	20.65***
	(7.87)	(8.46)	(6.28)	(7.07)
1940 share male non-white x year	4.56	-9.00*	-1.77	-1.81
	(4.91)	(4.78)	(4.54)	(2.43)
1940 share male farmer x year	9.84***	-4.39*	2.23	2.96
	(2.03)	(2.42)	(1.86)	(2.55)
1940 male avg years educ x year	2.12***	-.96**	-.46	-.21
	(.436)	(.476)	(.576)	(.225)
Year	-22.35**	20.93***	10.01	-4.37
	(6.12)	(7.62)	(6.33)	(4.69)
N. obs.	15,955	25,127	45,015	45,037
Adjusted R^2	0.035	.029	.015	.017

Robust standard errors in parentheses account for clustering at the state-year level. Each column pools 45 to 50 years old women two cohorts at a time. Column 1 pools the 1900-1905 cohort in 1950 and the 1890-1895 cohort in 1940; column 2 pools the 1910-1915 cohort in 1960 and the 1900-1905 cohort in 1950; column 3 pools the 1920-1925 cohort in 1970 and the 1910-1915 cohort in 1960; column 4 pools the 1930-1935 cohort in 1980 and the 1920-1925 cohort in 1970. The dependent variable, weeks worked, is regressed on the mobilization rate variable (interacted with year dummies) assigned by the woman's state of birth. We also control for state fraction of male farmer, the state fraction of non white male, and the state average education of males in 1940. All the 1940 variables (interacted with year dummies) are also assigned by the woman's state of birth. All specifications include state of birth dummies, year dummies, age dummies, and the latter interacted with a year dummy. Data are from Census IPUMS one percent sample for all years. For the 1950 they refer to the sample line subsample. All specifications are weighted by census sampling weights. Our sample consists of 45 to 50 years old white married women born in mainland U.S. states excluding Nevada and DC, not living in institutional quarters, not living in farms or working in agricultural occupations. The sample is further restricted to women who were born in the same state they reside in. *Significance at 10% level. **Significance at 5% level. ***Significance at 1% level.

TABLE V
FERTILITY REGRESSIONS

	Dependent variable is		
	LFP	Positive Hours	Weeks Worked
Avg Fertility Ratio t-20	.126***	.104**	4.53**
	(.047)	(.046)	(2.33)
N. obs.	129341	129341	129341
Adjusted R^2	0.18	0.16	0.18

Robust standard errors in parentheses account for clustering at the state-year level. Each column is for a separate pooled regression for the years 1960 to 1980 of different measures of labor force participation for women 25-30 at time t on the average labor force participation of women 30-35 twenty years before assigned by state of birth and on the ratio of average fertility of working women age 30-35 over average fertility of non working women age 30 to 35 twenty years before also assigned by state of birth. The first column uses the Census definition of LFP; the second column defines work as an indicator variable that equals 1 if a woman worked positive hours during the week before the interview and the last column uses the number of weeks worked in previous year as dependent variable. Average fertility is defined as average number of own children in the household and the definition of working versus non working woman changes across colums accordingly to the definition adopted for the dependent variable in each specification. In the last column a woman is defined as working if she worked a positive number of weeks in the previous year. Our specification also includes a constant, state fixed effects, year main effects, age and marital status dummies, and their interaction with 1960, 1970, and 1980 dummies. Data are from Census IPUMS one percent sample for all years. For the 1950 they refer to the sample line subsample. Our sample consists of white women residing in mainland U.S. states, not living in institutional quarters, not living in farms or working in agricultural occupations. *Significance at 10% level. **Significance at 5% level. ***Significance at 1% level.

Appendix: Summary Characteristics of Married Women, 1940-1980

	1940	1950	1960	1970	1980
25 to 30 years old					
Weeks Worked	8.83	10.25	11.78		
	(17.98)	(18.29)	(18.77)		
Age	27.02	27.02	27.04		
	(1.41)	(1.41)	(1.42)		
Husband's Age	31.10	30.55	30.40		
	(5.22)	(4.75)	(4.43)		
Number of observations	27,145	11,702	34,862		
35 to 40 years old					
Weeks Worked	7.44	10.79	14.01	18.02	
	(16.95)	(19.09)	(20.49)	(21.81)	
Age	36.94	36.92	36.98	37.01	
	(1.43)	(1.41)	(1.41)	(1.42)	
Husband's age	40.81	40.60	40.30	40.19	
	(5.64)	(5.33)	(5.12)	(5.01)	
Number of observations	22,979	10,153	41,595	35,137	
45 to 50 years old					
Weeks Worked	5.52	11.81	17.91	21.83	26.26
	(15.00)	(19.97)	(22.18)	(23.05)	(23.59)
Age	46.91	46.95	46.90	46.96	47.03
	(1.40)	(1.42)	(1.41)	(1.41)	(1.43)
Husband's Age	50.32	50.57	50.25	49.92	50.11
	(5.64)	(5.76)	(5.69)	(5.41)	(4.88)
Number of observations	16,717	6,922	32,007	38,082	33,999

Means and standard errors (in parentheses). Data are from the Census IPUMS one percent sample for 1940 to 1980. Data for 1950 refer to the sample line subsample. The sample consists of white married women belonging to three age groups: 25-30, 35-40, and 45-50. We exclude women living in farms or employed in farming, women living in institutional group quarters and women who were born in Alaska, Hawaii, Nevada, D.C. or abroad.