# The Political Economy of Women's Suffrage and World War I*

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**Abstract**

After nearly a century of activism, American women won suffrage rights within one month of WWI's close with the passage of the Nineteenth Amendment. Wartime mobilization drew thousands of women into traditionally male-dominated industries, altering society's view on the suitability of women in the workplace and public sphere. This paper studies the effect of women's labor force participation (LFP) during WWI on political support for the Nineteenth Amendment. I introduce newly-digitized data charting the allocation of women's labor across war-related industries throughout WWI to show that a 3.65pp (1SD) increase in women's LFP from 1910-20 was associated with a 14pp increase in the probability that a congressman supported the Nineteenth Amendment. I implement two identification strategies, difference-in-differences and shift-share instrumental variables, to verify the causality of this relationship. My findings imply that LFP and civic engagement are complements, and that market labor may offer means to widened political rights.

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*"We have made partners of the women in this war... Shall we admit them only to a partnership of suffering and sacrifice and toil, and not to a partnership of privilege and right?"* – President Woodrow Wilson, 1918

*"because of the work women have done, because of the advantage they have been to America in winning the war, because of their loyalty and unselfishness and their ability to cope with all the vicissitudes of war, [they should] be given the same right to participate in their Government as the men have."* – Representative John Edward Raker, Chairman of the Woman Suffrage Committee

# 1 Introduction

World War I bookended a century-long fight for women's suffrage with the passage of the Nineteenth Amendment in 1919, marking the largest expansion of voting rights in U.S. history.[1] Early suffragists lobbied for women's suffrage as a means for women to protect the domestic sphere, particularly from problem drinkers and other perceived social evils. However, opponents to women's suffrage frequently cited women's lack of experience in the workforce and public sphere as justification for their disenfranchisement. For example, while serving as President of Princeton University from 1902-1910, Woodrow Wilson wrote "...safe and wise conclusions in such affairs can be drawn only from experience - experience of the world - such as women have not had ... Married women could never get the necessary experience unless the present constitution of the family and the present division of duties between husband and wife is to be absolutely altered" (Woodrow Wilson House, 2021).

By the end of World War I, the political, economic, and social landscape had shifted substantially. Wartime mobilization in the United States increased labor demand, particularly in manufacturing industries, drawing women into new fields and occupations as men were called into the military. By filling these open positions, women gained "experience of the world" and changed society's expectations about the suitability of women in the workplace and public sphere. A 1920 survey conducted by the U.S. Department of Labor showed that 77% of manufacturing firms viewed women's work as "as satisfactory or better than men's" by the end of the war; managers of clock and aircraft factories noted women had comparative advantage in certain tasks requiring "patience" or "deft fingers" (Department of Labor, 1920). In the political sphere, fifteen states extended full or presidential voting rights to women between 1917 and 1919.[2]

This paper asks whether women's labor during WWI influenced the political economy of support for women's enfranchisement. I use two empirical tests motivated by the history to

[1] The population of the United States exceeded 100 million in 1920. Because fifteen states extended full suffrage rights to women by the end of World War I, the Nineteenth Amendment *legally* enfranchised about half of the estimated 50 million women living in the United States. However, the Nineteenth Amendment was limited in its impact by pervasive racial disenfranchisement and citizenship restrictions.

[2] Figure 6 depicts these policy changes.

study this relationship causally. First, I exploit the timing of two roll call votes on a woman's suffrage amendment in the House of Representatives. Congress successfully passed the Nineteenth Amendment on June 4, 1919, only one month after the war's close. However, prior to U.S. entry into the war, Congress voted on a failed woman's suffrage amendment in January of 1915. I harmonize congressional district boundaries between the 63rd and 66th Congresses to create a panel consisting of two cross sections. In a difference-in-differences framework, I study the impact of women's labor force participation on *changes* in amendment support from 1915 to 1919 and find that a one standard deviation (3.65pp) increase in women's labor force participation from 1910 to 1920 was associated with a 20% increase in the probability that a congressman voted "yea" for the Nineteenth Amendment over baseline.

At the war's close, war-related industries scaled back production significantly and firms reinstated marriage bar policies to oust women from their positions upon soldiers' return from Europe (Goldin, 1988). Because of this rapid demobilization, the 1920 Census data (enumerated in January 1920) may under-represent the true shift of women into the labor force induced by WWI production, thereby creating attenuation bias in the difference-in-differences in estimate above. To address this potential measurement concern, I introduce a shift-share instrumental variable (SSIV) as the second identification strategy. I create the SSIV using newly-digitized data from the New Position of Women in American Industry report, a 1920 federal report published by the Women's Bureau of the U.S. Department of Labor. The report documents the number of male and female wage earners, the number of firms employing women, and the substitution of women on men's work after the first and second military drafts by industry. I use these data to capture war-induced growth in women's employment at the national industry level, which I combine with pre-WWI CD-level industry shares to create the shift-share instrument.

I consider evolution of social norms as a mechanism connecting women's employment to political support for universal enfranchisement. I use referendum data from the states of Michigan and New York to investigate the impact of women's wartime labor on social attitudes and local voting patterns in state suffrage referendums. These county-level referenda data measure local support for state-level enfranchisement before *and* after the war, as both states held failed referendums prior to WWI, and successful referendums after the United States joined. I also consider whether women were enfranchised as a bloc of "dry" voters in order to pass prohibition policy. Teele (2018) and Teele and Grosjean (2022) promote the alignment of women's interests with politicians' as the central force behind women's enfranchisement. Rising anti-German sentiment during WWI turned public opinion against the largely German brewing and liquor industries. Because women were known to favor prohibition policy, they may have been enfranchised strategically as part of a broader vision for Progressive Era politics.

This paper contributes to several strands of literature in economics. First, it contributes to an emerging empirical literature on civic engagement and the *social contract*. Heldring, Robinson

and Whitfill (2022) argue that citizens will tolerate the sacrifices involved in wartime military and workforce mobilization only if the social contract between citizens and government becomes more egalitarian. This finding is supported by several empirical studies in the context of the mid-twentieth century United States such as Caprettini and Voth (2023) and Qian and Tabellini (2021).[3] I extend this literature by considering labor force participation as a complement to civic engagement. Women's war-time labor supported the United States' capacity to raise a domestic workforce during WWI, which was central to its economic and military success. I propose that women were compensated for this contribution with voting rights. W.E.B. Du Bois famously encouraged Black participation in WWI mobilization as a means to secure more civic privileges, offering a precedent that legal rights were expected by some groups in exchange for wartime sacrifices.

Second, this paper will help inform future political economy models of suffrage extension. Teele (2018) and Aidt (2022) call for more inclusive concepts of democratization, since existing models focus mainly on the redistributional impact of class- or race-based suffrage extensions for men (Acemoglu and Robinson, 2000; Hanlon, 2022). The integration of women into the industrial labor force, albeit temporary, decreased wage inequality between men and women and increased demand for human capital among women wage earners. Bertocchi (2011) and Doepke and Tertilt (2009), respectively, link these shifts to greater support for women's enfranchisement and political rights more broadly. While these these conditions are situated as arising mainly from a technology-driven shift away from physical labor, this paper posits that *labor market access* provides an alternate means of securing political rights in the absence of technological change.

Finally, this paper adds to a rich literature on the economic history of WWI (Rockoff, 2004; Anderson and Chang, 2016; Boehnke and Gay, 2020; Kitchens and Rodgers, 2020; Ferrara and Fishback, 2022) and the *consequences* of women's suffrage in the United States (Lott and Kenny, 1999; Miller, 2008; Moehling and Thomasson, 2012; Carruthers and Wanamaker, 2015; Kose, Kuka and Shenhav, 2021). This paper also extends a largely descriptive empirical literature on the *causes* of women's suffrage in the U.S. by documenting the causal impact of women's war-time labor on the passage of the Nineteenth Amendment.[4]

## 2 Historical Background and Related Literature

[3] These papers show that more inclusive government institutions increased citizens' mobilization for WWII. Specifically, Caprettini and Voth (2023) show that higher New Deal spending increased WWII military enlistment, volunteerism, and war bonds purchasing. Qian and Tabellini (2021) show that U.S. counties with more severe racial discrimination had significantly lower rates of Black volunteer enlistment. Koch, Logan and Parman (2021) show the relationship between civic engagement and inclusive institutions also operates in reverse; Black WWII enlistees had higher voter registration rates after passage of the Voting Rights Act of 1965.

[4] Moehling and Thomasson (2020) provide a thorough literature review of empirical studies of women's suffrage across all social sciences.

### 2.1 Woman's Suffrage and Progressive Era Politics

The woman's suffrage movement in the United States originated from the industrial labor, temperance, and anti-slavery movements of the early nineteenth century (Orleck, 2022). The movement formally began with the Seneca Falls Convention of 1848, but it was fractured soon after the Civil War when the Fourteenth and Fifteenth Amendments to the U.S. Constitution extended the franchise to Black men before enfranchising white women. This controversy created factions within the movement, which slowed its progress, allowing temperance to emerge as the dominant social movement for women in the late nineteenth century. Temperance activists lobbied extensively for woman's suffrage in order to pass prohibition policies and many notable suffragists received their first political experience in the Woman's Christian Temperance Union, which became a feeder organization to future suffrage organizations.The relationship between these two movements is important because prohibition and woman's suffrage were contemporaneous political conversations for nearly a century before both movements achieved federal legislation in the wake of WWI. I control for the relative size of the German population and size of the liquor industry labor force in my main specifications, as WWI-driven anti-German sentiment may have bolstered public support for prohibition of the largely-German brewing and liquor industry, thereby mediating the public's desire to enfranchise women (i.e. dry voters).

The woman's suffrage movement continued its partnership with industrial labor movements into the twentieth century. Women wage earners had long recognized that enfranchised men had political leverage to pressure politicians to address workplace safety and hours, whereas disenfranchised women had no recourse for change (Orleck, 2022). In 1909, the National American Woman's Suffrage Association (NAWSA) formally amended their mobilization strategy to emphasize recruitment of industrial workers. This strategy helped their membership nearly double between 1913 and 1920 (Mansbridge, 1999). Further, the rapid growth in union membership during WWI, paired with the entrance of women into more organized industries, increased women's exposure to the labor movement as well as their interest in influencing relevant policy (Greenwald, 1990). This connection between industrial labor and suffrage activism offers one of many ways in which women's war-time employment may have mechanically increased women's agitation for suffrage rights.

### 2.2 Women's Labor and World War I

In the early twentieth century, the vast majority of working-age women were engaged in household production. Among those in wage labor, about 6% were employed in agriculture, 25% in manufacturing, and 22% in services. According to the 1914 Census of Manufactures, among the 345,000 women employed in manufacturing, 75% worked in the textile, food, or tobacco industries (Department of Labor, 1920). Most women wage earners were young, unmarried, and belonged to low-income and/or immigrant households. Pre-war industry had already undergone a shift toward specialized labor, placing higher emphasis on "swiftness and endurance" where

managers had previously valued "versatility, judgment, and expertise," (Greenwald, 1990). This means that by the eve of WWI, women were physically capable of performing most industrial work, but were still limited by social barriers constraining women's labor to traditionally female-dominated occupations.

As the United States ramped up production in war-related industries, some women filled vacancies left by men gone to the front. Others found jobs in new or rapidly-growing industries, such as aircraft, firearm, or ammunition production. The ship-building industry saw the highest growth in women's employment between 1910 and 1920, according to Census data. In addition to these new entrants, white women who were previously employed in textile, tobacco, or food production transitioned into higher-paying positions within the "war agent and implement" industries. These skilled workers secured higher wages during the war not only because of high demand, but also because of their previous work experience and high productivity relative to newcomers (Department of Labor, 1920). Black women wage earners, 95 percent of whom were engaged in either domestic or agricultural labor in 1910, shifted into the factory and private housekeeping jobs left behind by white women (Greenwald, 1990).

At the war's close, war-related industries scaled back production significantly and firms reinstated marriage bar policies to oust women from their positions upon soldiers' return from Europe (Goldin, 1988). Although WWI's shocks to women's labor force participation were temporary, I will show that their labor was not inconsequential for securing voting rights, consistent with the political economy literature on mechanisms of gender-based suffrage extensions discussed above.

# 3 Data

This paper connects women's WWI labor to congressional support for the women's suffrage amendment using three main sources of data: congressional voting records, U.S. Census data, and the New Position of Women in American Industry (NPWAI) report. I introduce each in turn.

## 3.1 New Position of Women in American Industry Report

The New Position of Women in American Industry is a 1920 federal report published by the Women's Bureau of the U.S. Department of Labor. The report documents the number of male and female wage earners, the number of firms employing women, and the substitution of women on men's work after the first and second military drafts at the national industry level. After digitizing the original document, I assigned each industry an IND1950 code for harmonization with the U.S. Census.[5] These data are used to create the shift-share instrument. An

[5]To match NPWAI to congressional district-level industry shares, I searched for key words from the NPWAI industry descriptions in the 1910 Census indstr variable. Then, I tablulated the number of match search cases by ind1950. In most cases, I coded the NPWAI sub-industry as the most frequent ind1950 code.

excerpt of the NPWAI report is depicted in Figure 1.

### 3.2 Voting Records

The main outcome of interest is congressional support for a women's suffrage amendment. Data are from Voteview.com (Lewis, Poole, Rosenthal, Boche, Rudkin and Sonnet, 2023), a website which archives every congressional roll call vote in U.S. history. The 63rd Congress voted on a failed women's suffrage amendment on January 12, 1915, and the 66th Congress passed the Nineteenth Amendment on May 21, 1919. For all 435 congressional districts, the Voteview data include the elected representative's name, party, and whether they voted "Yea," "Nay," or abstained. I then link these data to the Database of United States Congressional Historical Statistics (Swift, Brookshire, Canon, Fink, Hibbing, Humes, Malbin and Martis, 2004), which include representatives' state of birth, incumbency status, years of service at time of vote, college attended, and military history.

### 3.3 U.S Census Data

The independent variable of interest is the change in women's labor force participation from 1910 to 1920. To measure this change, I begin with the individual-level 1910 and 1920 full count U.S. Censuses. I aggregate the number of working-age women and women wage-earners by county.[6] Next, I aggregate these population counts up to the congressional district level following Ferrara, Testa and Zhou (2021). This methodology uses topographic suitability data to accurately allocate county-level population counts between congressional district boundaries. Figure 2 plots the independent variable of interest against outcome of interest in 1915 versus 1919, suggesting the positive relationship between women's LFP and congressional support for women's suffrage emerged only after WWI.

I also use the 1910 Census to measure the size of the liquor industry labor force, the number of first- or second- generation Germans, and the number of males and females at the county level in 1910. I combine these measures with Haines (2010) county characteristics and WWI draft and casualty data (Ferrara and Fishback, 2022). I then aggregate all measures up to the congressional district level, again following Ferrara et al. (2021). These variables, expressed in percentage terms, compose my final set of controls: manufacturing labor as share of employed, liquor labor as share of employed, Germans as share of total population, casualties as share of voting-age men, drafted men as share of voting-age men, casualties as share of drafted, ratio of women to men, improved acreage as share of owned acreage, share of population in urban (2,000+) areas, etc.

## 4 Empirical Strategy

[6] I define working age as age 16 or older. Women are considered to be in the labor market if their OCC1950 code is less than or equal to 970.

### 4.1 OLS and Difference-in-Differences

I model the effect of women's wartime labor on support for a women's suffrage amendment in congressional district *d* as follows:

$$\text{Vote}_{d,1919} = \beta(\Delta\text{FLFP}_d) + X_d + \alpha_{r(d)} + \epsilon_d \tag{1}$$

$\text{Vote}_{d,1919}$ indicates whether the congressman representing congressional district $d$ voted in favor of the Nineteenth Amendment in 1919. $\Delta\text{FLFP}_d$ represents the change in women's labor force participation between the 1910 and 1920 Censuses. Because the 1920 Census was enumerated in January 1920, these data capture women's labor force participation prior to the Nineteenth Amendment's ratification in August of 1920. Finally, $X_d$ represents pre-war controls, $\alpha_r$ is census region fixed effect, and $\epsilon_d$ is an error term.[7]

In this specification, $\beta$ represents the effect of a 1pp increase in women's labor force participation from 1910-20 on the probability a congressman voted in favor of the Nineteenth Amendment in 1919. Any omitted variables that correlate with the shift in women's labor over the 1910-20 period *and* support for women's suffrage could bias the OLS estimate. For example, a district with more progressive social attitudes may support women's enfranchisement and be less hostile to women entering male-dominated fields, thereby biasing the OLS estimate up.

To address any such omitted variable bias, I implement a difference-in-differences strategy. The 63rd Congress voted on a failed woman's suffrage amendment prior to U.S. entry into WWI on January 12, 1915. The 66th Congress then successfully passed the 19th Amendment on June 4, 1919. For a sample of congressional districts who were not substantially redistricted between 1915 and 1919, I compare their representatives' votes before and after U.S. participation in WWI as a function of the change in women's LFP. Figure 3 provides an example of the redistricting that occurred in the state of Alabama. The final sample of manually-linked congressional districts is shown in Figure 4, and Table 6 shows my results are robust to an alternative, more objective linking procedure in which districts are linked if they share 80% common geographic area between the 63rd and 66th congresses.

For $t \in \{1915, 1919\}$ I estimate,

$$\text{Vote}_{dt} = \beta(\Delta\text{FLFP}_d \times \text{PostWWI}_t) + X_d + \alpha_d + \delta_t + \epsilon_{dt} \tag{2}$$

where $X_d$ are controls interacted with the $\text{PostWWI}_t$ dummy, $\alpha_d$ is a district fixed effect, and $\delta_t$ is a year fixed effect.

[7] I employ a census region fixed effect instead of a state fixed effect because some congressional districts cover the entire state. Census regions split the continguous U.S. into ten regional groups.

### 4.2 Shift-Share Instrumental Variable (SSIV)

Rapid demobilization upon WWI's close may cause 1920 Census data (enumerated in January 2020) to under-represent the true shift of women into the labor force induced by WWI production, especially in districts with the highest wartime participation. To address potential attenuation bias arising from this measurement concern, I use newly-digitized industry-level data from the New Position of Women in American Industry report to create a shift-share instrumental variable (SSIV). This SSIV reflects growth in women's employment driven by domestic World War I mobilization, weighted by pre-war industry shares at the congressional district level. The instrument uses two sources of variation: (i) the war-induced *shift* in the size of industry $k$'s female labor force ($M_{k,1917-18}$), and (ii) the pre-war *share* of industry $k$'s female labor force employed in congressional district $d$ in 1910 ($\pi_{kd,1910}$).

$$Z_d = \sum_{k=1}^{K} \pi_{kd,1910} M_{k,1917-18}$$

Because the NPWAI data offer a non-representative survey of manufacturing firms, I calculate the war-induced shift, $M_{k,1917-18}$, first by calculating a war-induced growth rate in female employment, for each manufacturing industry $k$ as follows:

$$g_{k,NPWAI} = \frac{(\text{Female wage earners})_{k,1918} - (\text{Female wage earners})_{k,1917}}{(\text{Female wage earners})_{k,1917}}$$

For all industries *not* designated as war-related by the NPWAI data, I assume a war-induced growth of zero, or $g_{k \notin NPWAI} = 0$. Then $M_{k,1917-18} = g_k * (\text{Female wage earners})_{k,1910Census}$ represents the estimated war-induced shift in the number of female wage earners from 1910 to 1920. Scaling $Z_d$ by the 1910 population of working-age (age>15) women and multiplying by 100 then gives the final instrument: the predicted war-induced change in the female labor force participation rate from 1910-20.

Consider two comparable congressional districts with similar female labor force participation rates prior to WWI mobilization. The intuition behind the SSIV is that between these two districts, whichever has a larger share of women employed in war-related industries prior to the war will experience a greater exogenous change in female labor force participation due to the war. Figure 7 visualizes this change for New York District 2 and New Jersey District 3. Both districts had a female labor force participation rate of 9.4% in 1910. However, New York District 2 has a greater composition of women employed in war-related industries relative to New Jersey District 3. It follows, then, that by 1920, New York District 2's female labor force particpation rate had grown to 12.5%, while New Jersey District 3's increased to 9.9%, growing by only 0.5pp.

Following Goldsmith-Pinkham, Sorkin and Swift (2020), identification follows from exo-

geneity of the *shares*, whereas the industry-level shifts in the size of the female labor force are allowed to be endogenous. I follow this share-based identification rather than the shift-based identification proposed by Borusyak, Hull and Jaravel (2022) because my research design emphasizes differential exposure to relatively few common WWI-induced industry-level shocks. The identifying assumption is, therefore, that the pre-war distribution of industries' female labor force across space is conditionally random, and specifically uncorrelated with unobserved determinants of support for women's suffrage. I verify this assumption by regressing initial shares on various pre-WWI congressional district characteristics. Figure 8 shows these correlations for a sample of industries: ship and boat building and repairing (378), auto repair services and garages (816), and miscellaneous petroleum and coal products (477). I chose to visualize the coefficients from these three industries' balance tables because they experienced the highest growth in the size of their female labor force from 1910 to 1920 according to census data, but all other industries show similar patterns of independence from observable congressional district characteristics.

# 5 Results

This section discusses evidence of a causal relationship between women's labor and politicians' support for suffrage rights. I discuss estimates from both identification strategies before exploring potential mechanisms underlying the documented change in political support.

## 5.1 Women's Labor and Suffrage Support in the House of Representatives

Baseline OLS estimates of $\beta$ from Equation 1 are reported in Table 4. Columns (1) through (3) show the OLS estimate remains relatively constant as controls for pre-war congressional district characteristics, congressman characteristics, and the WWI draft and casualty rates are added. These OLS estimates imply that a one standard deviation (3.65) increase in women's labor force participation between 1910 and 1920 was associated with a 14.7-16.6pp increase in the probability that a congressional representative voted "yea" for the Nineteenth Amendment in 1919. This is a 20% increase over the unconditional probability of voting "yea."

Table 3 shows that the difference-in-differences estimates of $\beta$ from Equation 2 are similar to the OLS estimates discussed above. Because all districts are treated together and the outcome is measured in only two periods, the primary concern with a difference-in-differences estimator in this setting should be that districts with high and low "doses" of treatment experienced parallel trends in political ideology prior to WWI, and that there are not heterogeneous treatment effects along the treatment distribution (Callaway, Goodman-Bacon and Sant'Anna, 2021; de Chaisemartin and D'Haultfoeuille, 2020, 2022). Because there are only two House votes on a woman's suffrage amendment, I use alternative measures of political ideology to verify the parallel trends assumption. Figure 5 shows the average support for Republican candidates in congressional elections from 1900 to 1930 by quantile of $\Delta FLFP$, or by geographical

region. Despite level differences between the bottom and higher quantiles, the *trend* in poltical ideology seems relatively consistent for all treatment quantiles.

I explore a range of robustness specifications for the difference-in-differences estimates in Table 6. First, I verify that the difference-in-differences estimate is robust to (i) both congressional district harmonization techniques, (ii) dropping the six districts who voted "yea" in 1915 and "nay" in 1919 (all of whom changed representation between the 63rd and 66th congresses), and (iii) dropping the South. Dropping the South effectively drops the bottom treatment quantile (as seen in Figure 5), or the group of districts for whom the parallel trend assumption could be violated. Due to differences in the enumration of unpaid family labor in the 1910 and 1920 Censuses, I verify the estimate is robust to dropping this occupational classification of workers (occ1950=830) , and consider alternative constructions of the independent variable (Costa, 2000). Future work should implement the methodology of Chiswick and Robinson (2021) to further account for this enumeration difference between census years. Finally, I add as a control the 63rd congressional district representative's vote on a failed prohibition amendment to verify that wartime shifts in women's labor are not also capturing war-related shifts in political support for prohibition, given the shared history of the prohibition and women's suffrage movements.

Columns (4) and (5) of Table 4 show the SSIV estimate and first stage, respectively. The first-stage $F$ statistic is 28.29. The SSIV estimate of $\beta$ is about twice as large as the OLS and difference-in-differences estimates. This discripency implies some degree of attenuation bias arising from an under-count of women's war-related labor force participation due to rapid demobilization after WWI's close, prior to enumeration of the 1920 census. Table 6 shows these SSIV results are robust to various relevant standard error adjustments.

### 5.2 Mechanisms

Two primary mechanisms could connect women's labor force participation to support for women's suffrage as established above. It is possible women's wartime labor increased women's agitation for suffrage rights by exposing more women to suffrage or labor movement activism, or by equipping women with new skills applicable to political organizing. Alternatively, women's wartime labor may have changed men's opinions about the suitability and effectiveness of women in the labor market and political sphere, thereby making them more amenable to extending voting rights.

This section establishes evidence for the latter mechanism. Prior to WWI, New York and Michigan held failed state referenda on the issue of extending women the right to vote in presidential elections. Both states successfully passed these resolutions after U.S. entry into WWI. Since women did not have suffrage rights at the time of either vote, a change in support for these referenda would reflect a change in *men's* attitudes toward women's suffrage. Using newly-digitized county-level data on referenda support in Michigan (1913 and 1918) and New

York (1915 and 1917), I apply the same difference-in-differences specification in Equation 2, except the outcome is "percent yea" instead of a binary vote. The results are presented in Table 5. They suggest that a 1pp increase in FLFP from 1910 to 1920 corresponds with a 0.68-0.74pp increase in men's support for a state-level suffrage extension.

## 6 Conclusion

Only six percent of the U.S. population was eligible to vote in George Washington's election. Today, 92.7% of the voting-age population is eligible to vote, and the Nineteenth Amendment is responsible for about one third of this gain in voting eligibility (McDonald, 2022). The Nineteenth Amendment, passed in 1919 and ratified in 1920, extended universal suffrage rights to women in the United States. This paper shows that women's contribution to the U.S. economy during WWI helped them achieve these political rights. Using difference-in-differences and shift share IV frameworks, I causally identify the effect of women's labor force participation on support for a women's suffrage amendment. This political legacy of WWI for American women is important, as their wartime labor is often overlooked in existing literature since it did not produce the same persistent effects seen after WWII. These findings highlight new mechanisms of suffrage extension and demonstrate the importance of social norms in constraining economic behavior (and vice versa). This paper is part of an ongoing research agenda aiming to establish a connection between political and labor force participation, particularly for American women throughout the nineteenth and twentieth centuries.

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# Tables and Figures

## 6.1 Tables

Table 1: NPWAI Summary Statistics

| Statistic | N | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|---|
| IND1950 Code | 49 | 402.2 | 56.2 | 307 | 489 |
| Number of firms surveyed | 49 | 297.5 | 374.6 | 2 | 2,179 |
| Female wage earners, 1st Draft (6/1917) | 49 | 9,295.0 | 19,080.4 | 2 | 92,561 |
| Female wage earners, 2nd Draft (6/1918) | 49 | 9,808.8 | 17,283.6 | 2 | 84,716 |
| Industry Growth Rate | 49 | 0.5 | 0.6 | −0.1 | 2.4 |

Table 3: Effect of Women's War-time LFP on Suffrage Amendment Support

| | Pr(Yea Vote for Woman's Suffrage Amendment) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $\Delta$ FLFP 1910-20 $\times$ Post | 0.017*** | 0.037** | 0.038** | 0.036** |
| | (0.005) | (0.015) | (0.015) | (0.015) |
| 1910 Controls $\times$ Post | | X | X | X |
| Congressman characteristics controls $\times$ Post | | | X | X |
| WWI Draft and Casualty rates $\times$ Post | | | | X |
| Year FE | X | X | X | X |
| Congressional district FE | X | X | X | X |
| Outcome mean | .551 | .551 | .551 | .551 |
| R-squared | 0.386 | 0.411 | 0.426 | 0.431 |
| $N$ | 820 | 820 | 820 | 820 |

**Note:** Regressions where the dependent variable indicates whether or not a member Congress voted "yea" for a woman's suffrage amendment. The data cover one vote in 1915 and a second in 1919. All columns include year and CD fixed effects. Standard errors are clustered at the CD level. Pre-war controls include congressional district characteristics from 1910, including log of total population, percent urban, female-to-male ratio, percent of women who are voting-age, percent of women older than 15 who are single/never married, percent of labor force engaged in agriculture, percent of labor force employed in the liquor industry, and percent German. Additional controls include congressman characteristics (veteran status, year first elected to Congress, whether they attended college, and whether they were born in the state they represent) and the WWI draft and casualty rates. Significance levels are denoted by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Summary Statistics

| | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| *Characteristics of women's labor, 1910 and 1920 Censuses* | | | | | |
| FLFP 1920 | 419 | 13.41 | 4.98 | 5.18 | 27.78 |
| FLFP 1910 | 419 | 15.94 | 6.91 | 5.73 | 40.19 |
| Change FLFP, 1910-20 | 419 | -2.52 | 3.63 | -19.69 | 2.22 |
| Predicted $\Delta$ FLFP, Post-war | 419 | 9.32 | 5.06 | 1.44 | 56.36 |
| | | | | | |
| *Characteristics of CD, 1910 Census* | | | | | |
| Percent urban | 422 | 44.20 | 31.73 | 0.00 | 100.00 |
| Log of total population | 422 | 12.20 | 0.73 | 8.24 | 15.85 |
| Ratio of women to men | 422 | 0.95 | 0.08 | 0.56 | 1.08 |
| Percent German | 422 | 9.54 | 9.25 | 0.00 | 54.25 |
| Log of count working in liquor industry | 423 | 5.26 | 1.86 | 0.00 | 10.08 |
| | | | | | |
| *Characteristics of CD Representative, Voteview roll call data* | | | | | |
| Born in same state as CD | 423 | 0.67 | 0.47 | 0.00 | 1.00 |
| Years as representative of CD | 423 | 6.67 | 6.57 | -1.00 | 47.00 |
| Attended college | 423 | 0.78 | 0.41 | 0.00 | 1.00 |
| Served in military | 423 | 0.15 | 0.35 | 0.00 | 1.00 |
| Member of Democratic Party | 423 | 0.44 | 0.50 | 0.00 | 1.00 |
| Member of Republican Party | 423 | 0.56 | 0.50 | 0.00 | 1.00 |
| | | | | | |
| *Impact of WWI* | | | | | |
| Percent of draft-age men killed | 422 | 0.29 | 0.15 | 0.01 | 1.49 |
| Percent of enlistees killed (casualty rate) | 423 | 2.61 | 1.39 | 0.00 | 16.93 |
| Percent drafted | 423 | 10.66 | 3.77 | 0.00 | 24.80 |

Table 4: Effect of Women's War-time LFP on Suffrage Amendment Support

| | Pr(Yea Vote for Nineteenth Amendment, 1919) | | | | Δ FLFP 1920 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Δ FLFP 1910-20 | 0.045*** | 0.043*** | 0.039*** | 0.081* | |
| | (0.007) | (0.008) | (0.008) | (0.046) | |
| Predicted Δ FLFP, Post-war | | | | | 0.185*** |
| | | | | | (0.049) |
| Estimator | OLS | OLS | OLS | IV | OLS |
| Census Region FE | X | X | X | X | X |
| Pre-war controls | | X | X | X | X |
| WWI controls | | | X | X | X |
| Outcome mean | .707 | .707 | .707 | .707 | -2.537 |
| K-P F-stat | | | | 14.12 | 14.12 |
| $N$ | 426 | 426 | 426 | 426 | 426 |

**Note:** Regressions where the dependent variable indicates whether or not a member of the 66th Congress voted "yea" for the Nineteenth Amendment in 1919. Pre-war controls include congressional district characteristics from 1910, including log of total population, percent urban, female-to-male ratio, percent of women older than 15 who are single/never married, percent of labor force employed in the liquor industry, and percent German. Additional controls include congressman characteristics (veteran status, year first elected to Congress, whether they attended college, and whether they were born in the state they represent) and the WWI draft and casualty rates. Robust standard errors are reported in parentheses. Significance levels are denoted by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effect of Women's Wartime LFP on State Suffrage Referenda in New York and Michigan

| | Percent yes | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Δ FLFP 1910-20 × Post | 0.683** | 0.733** | 0.744** |
| | (0.333) | (0.335) | (0.349) |
| Demographic controls, 1910 × Post | | X | X |
| Economic controls, 1910 × Post | | | X |
| Year FE | X | X | X |
| County FE | X | X | X |
| Outcome mean | 48.442 | 48.442 | 48.442 |
| $N$ | 288 | 288 | 288 |

**Note:** This table provides evidence that change in social attitudes was a mechanism by which women's wartime labor influenced congressional support for the Nineteenth Amendment. Michigan held referendum votes on extending presidential suffrage rights to women once in 1913 (failed) and again in 1918 (passed). Similarly, New York voters failed to extend presidential suffrage rights to women by referendum vote in 1915, but succeeded in 1917. The dependent variable reflects the percent of enfranchised men voting in favor of extending these state-level suffrage rights by county. Demographic controls include 1910 county-level demographic characteristics from Census data, including log of total population, percent urban, female-to-male ratio, percent Black, percent German, and log of liquor employment. Economic controls include percent manufacturing labor, percent illiterate, farms per capita, and percent of owned acrage improved. All specifications include county and year fixed effects and cluster at the county level. Significance levels are denoted by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Robustness

| Difference-in-Differences Identification Checks | $\hat{\beta}$ |
|---|---|
| *Alternative estimators* | |
| de Chaisemartin, C and D'Haultfoeuille, X (2020a) | $0.022^{***}$ |
| | (0.006) |
| de Chaisemartin, C and D'Haultfoeuille, X (2020b) | $0.251^{***}$ |
| | (0.056) |
| *Alternative samples* | |
| CDs with 80% common area in 63rd and 66th Congresses | $0.037^{**}$ |
| | (0.017) |
| Drop six CDs voting yea in 1915, no in 1919 | $0.032^{**}$ |
| | (0.015) |
| Drop the South (re: parallel trends) | 0.053 |
| | (0.036) |
| *Alternative Construction of $\Delta FLFP$* | |
| Exclude unpaid family workers (occ1950=830) | $0.036^{*}$ |
| | $(0.021)$ |
| Only working-age in FLFP denominator | $0.022^{**}$ |
| | $(0.009)$ |
| *Alternative controls* | |
| 63rd Congress vote on prohibition amendment | $0.037^{**}$ |
| | $(0.016)$ |

| SSIV Identification Checks | $\hat{\beta}$ |
|---|---|
| *Alternative Standard Errors* | $0.081^{*}$ |
| Conley (1999) | (.032) |
| Adao et al (2019) | (.050) |

**Note:** This table reports the point estimates and standard errors (in parentheses) for a host of robustness specifications. The top panel explores robustness of the difference-in-differences results reported in Table 3 and the bottom panel explores robustness of the SSIV summarized in Table 4. Significance levels are denoted by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 3.—CHANGE IN LABOR FORCE DURING THE WAR IN PLANTS IN THE IRON AND STEEL INDUSTRY AND PROPORTION OF THIS INDUSTRY REPRESENTED IN THE SURVEY, BY BRANCH OF INDUSTRY.

| Branch of industry. | Wage earners. | | | Firms. | | | Change in labor force during the war. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Represented in this survey. | | | Represented in this survey. | | After first draft. | | | | After second draft. | | | | | |
| | | | | | | | Wage earners. | | Firms employing women. | | Wage earners. | | | | Firms employing women. | |
| | Total in industry.[1] | Number.[2] | Per cent of total. | Total in industry.[1] | Number. | Per cent of total. | Men. | Women. | Number. | Per cent of total included in this survey. | Number. | | Per cent increase (+) or decrease (−) over first draft. | | Number. | Per cent increase over first draft. |
| | | | | | | | | | | | Men. | Women. | Men. | Women. | | |
| Foundry and machine-shop products[3] | 398,251 | 182,697 | 45.9 | 11,208 | 1,175 | 10.5 | 169,768 | 5,509 | 423 | 36.0 | 171,646 | 11,051 | + 1.1 | +100.6 | 491 | 16.1 |
| Crude iron and steel and rolled products | 278,605 | 49,022 | 17.6 | 587 | 93 | 15.8 | 48,423 | 599 | 33 | 35.5 | 47,694 | 976 | − 1.5 | + 62.9 | 41 | 24.2 |
| Hardware | 63,226 | 19,326 | 30.6 | 841 | 102 | 12.1 | 16,415 | 2,911 | 66 | 64.7 | 15,262 | 3,437 | − 7.0 | + 18.1 | 75 | 13.6 |
| Structural iron work | 48,022 | 7,125 | 14.9 | 1,278 | 81 | 6.3 | 6,745 | 15 | 8 | 9.9 | 7,072 | 53 | + 4.8 | +253.3 | 12 | 50.0 |
| Stoves and furnaces | 47,319 | 9,455 | 20.0 | 640 | 88 | 13.8 | 9,214 | 241 | 40 | 45.5 | 7,572 | 384 | −17.8 | + 59.3 | 40 | ..... |
| Cutlery and tools | 41,044 | 30,902 | 73.7 | 1,061 | 283 | 26.7 | 26,270 | 3,562 | 120 | 42.4 | 25,735 | 5,167 | − 2.1 | + 45.1 | 142 | 18.3 |
| Engines and pumps | 36,995 | 19,782 | 53.5 | 629 | 98 | 15.6 | 17,630 | 420 | 41 | 41.8 | 18,462 | 1,320 | + 4.7 | +214.3 | 54 | 31.7 |
| Small machines for home and office use | 31,794 | 10,519 | 33.1 | 205 | 30 | 14.6 | 8,684 | 1,835 | 23 | 76.7 | 6,916 | 3,308 | −20.4 | + 80.3 | 27 | 17.4 |
| Wire and wire work | 28,554 | 6,166 | 21.6 | 606 | 48 | 7.9 | 5,537 | 407 | 26 | 54.2 | 5,538 | 628 | (4) | + 54.3 | 27 | 3.8 |
| Firearms and ammunition | 22,235 | 81,369 | (5) | 61 | 74 | (5) | 47,150 | 8,017 | 46 | 62.2 | 67,798 | 13,571 | +43.8 | + 69.3 | 58 | 26.1 |
| Tinplate and terneplate | 5,818 | 7,863 | (5) | 31 | 6 | 19.4 | 6,544 | 236 | 6 | 100.0 | 7,544 | 319 | +15.3 | + 35.2 | 6 | ..... |
| Springs, steel-car and carriage | 3,867 | 1,875 | 48.5 | 84 | 26 | 31.0 | 1,624 | 175 | 14 | 53.8 | 1,543 | 333 | − 5.0 | + 90.3 | 14 | ..... |
| Total | 1,006,630 | 426,102 | 42.3 | 17,231 | [6] 2,104 | 12.2 | 364,013 | 23,927 | 846 | 40.2 | 382,782 | 40,547 | + 5.2 | + 69.5 | 987 | 16.7 |

[1] United States Bureau of Census. Abstract of Census of Manufactures, 1914, pp. 516–543. Figures for wage earners give number on Dec. 15, 1914, or nearest representative day.
[2] Represents maximum number employed at either of the two periods covered. The total therefore does not represent necessarily the total employed at one time or the other.
[3] Includes cast iron, wrought pipe, forgings, horseshoes, and plumbers' supplies.
[4] Less than one-tenth of 1 per cent.
[5] The demands of war so expanded the industry that the number of wage earners included in this survey for the war period exceeded the number reported in the Census of Manufactures for 1914.
[6] As only principal branches of the iron and steel industry are included in this table, the totals do not agree with those in Tables 10 and 22, which include also minor branches and firms reporting only after the second draft.

Figure 1: Sample of the NPWAI report showing employment data for the iron and steel industries.

## 6.2 Figures

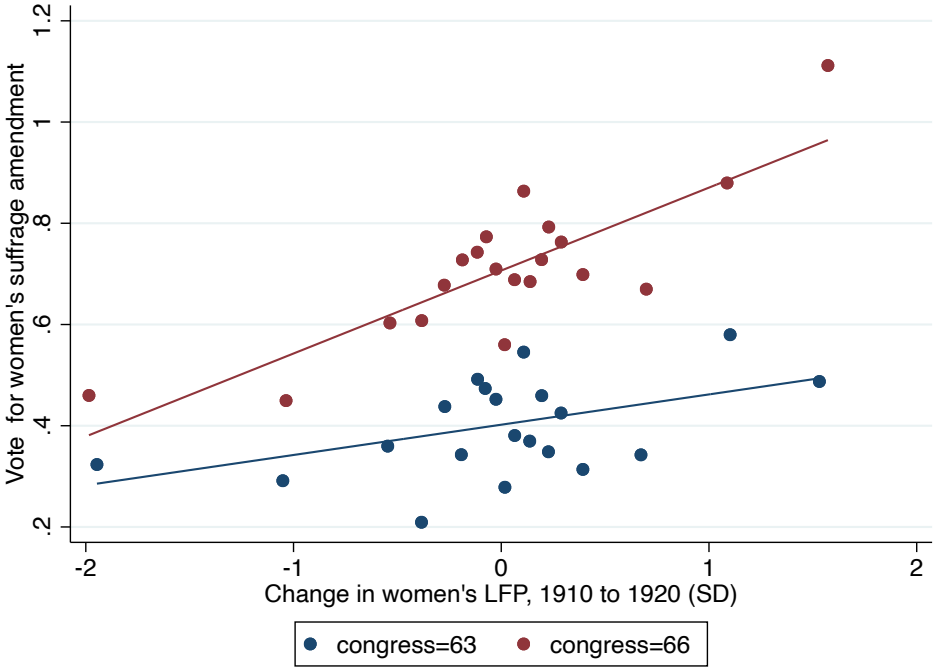


Figure 2: Binned scatter plot of congressional support for a women's suffrage amendment as a function of the change in women's labor force participation between 1910 and 1920, by congressional vote. The 63rd congress voted on the amendment in 1915, before U.S. entry into WWI, and the 66th congress passed the Nineteenth Amendment in 1919.

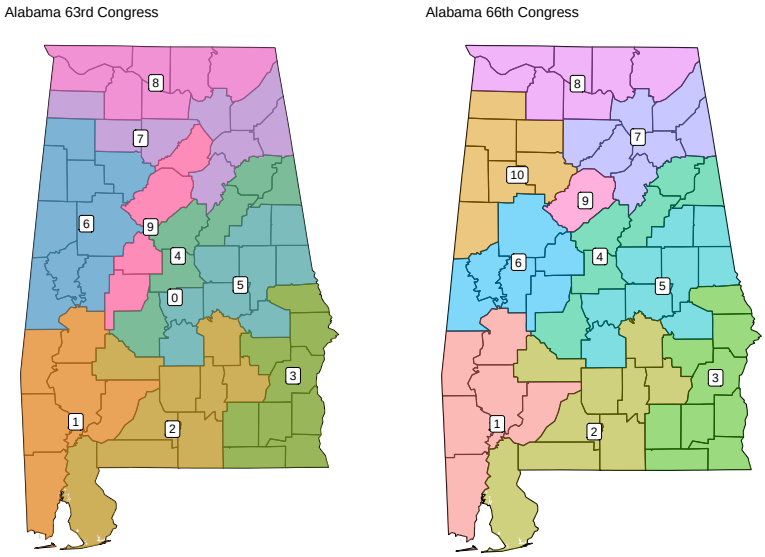


Figure 3: Maps showing the congressional district boundaries for the 63rd and 66th Congresses. While districts 1, 2, 3, 4, 5, and 8 remained consistent across Congresses, 6, 7, and 9 are severely redistricted, and a 10th district is added for the 66th Congress. To create a panel dataset with consistent units across time, I implement two harmonization techniques to link these districts between the 63rd and 66th Congresses. All main specifications use a manual linkage, in which I dropped districts 6, 7, 9, and 10 (see Figure 4). An alternative linkage procedure matches districts in the 66th Congress to which ever district has at least 80% of its geographic area in common with a corresponding district in the 63rd Congress. With this alternative linking procedure, Alabama District 7 would match, for example, even though it represents a slightly different populace in the 63rd versus 66th Congress.

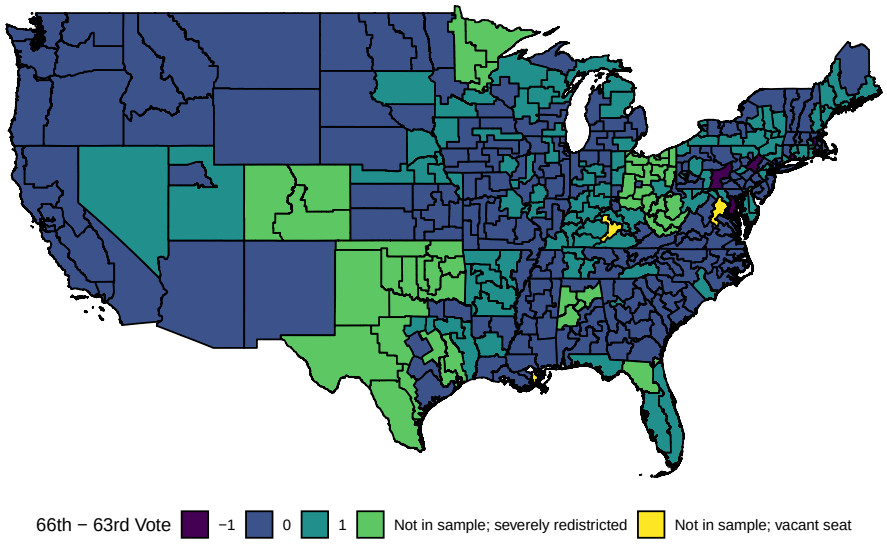


Figure 4: This map shows how congressional support for a woman's suffrage amendment changed between 1915 and 1919. Identifying variation comes from comparing teal congressional districts, whose representatives voted 'nay' in 1915 and switched their vote to 'yea' in 1919, to blue districts, whose representatives did not change their vote, either supporting the amendment in both years, or opposing. Green and yellow districts are dropped because they could not be harmonized across congresses due to extensive redistricting or seat vacancy at the time of the 1919 vote, respectively. Six districts (purple) voted yes in 1915 and no in 1919 (CT-03, MA-13,MD-05,NJ-07,PA-17,PA-26). All six districts elected different representatives in that time; the Republican Party maintained control of NJ-07 and the Democratic Party kept PA-26, but the remaining four transitioned from Democrat to Republican.

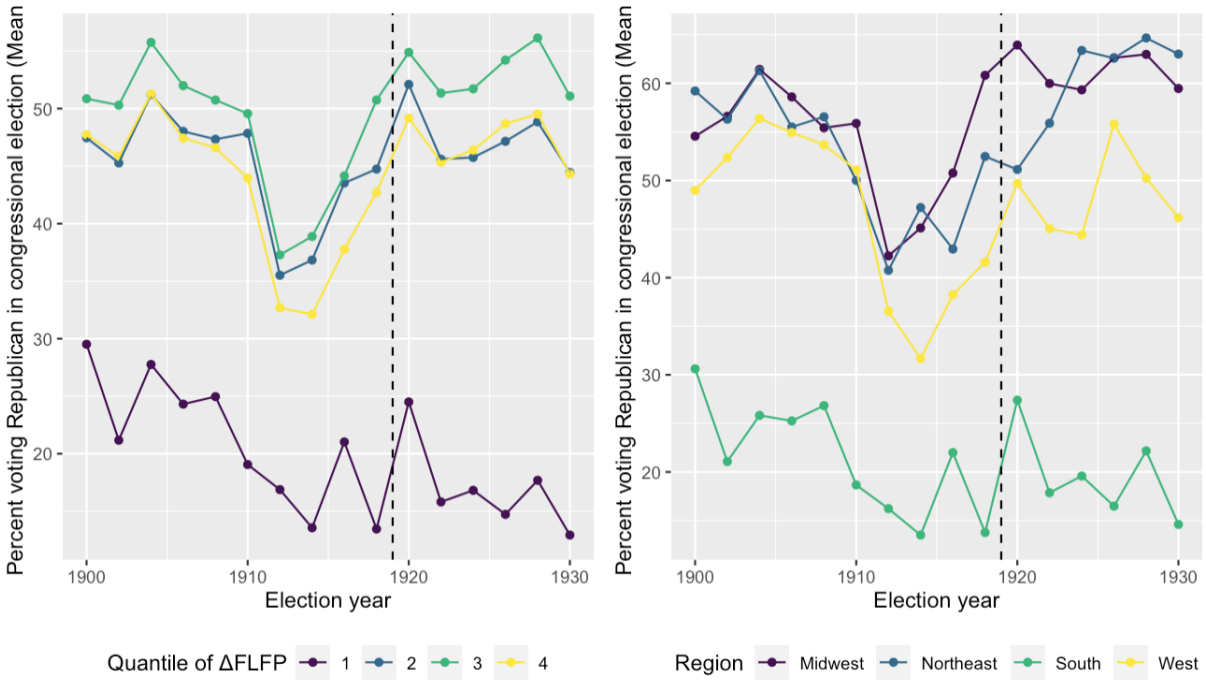


Figure 5: This graph is a binned scatterplot by quantile of $\Delta FLFP$ or geographic region of local support for Republican candidates in congressional elections over time (every two years from 1900 to 1930). Panel (A) graphs this trend in political ideology by quantile of the independent variable of interest, and Panel (B) shows that the bottom quantile is mainly composed of Southern congressional districts. The dotted line marks the passage of the Nineteenth Amendment in 1919.

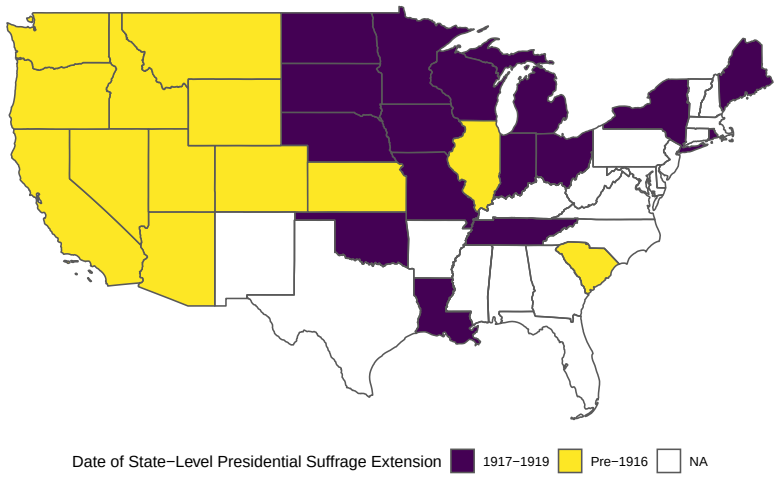


Figure 6: Map showing the year each state extended presidential suffrage rights to women. States colored yellow received presidential voting rights prior to the United States' entry in WWI. States in purple extended presidential voting rights to women after the United States entered WWI, but before Congress passed the Nineteenth Amendment. States in white (NA) did not pass any state-level presidential suffrage policy; women in these states were enfranchised by the Nineteenth Amendment.

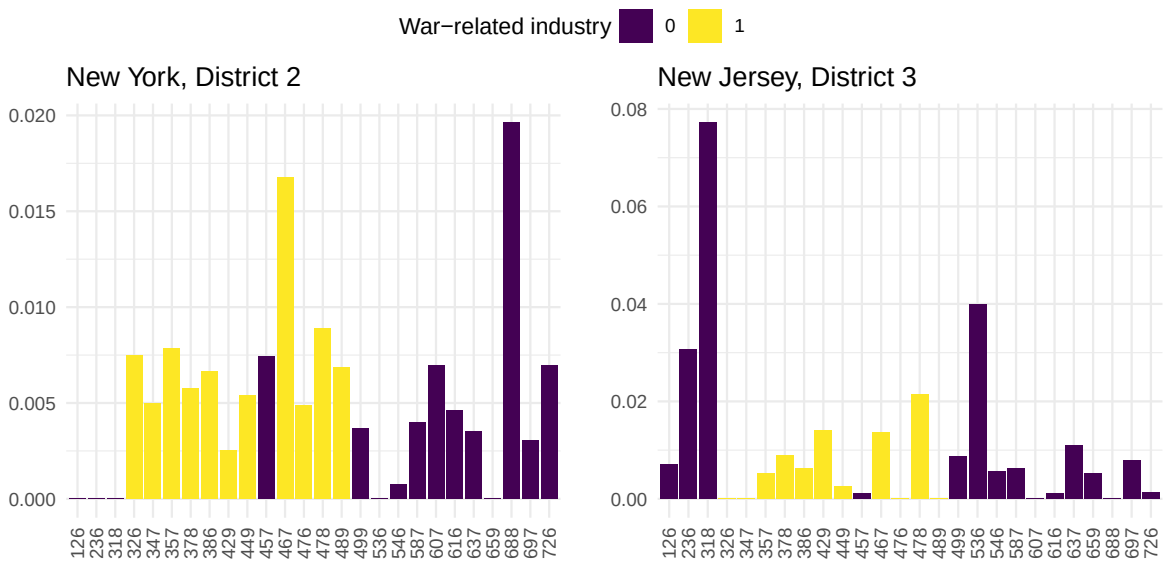


Figure 7: Panels (A) and (B) show the 1910 cross-sectional variation in the *share* of women employed in congressional districts NY-2 and NJ-3, respectively, by industry. Both districts had a female labor force participation (FLFP) rate equal to 9.4 in 1910. By 1920, FLFP was 12.5 in NY-2 and 9.9 in NJ-3. The intuition behind the SSIV is that this difference was driven by the higher presence of war-related industries in NY-2 pre-WWI. Panel (A) also shows that 2% of all women employed in liquor stores worked in NY-2; by assigning this industry a shift of zero, we remove confounding shifts in FLFP related to prohibition and non-war-related employment changes.

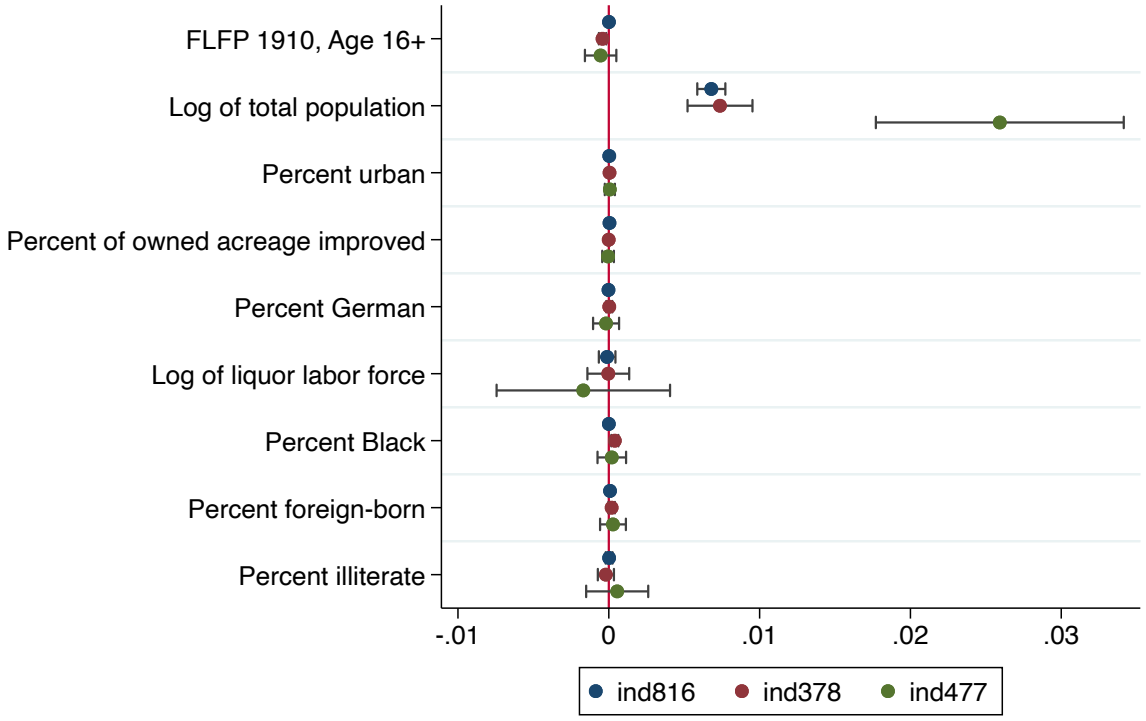


Figure 8: Coefficient plot of the balance table regressing congressional district-level industry shares for the ship and boat building and repairing (378), auto repair services and garages (816), and miscellaneous petroleum and coal products (477) industries on various congressional district characteristics. According to census data, these three industries experienced the highest growth in the size of their female labor force from 1910 to 1920, hence their inclusion in this graph. Although log of total population is a significant predictor of these industry shares, the exclusion restriction only demands that the industry shares be *conditionally* random. Shares for all industries not pictured show similar independence to observable congressional district characteristics.