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Missing Men and Women's Demand for Political Representation

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Missing Men and Women's Demand for Political Representation*

Barbara Boelmann† Carola Stapper‡

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Abstract

Over the past century, women have gained formal political rights, yet remain under-represented in leadership—partly due to lower demand for representation among women themselves. In this paper, we shift the perspective from why men extended political rights to women toward what shaped women's own demand for representation. Specifically, we study how male absence during World War I affected German women's demand for the franchise, exploiting exogenous variation in drafting intensity across regions for identification. To make demand for political representation directly measurable, we construct a newly digitised panel dataset of the universe of German suffragette clubs—a revealed-preference measure of demand, given the considerable costs of maintaining a club, especially under wartime restrictions on political activism. Our results show that women were more likely to keep suffragette clubs open in counties with greater male absence. This effect is driven by regions where women publicly led war relief efforts, pointing to agency and specifically women's experience in visible leadership roles as the central mechanism. We further show that this demand for representation persisted after the franchise was extended, with women more likely to run for parliament and to vote in counties with greater wartime male absence and a suffragette club.

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1 Introduction

Over the past century, women have gained considerable formal rights, including the right to vote and hold office (Tertilt et al., 2022). The existing literature has almost exclusively studied why and when men extended such rights to women (Doepke et al., 2012; Hanlon, 2022), but has paid less attention to women's own mobilization for these rights during the suffrage movement. Understanding what drives women's willingness to actively fight for political representation despite the costs of doing so is important. First, understanding the factors driving women's suffrage mobilization historically can inform patterns of under-representation that persist today: Women remain under-represented in leadership positions (World Economic Forum, 2024), partly due to lower demand for representation among women themselves—as evidenced by their lower likelihood to apply or run for such positions (Gonzalez-Eiras & Sanz, 2021; Haegele, 2025; Lawless & Fox, 2025). Second, women's historical fight over the vote more generally speaks to the conditions under which under-represented groups successfully take collective action to demand inclusion. In this paper, we shift the perspective to women's demand for political representation, investigating what factors shaped it during the suffrage movement.

Specifically, we study how male absence shaped women's demand for political representation in the German suffrage movement during the early 20th century. This setting is instructive for three reasons. First, building on newly collected data on local chapters of the suffragette movement, we can make demand for political representation directly measurable. Second, World War I (WWI) substantially increased the costs of suffrage activism when the Emperor called for a halt to political activities in the interest of national unity. Studying mobilization under such unfavourable conditions allows us to identify what truly sustains demand for representation when activism becomes costly—something that may be particularly relevant today, as conditions appear increasingly unfavourable for women's rights and Diversity, Equity and Inclusion (DEI) more broadly, with one in four countries reporting backlash on gender equality in 2024 (UN Women (United Nations Entity for Gender Equality and the Empowerment of Women), 2025), and 30 US states having proposed anti-DEI legislation since 2023 ("DEI Legislation Tracker", 2026). Third, the war created stark regional variation in male absence due to mass conscription, which we exploit to identify how the absence of men shaped women's demand for political representation during this high-cost period.

The analysis builds on a newly-collected dataset of the universe of suffragette clubs in Germany between 1912 and 1918. The German suffragette movement consisted of middle-class women who demanded voting rights through a network of local chapters. We measure demand for women's political representation by the presence of a local suffragette club. This measure has two key advantages. First, it provides yearly measures of demand at a granular geographic scale—something not typically feasible for historical

periods. Second, opening and maintaining a club is considerably more costly than lower-commitment actions like signing petitions, making club presence a revealed-preference measure that captures actual demand even when activism is costly.

These costs were particularly high during WWI. At the war's onset, the German Emperor called a truce of parties (*Burgfrieden*), prohibiting political arguments that might divide the national front. The middle-class women's movement followed suit. In the first month after the beginning of the war, the movement's journal predominantly calls for a union of the entire women's movement to build the home front. The number of counties with active suffragette clubs reported in the annual yearbook decreased by 21% during the war (from 108 to 85), where reporting required active confirmation of a club's continued operation.

What shaped whether women maintained clubs lobbying for political representation despite this political climate? We identify one important experience: a large absence of men, which reallocated everyday responsibilities and public roles toward women. We link our annual measure of demand for political representation—the presence of a local suffragette club—to local changes in the sex ratio from 1910 to 1916 on the county (*Kreis*) level. Changes in the sex ratio measure the total absence of men compared to women, including both those temporarily away and those permanently absent. We apply a difference-in-differences (DiD) strategy. In our baseline specification, we discretise treatment into a binary measure for ease of interpretation and weaker identifying assumptions, comparing counties experiencing the largest decrease in male presence (top 25% of the sex ratio change distribution) to those experiencing the smallest changes (bottom 25%). We exploit regional variation in the probability to be drafted based on men's age and occupation. County fixed effects hold constant initial differences in women's demand for the vote and empowerment. We include pre-war county characteristics—club presence, age and industry structure, urbanisation—allowing differential effects over time. Results are robust to using the full continuous treatment variation and alternative specifications, including a border design comparing neighbouring counties across recruitment area borders.

Our main findings indicate that women in treatment counties are 3.8 percentage points (37% of the baseline) more likely to keep suffragette clubs open during the war compared to control counties, suggesting that locally missing men helped keep women's demand for the franchise alive despite considerable costs. We demonstrate that this is not a general collective-action effect by digitizing the universe of local chapters of two other women's organizations—one charitable and one professional—and finding no relationship between their presence and local male absence.

Why did women keep suffragette clubs alive when more men were missing locally? We distinguish between two channels: economic need and increased agency, defined as women's capabilities to further their own agendas (Giddens, 1984). When men left for

war, women faced economic hardship, driving them to enter the labour force, but also gained agency by becoming primary decision-makers in families, organising war relief efforts, and taking over leadership positions. We first test whether economic need drove the effect. Women who entered the workforce during the war were typically poor and struggled to feed their families, making increases in female employment a proxy for economic need. Splitting the sample by median change in female employment shows the effect is only modestly larger in high-change areas, indicating economic need was not the main driver. We next test whether increased agency explains the pattern. Middle-class women organizing war relief in the National Women's Service [German: *Nationaler Frauendienst*] (NFD) gained leadership experience in public roles—likely the most pronounced agency increase. Splitting by NFD presence reveals the effect is entirely driven by areas with an NFD chapter, highlighting the central role of agency and public leadership for women's demand for political representation.

Last, we investigate how demand for political representation translated to political participation after women gained the franchise in November 1918. Using a novel dataset on all candidates running for the first Weimar Republic election in early 1919, we find women are more likely to run as candidates when more men were missing during the war, driven by constituencies with a suffragette club. This suggests women's continued demand for political representation. However, women are less likely to be elected when more men were missing, primarily in constituencies without a wartime suffragette club. Examining voting patterns from 1919–1930, we find women's turnout is higher in counties with more missing men during the war, mainly in areas with a suffragette club, indicating longer-term demand for political representation. Women typically vote more conservatively than men, but this gap is smaller in areas with more missing men during the war, suggesting that increased agency may have shifted women's political preferences towards less conservative positions. Our results are consistent with Bühler and Sabet (2025) who show that middle-class women voted less conservatively compared to the broader female electorate.

Our paper makes three main contributions, connecting several strands of the economics literature. First, to the best of our knowledge, our paper is the first to quantitatively study the demand for political representation by a disenfranchised group. The literature on the extension of the franchise to women almost exclusively studies reasons why men would or have extended it (for overviews, see Doepke et al., 2012; Hanlon, 2022), including *men's* benefits of women's franchise (Bertocchi, 2011; Doepke & Tertilt, 2009; Teele, 2018; Wong et al., 2018), lower costs to men when women are scare (Braun & Kvasnicka, 2013) and women's labour force participation (Arnsbarger, 2024; Tertilt et al., 2022). In fact, Teele and Grosjean (2024, p. 719) come to the conclusion that "[t]o date there are few high-quality measures of women's political activism for suffrage". We propose a new revealed-preferences measure for the demand for representation, using

suffragette clubs, which takes into account the costs associated with fighting for political representation. Historians argue that the suffragette clubs, by creating political pressure over years, contributed to the eventual extension of the franchise to German women (Schaser, 2009). In their interdisciplinary review, Moehling and Thomasson (2020) make a similar argument for the US. Thus, it is important to study both the supply of and demand for political rights when considering franchise extensions. By contributing this new perspective, our paper also speaks to papers evaluating other extensions of political rights, such as the US civil rights movements. Existing papers have documented which factors ultimately led to the success of the movement (e.g. recently Calderon et al., 2023), i.e. the supply of further rights, but little is known about the factors driving demand.

Second, our results highlight the central role of agency and women in leadership positions for shaping demands for representation in light of costs. This may also offer insights into settings where the formal rights to representation have already been granted but women remain under-represented, adding to other reasons for under-representation studied in previous research (Bernhard et al., 2021; Preece & Stoddard, 2015; Schneider et al., 2016). Being a female leader today may still have substantial social costs—such as being perceived as too manly or being seen as a bad mother.[1] These costs associated with leadership roles can reduce women's demand for representation at the top, which has been found in previous research (Gonzalez-Eiras & Sanz, 2021; Haegele, 2025; Lawless & Fox, 2025). Our findings indicate that more women *doing* leadership tasks may counteract this, increasing women's willingness to take up leadership roles.

In addition, by shifting the perspective to the determinants of demand for representation, our findings help explain how women in leadership positions translate into increased supply of female political candidates. Prior research documents that women's presence in political office increases other women's candidacy, both at the individual level (Baskaran & Hessami, 2022; Bhalotra et al., 2018; Bhavnani, 2009; Carpenter & Moore, 2014; O'Connell, 2020; Wasserman, 2023) and through aggregate role model effects (Brown et al., 2022; Gilardi, 2015; Ladam et al., 2018). Our results suggest a mechanism for these patterns: Increased agency and leadership experience raise women's demand for political representation despite associated costs, ultimately expanding the pipeline of female candidates. This mechanism may also help explain why the effects of women's employment (Aalen et al., 2019; Matland, 1998; Ross, 2008; Schlozman et al., 1999) and economic development (Duflo, 2012) on women's political participation show mixed results: Employment alone may not increase political engagement unless it involves roles that genuinely expand women's decision-making authority and agency.[2]

[1] For example, when German Chancellor Angela Merkel wore an evening dress instead of her usual suit, this was heavily debated in both regular and social media (Strohmaier, 2008). Likewise, there were many public debates asking whether and how Ursula von der Leyen, at the time German Minister for Family Affairs, can combine her work with raising seven children (Poelchau, 2006).

[2] A. Evans (2016) makes a similar argument regarding Zambian women's increased political repre-

Third, our findings show that war can result in the political empowerment of women, complementing our understanding of how war affects women's lives. The existing literature has documented war's effects—here only listed for findings on WWI—on women's employment (Boehnke & Gay, 2022), marriage markets (Abramitzky et al., 2011; Knowles & Vandenbroucke, 2019), and fertility (Kitchens & Rodgers, 2023; Vandenbroucke, 2014).[3] Contemporary work shows war's effects on women's political outcomes operate through multiple channels: Women's active participation in war increases political empowerment (Accettura, 2025), while high casualties can decrease support for women's suffrage through more conservative gender norms (Calder, 2025). Our findings highlight an additional mechanism—expanded agency at the home front through male absence. In addition, our results provide a short-run foundation for the long-lasting effects of missing men during wartime on women's political participation decades later documented in prior research (Grant et al., 2018): Only if the directly-affected women change their behaviour, can we expect these changes to persist over several generations.

2 Historical background

2.1 The women's movement before WWI

In 1894, the German women's movement united under the umbrella organization *Bund Deutscher Frauenvereine* (BDF), which grew rapidly from 70,000 members in 1900 to 328,000 in 1918 (Schaser, 2020, p. 58). This growth brought internal tensions: conservative members opposed women's emancipation and franchise, while those favoring emancipation disagreed on strategy—some argued women must first earn their place through contributions to national welfare, others demanded immediate equality (Schaser, 2020, Chapter IV).[4]

The BDF avoided demanding voting rights until 1902, when Anita Augspurg and Lida Gustava Heymann founded the first women's franchise association, the *Deutscher Verband für Frauenstimmrecht*. Disagreement on the extent of the franchise that should be extended to women led to a split: A second organization, the *Deutsche Vereinigung*

sentation. In her qualitative work, she finds that women's increased labour force participation changed gender norms, making women's political representation more likely—something that was not achieved by granting formal rights only.

[3]Since our findings are driven by missing men, they further contribute this aspect to the literature studying consequences of imbalances in the local sex ratio which so far has studied effects on gendered employment patterns (Amuedo-Dorantes & Grossbard, 2007; Cardoso & Morin, 2018; Gay, 2023), the marriage market (Angrist, 2002; Charles & Luoh, 2010), gender norms (Alix-Garcia et al., 2022; Baranov et al., 2023; Grosjean & Khattar, 2019; Rogall & Zárate-Barrera, 2020; Teso, 2019) and intimate partner violence (Boggiano, 2024).

[4]The working-class women's movement (*proletarische Frauenbewegung*) took a distinct approach, prioritizing employment issues and seeking gender equality through broader socialist transformation rather than direct advocacy for women's rights (Schaser, 2020, pp. 11, 37).

für Frauenstimmrecht, was founded in 1911. These reunited in 1916 as the *Reichsverband für Frauenstimmrecht* due to shared nationalist sentiment during WWI. A third association, the *Deutscher Bund für Frauenstimmrecht*, emerged in 1913 and remained separate (Wischermann, 2003, 112 ff.). Our analysis considers suffragette clubs from all three associations.

After women gained the right to join political associations in 1908, the franchise organizations established local chapters—which we refer to as women's suffragette clubs—to raise awareness of voting rights and strengthen mobilization. These clubs engaged in lobbying and propaganda through public events (two to four annually), regular member meetings (one to two monthly), social gatherings, election campaigns, flyer distribution, petitions, and collaborations with other local women's organizations (Wischermann, 2003, pp. 109–118). Local chapters were essential to the movement's success, implementing activities at the community level while higher-level clubs set broader political agendas (Wischermann, 2003, p. 120). Contemporary activists recognized this importance, as women's activist Agnes Zahn-Harnack noted:

> "The association in a given small village or city may be small in number; there are no important speakers among its members, no special work is carried out – but through the small association the women's circles of the city maintain contact with the overall movement; through it they receive magazines, visits from speakers, work suggestions, and the opportunity to take part in conferences and meetings on a larger scale. And through the small associations the head association or the overall organization always has a base and always the opportunity to spread an idea or a demand very quickly throughout the whole country."[5]

2.2 Men and women during WWI

The war changed women's and men's roles in Germany through two channels: men's absence due to military service and women's expanded responsibilities in their place. The scale of male conscription was substantial. Men aged 20 to 27 were part of the standing army ("Gesetz betreffend die Verfassung des Deutschen Reiches", 1871). During WWI, all men from birth cohorts 1896 to 1900 were required to serve in the war, meaning the youngest cohort drafted was 18 years old in 1918 (Nash, 1977), and exemptions for

[5]Own translation the German: "Der Verein in Xhausen oder Ystadt ist vielleicht zahlenmäßig schwach; bedeutende Rednerinnen sind nicht unter seinen Mitgliedern, irgendeine Sonder- aufgabe wird nicht betrieben – aber durch den kleinen Verein erhalten die Frauenkreise der Stadt die Verbindung mit der Gesamtbewegung aufrecht; durch ihn bekommen sie Zeitschriften, Besuch von Vortragenden, Arbeitsvorschläge und die Möglichkeit, an Tagungen und Zusammenkünften in größerem Rahmen teilzunehmen. Und durch die kleinen Vereine hat der Spitzenverein oder die Gesamtorganisation immer einen Fußpunkt und immer die Möglichkeit, einen Gedanken oder eine Forderung sehr schnell durch das ganze Reich zu verbreiten." (Wischermann, 2003, p. 117)

unfitness were rigorously checked and re-examined in 1915. The primary reason for men not to serve in the war was their occupation. In particular, those working in factories and mines were often exempt from conscription or called back home to continue their work in war-related industries. The regional military entity responsible for drafting was the so-called *Landwehr-Bezirke* (henceforth recruitment areas) (Koenig, 2023; Meyer, 1905). Note that volunteers to serve in the army were moderate in size.[6]

This absence of men created opportunities for women, particularly in public roles beyond the home (Schaser, 2020, p. 113). In 1914, the BDF founded the National Women's Service [German: *Nationaler Frauendienst*] (NFD), using existing local women's club networks to recruit women into NFD chapters that coordinated war relief efforts. The NFD provided charity and legal advice to soldiers' families, mobilized women for labour force participation, maintained food supply, and organized medical care. Additionally, BDF leader Marie-Elisabeth Lüders was appointed to head the War Office's Department for female labour supply. Through these activities, middle-class women gained organizational and financial skills, established contacts with local government offices, became publicly visible, and acquired leadership experience previously inaccessible to them. As Lüders wrote, "This national responsibility (...) not only gave us the will, but also the strength to take on work and decisions that for most women were far removed from their previous life and work paths" (Lüders, 1936, p. 7).[7] Women were motivated both by national duty and by hope that their wartime service would secure political rights after the war (R. J. Evans, 1978).

The war also increased women's agency in daily life. Women made important family decisions independently due to absent male relatives. The NFD club in Stuttgart, for example, planned to offer "free advice to wives and other female relatives of the warriors, who suddenly face multiple new tasks because of the man being away, who unexpectedly might be in a difficult situation and have nobody who could advise them" (Bund Deutscher Frauenvereine, 1914, p. 71).[8] Women also entered the workforce, replacing men at lower wages. Working-class women faced particular hardship and relied on employment to compensate for lost household income, as the support paid to soldiers' families was only a fraction of their previous income (Frevert, 2007, p. 149). Female employment rose from 23.7% in 1913 to 39.5% in 1918 (Reichsamt des Innern, 1914-a, 1919-b), mostly in unskilled positions (Lüders, 1936, p. 87).

[6]Around 185,000 volunteers (Verhey, 2000, as cited in Koenig, 2023) compared to a total number of men serving in the German military of around 13.4 million (Koenig, 2023, Table D3).

[7]Own translation of the German: "Aus dieser nationalen Verantwortung (...) ist nicht nur der Wille, sondern auch die Kraft erwachsen, Arbeiten und Entscheidungen auf uns zu nehmen, die für die meisten Frauen weit ab von ihrem bisherigen Lebens- und Arbeitswege gestanden hatten."

[8]Own translation of the German: "[...] die unentgeltliche Beratung der Frauen und übrigen weiblichen Angehörigen der fortgezogenen Krieger [gedacht], die durch das Fernsen des Mannes sich plötzlich vielfachen neuen Aufgaben gegebnüber sehen, sich oft in einer unerwartet schwierigen Situation finden und niemanden haben, der sie beraten könnte."

Despite women's expanded roles, organized feminist activism declined during the war. At the war's outset, the Emperor declared a political truce (*Burgfrieden*), postponing internal debates until war's end. The women's movement embraced this call for unity, declaring in 1914: "Religion – politics – gender – social status etc. do not exist in the common cause. One will forces down the common distress!" (Bund Deutscher Frauenvereine, 1914, p. 68)[9] Consequently, suffragette club activities declined sharply. For example, the club in the municipality of Panten reported in 1915 that "the current political and economic state have negatively affected the club's activities, in particular the stop of propaganda activities as the most interested members are overburdened with the war effort" (Bund deutscher Frauenvereine, 1916, p. 100).[10]

2.3 The end of the war and the introduction of the women's franchise

In 1918, after the war ended, the Council of People's Deputies (*Rat der Volksbeauftragten*) introduced universal suffrage, including for women. Historians debate why women's voting rights were granted: Some emphasize political calculations favouring the Social Democratic Party of Germany [German: *Sozialdemokratische Partei Deutschlands*] (SPD), while others credit the joint mobilization by social democratic, bourgeois (BDF), and socialist women's movements in 1917–1918 (Schaser, 2020, p. 76). In the first Weimar election in January 1919, women turned out at 87.7% (versus 89.4% for men), 300 women ran for the National Assembly (*Nationalversammlung*), and 37 were elected (Glück, 2018). Having achieved their goal, the suffragette clubs dissolved in 1919 (Schaser, 2020, p. 71).

3 Data, measurement and descriptives

3.1 Suffragette clubs

To measure local demand for voting rights, we digitize the universe of German suffragette clubs from 1912–1918. These clubs proxy local demand for voting rights because, as described above, they served as local lobby groups mobilizing women and informing the public (Wischermann, 2003, p. 120). Moreover, maintaining a club required sustained organizational effort and resources—regular meetings, event planning, membership coordination—making club presence a more credible signal of local demand than

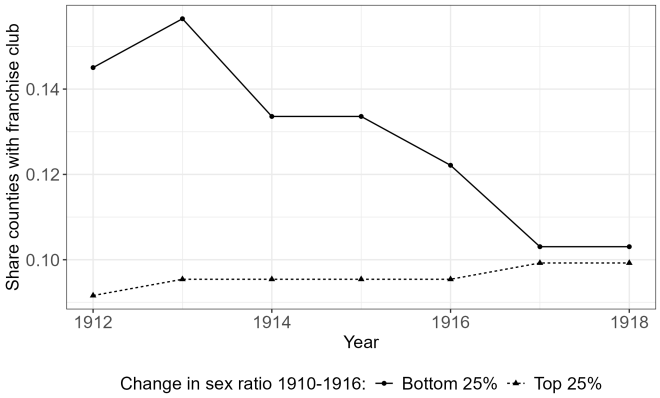
[9] Own translation of the German: Religion – Politik – Geschlecht – Vorrang usw. existieren in der gemeinsamen Sache nicht. Ein Wille zwingt die gemeinsame Not!"

[10] Own translation of the German: [...] hat die augenblickliche politische und wirtschaftliche Lage die Vereinstätigkeit ungünstig beeinflusst, besonders durch das Einstellen der Werbetätigkeit, da die am meisten interessierten Mitglieder mit der Kriegsarbeit überbürdet sind."

Figure 1: Suffragette clubs, 1912–1918: aggregate trends and heterogeneity by sex ratio change

(a) Number of suffragette clubs

(b) Counties with a suffragette club



(c) Share of counties with a suffragette club by intensity of sex ratio change

Notes: Part (a) shows the total number of suffragette clubs and Part (b) the number of counties with at least one suffragette club, for each year from 1912 to 1918, counting both local chapters and their parent organizations as separate clubs. Part (c) shows the evolution of the share of counties with a suffragette club for counties in the bottom quartile (solid line) and top quartile (dashed line) of the distribution of absolute change in the male-to-female sex ratio measured between 1910 and 1916.

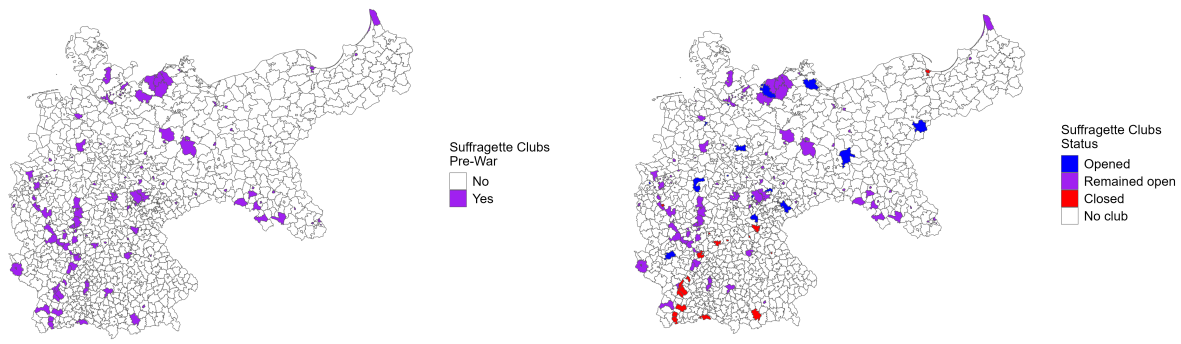
Source: Own illustration. See Table 1 for data sources.

lower-cost actions like petition signing.

The data come from the *Bund Deutscher Frauenvereine* (BDF) yearbook, which published annual lists of all women's associations in Germany with their location and head of club (Bund Deutscher Frauenvereine, 1912–1918). We include all associations dedicated to fighting for female voting rights. Since clubs had to actively report to appear in the yearbook, a missing entry may reflect a reporting gap rather than a genuine closure. To be conservative in measuring closures, we therefore treat a club as open across gaps of one or two years when the same person led the club before and after the gap.

The yearbook differentiates between clubs at different organisational levels (e.g. a local Berlin chapter versus a national club also located in Berlin). We count all suffragette clubs in a location, regardless of organisational level, for three reasons. First, supra-regional clubs were not necessarily located in provincial capitals, suggesting local demand

Figure 2: Suffragette clubs across German counties before and during the war, 1912–1918



(a) Before WWI **(b)** During WWI

Notes: The map shows suffragette club presence across German counties using 1907 county borders. Part (a) indicates whether a county had at least one suffragette club in the pre-war period (1912–1913). Part (b) shows club status during the war (1914–1918), distinguishing between counties where a club opened (blue), remained open (purple), or closed (red).

Source: Own illustration based on Bund Deutscher Frauenvereine (1912–1918). Geospatial shapefiles from MPIDR (2011).

rather than administrative default governed location choice. For example, the Rhineland provincial club was in Aachen rather than the capital, Koblenz. Second, small states like Lübeck had only state-level clubs because they were too small for multiple chapters, so these clubs still measure local demand. Third, regional and supra-regional clubs in the same city were typically managed by different people, indicating that multiple clubs reflected broader local engagement. In robustness checks, we use only local chapters and find similar results. No county had more than 5 clubs between 1912 and 1918, and the median among counties with at least one club was 1.

Figure 1 shows the evolution of suffragette clubs over time. Part (a) reveals that while clubs increased slightly from 1912 to 1913, they decreased sharply during the war. This decline partly reflects the 1916 merger of associations, which mechanically reduced club counts. However, Part (b) shows that the number of counties with clubs also declined, indicating a genuine reduction in franchise activism consistent with the movement's wartime focus on national unity. We therefore use a binary indicator of club presence as our main outcome variable to abstract from organisational mergers. Prior to the war, 10.3% of counties had a suffragette club (Table 1). Part (c) compares counties experiencing large decreases in local male population (top 25%, dashed line) with those experiencing minimal change (bottom 25%, solid line). Club closures occurred exclusively in counties with little change in male population, while counties with high intensities of missing men maintained their clubs and even slightly increased local suffragette presence.

Figure 2 shows the spatial distribution of suffragette clubs before (Part (a)) and during the war (Part (b)). Suffragette clubs were geographically dispersed rather than spatially

clustered, reflecting a national movement. Club closures during the war similarly occurred across Germany—in Lörrach (south), Danzig (east), Stralsund (north), and Bonn (west)—rather than concentrating in specific regions. This spatial variation supports our regional analysis. Table A2 in the appendix compares pre-war characteristics and changes in the female-to-male ratio between counties with and without a pre-war suffragette club. Clubs are more prevalent in urban areas with larger foreign populations and higher industrial employment shares, and we control for these differences flexibly in the analysis. Counties with and without a pre-war club do not differ in their pre-war gender ratio or its change over the war.

3.2 Missing men

We measure the extent of missing men by the change in the sex ratio during the war compared to before the war in each county, using census data for the German Empire (Kaiserliches Statistisches Amt, 1915; Kriegsernährungsamt, 1916).[11] The census reports the population currently present in each county, so men absent due to the war, either temporarily or permanently, are excluded from the count.

Our main explanatory variable is the change in the female-to-male ratio from before (1910) to during the war (1916), defined for county i as:

$$\Delta fpm_i = \frac{\text{women}_{i,1916}}{\text{men}_{i,1916}} - \frac{\text{women}_{i,1910}}{\text{men}_{i,1910}}. \tag{1}$$

The mean change was 0.215 (Table 1), equivalent to, for example, the actual change experienced by the Prussian city of Königshütte (36,000 inhabitants in 1910, sex ratio of 1.003), where 19% of men had left by 1916.[12] As cohorts were drafted at different points in time, we also construct the measure using the 1917 census (Kriegsernährungsamt, 1918), the only other year for which census data are available during our sample period, finding very similar results.

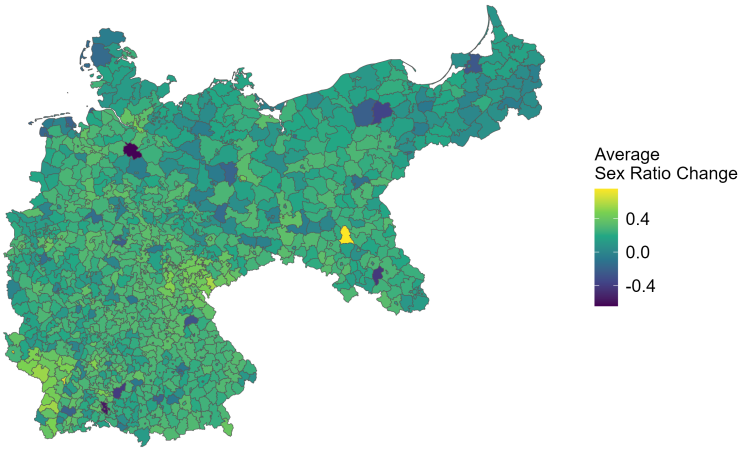
Figure 3 shows the regional distribution of sex-ratio changes across German counties. The absence of spatial clustering supports our argument that part of this variation is quasi-randomly determined. Some counties experienced an increase in men, likely due to the presence of military bases. Since the census counts all individuals present in a county, it includes military personnel. We flexibly control for their share of the total population in 1910 with year-specific effects, and exclude counties with an increase in the sex ratio as a robustness check. Our results are stable to this.

To distinguish effects driven by temporarily absent men from those driven by permanently missing men, we additionally use the 1919 census (Statistisches Reichsamt, 1920)

[11] For Prussian counties in 1910, we use the digitised data from Galloway (2007).

[12] We compute this by taking the difference between the actual number of men in 1910 and the imputed number using female population growth between 1910 and 1916, divided by the number of men in 1910.

Figure 3: Change in the female-to-male sex ratio across German counties, 1910–1916



Notes: The map shows the change in the female-to-male sex ratio between 1910 and 1916 for each German county, using 1907 county borders.

Source: Own illustration based on Kaiserliches Statistisches Amt (1915); Kriegsernährungsamt (1916). Geospatial shapefiles from MPIDR (2011).

to construct the change in the sex ratio from 1910 to 1919 as a proxy for long-run absence. By 1919, the average female-to-male ratio had nearly returned to pre-war levels (1.09 versus 1.03 in 1910), and the pre- and post-war ratios are strongly correlated across counties (correlation coefficient of 0.76), suggesting little permanent reallocation of men across counties after the war. Figure A4 in the appendix shows the regional distribution of long-run sex-ratio changes, again without visible spatial clustering.

3.3 Supplementary data sources

Control variables. We construct several pre-war county characteristics from multiple sources. The presence of a pre-war suffragette club is taken from our own data described above. The share of men employed in industry[13] and the share of men already employed in the military are taken from the 1907 occupational census (Kaiserliches Statistisches Amt, 1910). We also construct the share of men aged 12–18 in 1910 from the same source. The share of urban population, the share of Protestants, and the share of foreign population are taken from Thome (2006).

Recruitment areas. Recruitment areas were the regional military entities responsible for drafting, each covering on average 3.4 counties. To explicitly exploit the variation between recruitment areas, we digitized their borders from Reichsamt des Innern (1914-b). Figure A1 in the appendix shows the recruitment area borders overlaid on the county

[13]The industry sector covers mining, pit and quarry, metal, machines, chemicals, textiles, paper, timber, food, clothing, construction, and print.

borders.

Labour force participation. To investigate whether economic need is a contributing factor for demand for political representation, we use two datasets on female labour force participation. First, we construct a newly digitised dataset on employment before (1913) and during the war (1918) from Reichsamt des Innern (1914-a) and Reichsamt des Innern (1919-b).[14] The data cover 40 German regions and 16 sectors, including only firms with at least 10 employees. Since women were often employed in smaller firms or were de facto self-employed at home (e.g. in the textiles sector), this likely understates female labour force participation. Since this dataset covers only 40 regions with Prussia treated as a single region, we construct a second, county-level dataset comparing female employment in the 1925 occupational census (Inter-University Consortium For Political And Social Research, 2005) to pre-war levels in 1907 (Kaiserliches Statistisches Amt, 1910), yielding a complementary measure of the change in female full-time employment from before to after the war. This too likely understates the true increase as some men had already returned to work by 1925.

National women's service. During WWI, the National Women's Service [German: *Nationaler Frauendienst*] (NFD) coordinated women's war relief efforts. We digitise the locations of local NFD chapters published by the BDF in 1916 (Bund Deutscher Frauenvereine, 1912–1918). Overall, 29% of counties had a local NFD chapter (304 in total; Table 1), of which 27% also had a pre-war suffragette club. Figure A2 in the appendix shows their regional distribution, with chapters present across all areas of the German Empire rather than concentrated in urban centres.

3.4 Further outcome variables

Other women's clubs. To investigate whether missing men affected women's political engagement specifically or women's organisations more generally, we use two additional women's organisations as outcome variables: the German Protestant Women's Association (DEF) and the General German Women Teachers' Association (ADLV). Both were part of the BDF, from whose yearbooks we digitise annual location data for 1912–1917 (Bund Deutscher Frauenvereine, 1912–1918).[15] The DEF focused primarily on charitable work and opposed female suffrage, while the ADLV represented female teachers and supported women's education (Schaser, 2020). Prior to the war, 12% of counties had a DEF chapter and 14% had an ADLV chapter (Table 1). Figure A3 in the appendix shows these trends separately for counties with large decreases in male population (top 25%,

[14]The data for 1918 were collected between 1914 and 1918, with the majority collected in 1918.

[15]Complete information on the ADLV is available for only 16 German states, covering 634 of 1,048 counties (60%).

dashed line) and those with little change (bottom 25%, solid line). During the war, DEF presence remained stable while ADLV presence increased by 11% to 16% of counties, though both appear unrelated to changes in the sex ratio. We will test this formally in the econometric analysis below.

Election lists. Beyond women's demand for voting rights, we also investigate women as political candidates following the introduction of female suffrage in 1918. We are the first to digitise the universe of politicians running for parliament in the first election of the Weimar Republic's National Assembly in 1919 taken from Reichsamt des Innern (1919-a). For each of the 37 constituencies, the data list candidates' names and party affiliations, from which we code gender based on first name. The median constituency had 6 party lists, of which 88% included at least one female candidate. 15.4% of lists elected a woman to the National Assembly (Table 1). Voters cast ballots for entire party lists, with seats allocated proportionally to each list's vote share (Milatz, 1965). Figure A5 in the appendix shows the regional distribution of the average share of female candidates across constituencies.

Voting turnout. In addition to passive voting rights, we also examine women's active voting behaviour. We digitise gender-disaggregated voter turnout from 1919 to 1930 from Bremme (1956). While the Weimar Republic permitted gender-separate vote counts, this was only implemented in a subset of locations, yielding data for 53 counties covering on average 2.5 elections. Figure A6 in the appendix shows these counties are spread throughout the country.[16] For 28 of these counties, the data also report party vote shares by gender, allowing us to examine not only turnout but also voting behaviour.

3.5 Descriptive statistics

Table 1 shows the descriptive statistics for the main variables used in the analysis, i.e. the explanatory variable, all outcome variables, the contributing factors, as well as the control variables—all of which have been discussed above. Before the war, 10.3% of all counties had a suffragette club, which reduced to 8.1% by the end of the war. In Table A1 in the appendix, we show the average values of pre-war variables separately for counties with large sex ratio changes from 1910 to 1916 (top 25% of the distribution) and small changes (bottom 25% of the distribution). As expected given the drafting process, local industry composition and age structure are correlated with sex ratio changes. Counties in the bottom 25% are also more urban, have a more balanced pre-war sex ratio, and are

[16] Table A3 in the appendix compares pre-war characteristics and changes in the female-to-male ratio between counties with and without turnout data. Data availability is not related to the change in the female-to-male ratio.

more likely to have had a pre-war suffragette club. We directly control for these pre-war differences in the analysis, as discussed below.

Table 1: Summary statistics

	N	Mean	Std. Dev.	Min.	Max.
Change in female-to-male ratio	1048	0.215	0.137	-0.645	0.755
Any clubs before the war	1048	0.103	0.304	0.000	1.000
Any clubs at the end of the war	1048	0.081	0.273	0.000	1.000
Any DEF clubs before the war	1048	0.121	0.326	0.000	1.000
Any DEF clubs at the end of the war	1048	0.120	0.325	0.000	1.000
Any ADLV clubs before the war	633	0.142	0.350	0.000	1.000
Any ADLV clubs at the end of the war	633	0.156	0.364	0.000	1.000
Change in female LFP 1907-1925	944	0.025	0.045	-0.151	0.253
Change in female LFP 1913-1918	1006	0.170	0.037	0.028	0.543
Presense of National Women's Service	1048	0.290	0.454	0.000	1.000
Female-to-male ratio before the war	1048	1.026	0.068	0.650	1.437
Share of men employed in industry	1048	0.389	0.165	0.102	0.855
Share of men employed in military	1048	0.026	0.059	0.000	0.448
Male share 12 to 18	1048	0.129	0.013	0.063	0.179
Urban population share 1900	1021	0.407	0.311	0.000	1.000
Lutheran population share in 1900	1021	0.569	0.385	0.001	1.042
Share foreign population in 1900	1018	0.071	0.190	0.000	0.900
Female candidate	200	0.880	0.326	0	1
Female elected	208	0.135	0.342	0	1
Female turnout	133	69.099	13.067	22.9	91.6

Notes: The table presents the mean, standard deviation, minimum, and maximum of all variables at the county level. The share of female candidates and share of elected women are measured at the party list level (one observation per party and constituency), while female turnout is measured at the election level. The indicator for any club at the end of the war is based on club presence in 1918; the indicators for any German Protestant Women's Association (DEF) and General German Women Teachers' Association (ADLV) clubs are based on club presence in 1917.

Source: Census data for sex ratio changes from Kaiserliches Statistisches Amt (1915) and Kriegsernährungsamt (1916, 1918); data for suffragette clubs, protestant clubs, teacher clubs, and national women's service taken from Bund Deutscher Frauenvereine (1912–1918); female employment taken from Reichsamt des Innern (1914-a, 1919-b), Inter-University Consortium For Political And Social Research (2005), and Kaiserliches Statistisches Amt (1910); party list data based on Reichsamt des Innern (1919-a); voting data taken from Bremme (1956). We use geospatial shapefiles from MPIDR (2011).

4 Empirical strategy

To estimate the effects of male absence on local demand for political participation, we exploit wartime changes in the local sex ratio induced by WWI. We classify counties into high-change (treatment) and low-change (control) groups based on the top and bottom 25% of the distribution of changes in the female-to-male ratio from 1910 to 1916. We discretise the treatment rather than using a continuous measure for two reasons. First, the binary contrast is easier to interpret. Second, it requires weaker identifying assumptions: Rather than imposing parallel trends across the full distribution of sex ratio changes (Callaway et al., 2025), we need only assume that the two groups would have followed similar trends absent the war. We compare changes in the presence of local suffragette clubs from before to during the war across these groups in a difference-in-differences (DiD) framework, estimated as a two-way fixed-effects regression. As will be shown, this discretisation does not drive our results—scaling the continuous DiD estimate by the mean sex ratio change in the treatment counties yields nearly identical point estimates.

Specifically, we estimate:

$$club_{i,t} = \alpha + \delta_i + \delta_t + \beta High_Change_i \times post_t + \gamma_t(X_i \times \delta_t) + \varepsilon_{it}, \tag{2}$$

where $club_{i,t}$ is a binary indicator for the presence of a suffragette club in county i in year t, δ_i and δ_t are county and year fixed effects. $High_Change_i$ is a binary indicator equal to one for high-change counties, and $post_t$ is a dummy equal to zero for 1912–1913 (pre-war) and one for 1914–1918 (wartime). β is the coefficient of interest, capturing the change in suffragette club presence in high-change counties relative to low-change counties from before to during the war. X_i is a vector of pre-war county characteristics interacted with year fixed effects, allowing baseline differences between counties to have differential effects over time. It includes the share of men in industry in 1907, the share of men in the military in 1907, the share of men at draftable age,[17] the presence of a pre-war suffragette club, the pre-war sex ratio, and county-level demographic controls (urban share, Protestant share, foreign population share). Standard errors are clustered at the recruitment area level, at which drafting decisions were made.

The main identifying assumption is that high-change counties would have followed the same trend in club presence as low-change counties absent the war. This does not require sex ratio changes to be randomly assigned. As shown above, drafting was determined by men's industry and age—time-invariant factors absorbed by county fixed effects. The

[17] We proxy draftable men by the share of men aged 12–18 in 1910 (i.e. aged 20–26 by 1918), consistent with the standing army age range of 20–27 ("Gesetz betreffend die Verfassung des Deutschen Reiches", 1871) and the youngest cohort drafted being 18 in 1918 (Nash, 1977). The share of men in industry is measured as the share of men working in mining, pit and quarry, metal, machines, chemicals, textiles, paper, timber, food, clothing, construction, and print in the full-time male working population (Kaiserliches Statistisches Amt, 1910).

remaining concern is that these factors may be related to differential *trends* in club presence. For example, counties with larger industrial sectors may have evolved differently in their demand for political participation. The controls in X_i address this directly. Allowing trends to vary non-parametrically across this rich set of controls considerably strengthens the conditional parallel trends assumption.

To support the common trends trends assumption, we also estimate a dynamic DiD specification that allows the effect of high sex ratio changes to vary over time:

$$club_{i,t} = \alpha + \delta_i + \delta_t + \sum_{\substack{\tau=1912 \\ \tau\neq 1913}}^{1918} \beta_\tau High_Change_i \times 1(\tau = t) + \gamma_t(X_i \times \delta_t) + \varepsilon_{it}, \quad (3)$$

where all variables are defined as above. We use 1913 as the baseline year, exploiting the two pre-war years to formally test for pre-trends. This specification also allows us to examine effect heterogeneity during the war.

Cross-sectional estimation. Since we do not have full panel data for all supplementary outcomes, we further estimate a cross-sectional equation with the change in the local sex ratio as the main explanatory variable:

$$club_{i,s} = \alpha + \beta \Delta fpm_i + X_i'\gamma + \delta_s + \varepsilon_{i,s}, \quad (4)$$

where $club_{i,s}$ equals one if county i had a club at the end of WWI (1918), and Δfpm_i measures the change in the local sex ratio from 1910 to 1916. X_i includes the pre-war sex ratio, a binary indicator for pre-war club presence, and the main draft determinants: the share of men in industry and in the military in 1907, and the share of men aged 12–18 in 1910. δ_s are state fixed effects, capturing historical differences in women's legal right to join political associations across German states. In a robustness check, we additionally control for urban population share, Protestant share, and foreign population share in 1900.

5 Missing men and women's demand for the suffrage

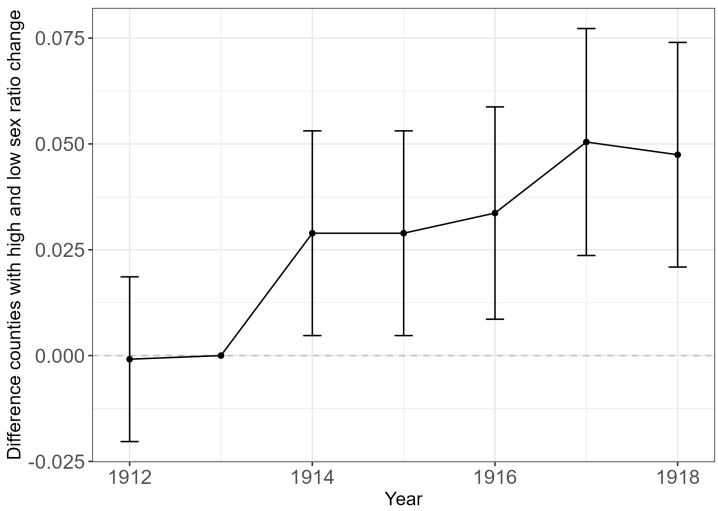
5.1 Suffragette clubs

Table 2 presents estimates from the DiD specification (equation 2), comparing counties in the top quartile of wartime change in the female-to-male ratio (treatment) to those in the bottom quartile (control). Column (1) reports estimates without controls. Column (2), our preferred specification, adds controls for industry structure, age composition, urban share, protestant share, share of foreign-born population, pre-war club presence, and sex

ratio interacted with year fixed effects. Across both columns, the estimates are stable. Counties experiencing the largest increases in the female-to-male ratio were 3.8 percentage points more likely to retain their local suffragette club during the war (column (2), significant at the 5% level). Given that only 10% of counties had a suffragette club prior to the war, this effect—equivalent to 38% of the baseline—is substantial in magnitude.

Column (3) splits the sex ratio change at the median rather than comparing the top and bottom quartiles; the estimate is smaller but qualitatively similar, as expected given the smaller difference in sex ratio change between treatment and control groups. Table A4 in the appendix iterates over further cut-offs, confirming that the estimates are not an artefact of cut-off choice, with results stable between the top/bottom 20% and 40% and attenuating towards the median. Column (4) of Table 2 replaces the binary treatment indicator with the continuous change in the sex ratio. This specification requires the stronger assumption that counties with different sex ratio changes would have evolved in parallel absent treatment, across all levels of exposure rather than only at the tails (Callaway et al., 2025). The continuous estimate is positive and highly significant. Scaling it by the mean difference in sex ratio change between the high- and low-change counties of the baseline specification yields an implied effect of 0.036, closely comparable to the binary estimate of 0.038 in column (2).

Figure 4: The effect of missing men on suffragette clubs: dynamic difference-in-differences estimates



Notes: The figure shows dynamic DiD estimates of β_t from equation 3 for 1912–1918, with 1913 as the omitted base year. Estimates compare the presence of suffragette clubs (binary) in counties that experienced the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). The regression includes year and county fixed effects and baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. 10% confidence bands are shown. Standard errors are clustered at the recruitment area level.

Source: Own illustration. See Table 1 for data sources.

Table 2: The effect of missing men on suffragette clubs: difference-in-differences results

	(1) Without controls	(2) Baseline	(3) Median split	(4) Continuous DiD
Top 25% sex ratio change × post	0.035**	0.038**		
	(0.015)	(0.016)		
Above 50% sex ratio change × post			0.017*	
			(0.010)	
Sex ratio change × post				0.113***
				(0.041)
Controls × year FE	No	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.876	0.893	0.893	0.893
N	3668	3549	7112	7112

Notes: The table presents DiD estimates of β from equation 2, comparing the presence of suffragette clubs (binary) in counties that experienced the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (1) includes year and county fixed effects. Column (2) adds controls for the share of men employed in industry and the military in 1907, the share of men aged 12–18 in 1910, pre-war club presence, the pre-war sex ratio, the share of urban population, the share of Protestants, and the share of foreign population in 1900, all interacted with year fixed effects. In column (3), treatment and control groups are redefined using a median split. Column (4) replaces the binary treatment indicator with the continuous change in the sex ratio. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Figure 4 presents the dynamic DiD estimates from equation 3. Although the pre-period is short, the absence of any differential trend between the two groups of counties in 1912–1913 supports the parallel trends assumption. From the outbreak of war onwards, the gap between high- and low-change counties widens steadily, with women in high-change counties retaining their local suffragette clubs while those in low-change counties increasingly close theirs.

Robustness. Table 3 tests the robustness of the baseline specification to alternative sample choices. Column (2) excludes counties with a relative increase in men, for instance due to the presence of a military base. Column (3) augments the baseline with a border discontinuity design (Dube et al., 2010; Lichter et al., 2021), restricting the sample to counties sharing a border but lying on opposite sides of a recruitment area boundary, and replacing county fixed effects with county-pair fixed effects.[18] Since recruitment areas were administrative units relevant solely for military decisions, neighbouring counties on

[18]Note that 399 counties are part of more than one county-pair and therefore show up multiple times in our sample.

either side of such a border are plausibly comparable in unobservables but differ in their drafting exposure (Figure A7).[19] The coefficient is larger in magnitude and significant at the 1% level. Columns (4) and (5) probe the treatment definition: Column (4) restricts the sample to 1912 and 1916, while column (5) defines treatment based on sex ratio changes through 1917 rather than 1916. Results are stable across both alternatives.

Table 3: The effect of missing men on suffragette clubs: robustness to sample choices

	(1) Baseline	(2) Excl. increase in men	(3) Border sample	(4) 1912 and 1916 only	(5) Treatment based on 1917
Top 25% sex ratio change × post	0.038**	0.039**	0.060***	0.035**	0.042**
	(0.016)	(0.016)	(0.023)	(0.017)	(0.018)
Controls × year FE	Yes	Yes	Yes	Yes	Yes
County-pair FE	No	No	Yes	No	No
County FE	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.893	0.891	0.822	0.922	0.892
N	3549	3421	5222	1014	3556

Notes: The table examines the robustness of the baseline DiD estimates of β from equation 2 to alternative sample choices. Column (1) reproduces the baseline estimate from Table 2, column (2), comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (2) excludes counties that experienced an increase in the local male population during the war, e.g. due to troop stationing. Column (3) restricts the sample to neighbouring counties on opposite sides of recruitment area borders, replacing county fixed effects with county-pair fixed effects. Column (4) restricts the sample to 1912 and 1916 only. Column (5) uses the sex ratio change from 1910 to 1917 rather than 1916 to define treatment and control groups. All columns include the baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level; in column (3) they are additionally clustered at the county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A5 in the appendix tests robustness to the choice of outcome variable. Column (2) restricts clubs to local chapters, excluding regional headquarters that may be located in larger cities.[20] The results are unchanged. Columns (3) and (4) use the number of suffragette clubs as the dependent variable and yield very similar estimates, reflecting the fact that most counties had at most one club. We nonetheless prefer the binary indicator in the baseline specification, as it is unaffected by the 1916 merger of the two main women's suffrage associations, which mechanically reduced club counts in counties where both had previously been active. Table A6 in the appendix reports the baseline results under alternative standard error choices, with our estimates remaining significant at the 5 or 1% level throughout.

[19]Following Lichter et al. (2021), we discard county pairs with borders below 2 km and retain only the longest border where multiple neighbours on the other side of a recruitment area border exist.

[20]For instance, in 1916, Essen hosted both a local chapter and the provincial club representing the Rhine region.

Cross-sectional estimates. Table A7 in the appendix presents cross-sectional estimates of equation 4, relating the change in the local sex ratio to the probability of retaining a suffragette club until the end of the war. The coefficient of interest is positive and significant across all specifications. Column (4) restricts the sample to counties in the DiD sample. Scaling the coefficient by the mean difference in sex ratio change between high- and low-change counties yields an implied effect size of 4.0 percentage points, closely comparable to the baseline estimate of 3.8 percentage points from column (2) of Table 2.

To account for potential unobserved heterogeneity, we bound the effect of missing men on suffragette club retention following Oster (2019); see Appendix B for details. The results are reported in Table B1 in the appendix. The R-squared increases substantially from 0.092 to 0.716 upon inclusion of controls, indicating that observables explain a large share of the variation. Under the conservative assumption that unobservable determinants of sex ratio changes are as important as observable ones, we obtain bounds of 0.07 and 0.119, depending on their direction. Both bounds are clearly positive and lie within the 95% confidence interval of the controlled estimate, supporting the robustness of our main findings.

5.2 Other women's clubs

To test whether our results reflect a general collective action effect rather than a politically specific response, we re-estimate equation 2 replacing the suffragette club indicator with the presence of two other women's organisations: the German Protestant Women's Association (DEF) and the General German Women Teachers' Association (ADLV). Table 4 shows that counties with more missing men exhibit no significant difference in the probability of retaining either organisation. If anything, greater male absence is associated with a lower probability of a Protestant women's club, which opposed the introduction of female suffrage. The effect on the women teachers' association is close to zero. Together, these results suggest that male absence specifically sustained women's engagement with suffragette organisations rather than boosting female associational life more broadly.

5.3 Long-term absence of men

To distinguish between the effects of temporary wartime absence and permanent absence due to fatalities, we re-estimate equation 2 using the change in the sex ratio from 1910 to 1919. Since the German borders changed after the war, we first re-estimate our baseline, excluding counties for which we do not have data in 1919. Column (2) of Table 5 shows that this reduces power, however the estimates remain qualitatively sim-

Table 4: The effect of missing men on other women's clubs: difference-in-differences results

	(1) Suffragette clubs	(2) Protestant clubs (DEF)	(3) Teacher clubs (ADLV)
Top 25% sex ratio change × post	0.038**	−0.015	0.009
	(0.016)	(0.012)	(0.021)
Controls × year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R^2	0.893	0.963	0.959
N	3549	3042	1782

Notes: The table presents DiD estimates of β from equation 2 for different club types, comparing the presence of women's clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (1) reproduces the baseline estimate for suffragette clubs from Table 2, column (2). Column (2) uses a binary indicator for the presence of a Protestant women's club (DEF) as the dependent variable. Column (3) uses a binary indicator for the presence of a female teachers' club (ADLV). All columns include the baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

ilar.[21] Columns (3) and (5) show no significant effect of the long-run sex ratio change in either the binary or continuous specification, suggesting that the results are driven by the temporary absence of men during the war rather than by permanent male loss. Women do not appear to have adjusted their club activity in anticipation of permanent male absence. This is consistent with Calder (2025), who finds that wartime casualties suppressed support for women's franchise after the US Civil War, in that permanent male loss does not appear to have mobilised women politically in either context.

6 Channels: Economic need vs. increased agency

What drives the relationship between male absence and sustained demand for political representation? Two channels are plausible. Wartime hardship may have heightened women's economic need, making political representation appear more valuable as a means

[21]Restricting the sample to counties within the 1919 German borders reduces the number of counties by 46, with the exclusion of Alsace-Lorraine accounting for a disproportionate share of the variation in club presence we exploit (see Figures A4 and 2). More formally, this restriction reduces the number of counties with any change in club status by 11.8%, explaining the smaller estimated effect.

Table 5: The effect of missing men on suffragette clubs: short and long-term absence

	(1) Short-run: full sample (baseline)	(2) Short-run: 1919 border	(3) Long-run: binary DiD	(4) Short-run: continuous DiD	(5) Long-run: continuous DiD
Top 25% sex ratio change × post	0.038**	0.025	−0.009		
	(0.016)	(0.017)	(0.016)		
Sex ratio change × post				0.113***	−0.010
				(0.041)	(0.099)
Controls × year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.893	0.898	0.895	0.893	0.897
N	3549	3234	3220	7112	6677

Notes: The table presents DiD estimates of β from equation 2 with alternative treatment definitions. Column (1) reproduces the baseline estimate from Table 2, column (2), comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (2) restricts the sample to counties within German borders as of 1919. Column (3) uses the sex ratio change from 1910 to 1919 rather than 1916 to define treatment and control groups. Columns (4) and (5) replace the binary treatment indicator with the continuous change in the sex ratio from 1910 to 1916 and from 1910 to 1919, respectively. All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

to address their circumstances. Alternatively, male absence may have increased women's agency—their capabilities to further their own agendas (Giddens, 1984)—as they took on roles vacated by men and local leadership positions of the war relief effort. We investigate these channels by splitting the sample into areas more exposed to each mechanism in turn.

6.1 The role of economic need

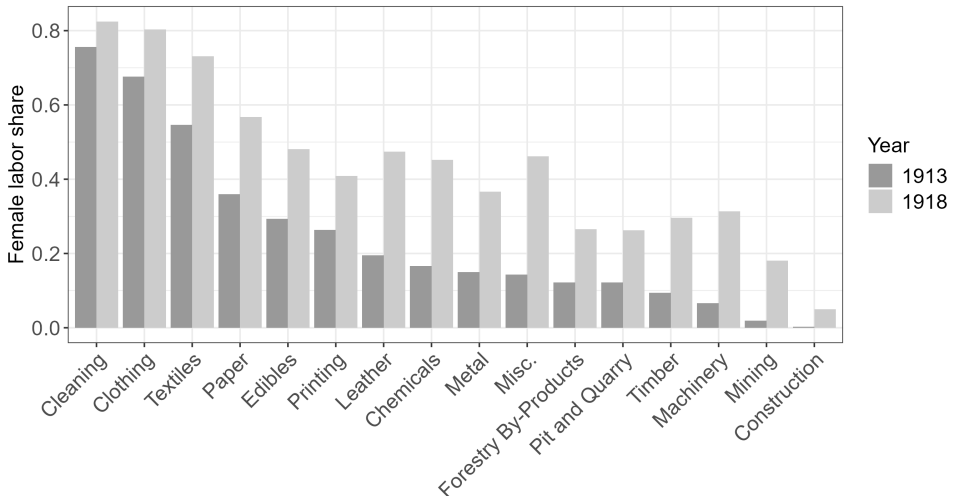
We begin by examining the role of economic need. We proxy this by the wartime increase in women's labour force participation, as economic hardship—particularly for poorer women—drove entry into the workforce. Greater poverty raises the perceived benefits of political representation, since the urgency of policies addressing economic distress becomes more acute. Already by early 1916, the Socialist press drew a direct connection between rising poverty and the absence of political freedoms (Zetkin, 1916, p. 75).[22] Areas

[22]Specifically, they said: "Isn't it provocative when, as a result of inflation, infant mortality among the proletariat is rising, but 45,000 tonnes of rye are being transferred to a grain alcohol plant for distilling schnapps? With complete freedom of the press and speech, abuses on the present scale would be impossible." which is our own translation of the German: "Muß es nicht aufreizend wirken, wenn infolge der Teuerung die Kindersterblichkeit unter den Proletariern anschwillt, einer Kornspirituszentrale aber 45 000 Tonnen Roggen zum Schnapsbrennen überwiesen werden? Bei voller Preß- und Redefreiheit wären Mißstände im heutigen Umfang gar nicht möglich."

with larger increases in female labour force participation therefore proxy for areas where the benefits of enfranchisement were likely highest.

Figure 5 shows women's employment shares across 16 sectors in 1913 and 1918. Female labour force participation rose across all sectors, with the largest increases in previously male-dominated industries such as chemicals, metals, machinery, and mining—suggesting that women entered the workforce out of economic necessity rather than occupational preference. Middle-class women who founded and maintained suffragette clubs were unlikely to have entered the labour force themselves, but they were acutely aware of the hardship facing poorer women. For example, women activist Marie-Elisabeth Lüders writes that, during the war, women and children accounted for the majority of those in need of help (Lüders, 1936, p. 9), and how "the close contact with families [led to] increasingly deep insights into women's hardship" (Lüders, 1936, p. 44). It is therefore plausible that the heightened benefits of enfranchisement for working-class women also strengthened middle-class women's motivation to keep the suffragette movement alive.

Figure 5: Female employment shares across sectors before and during WWI



Notes: The figure shows the share of female workers in total employment for 16 sectors, based on firms with at least 10 employees across 40 German regions. Dark grey bars show 1913 values, light grey bars 1918 values.

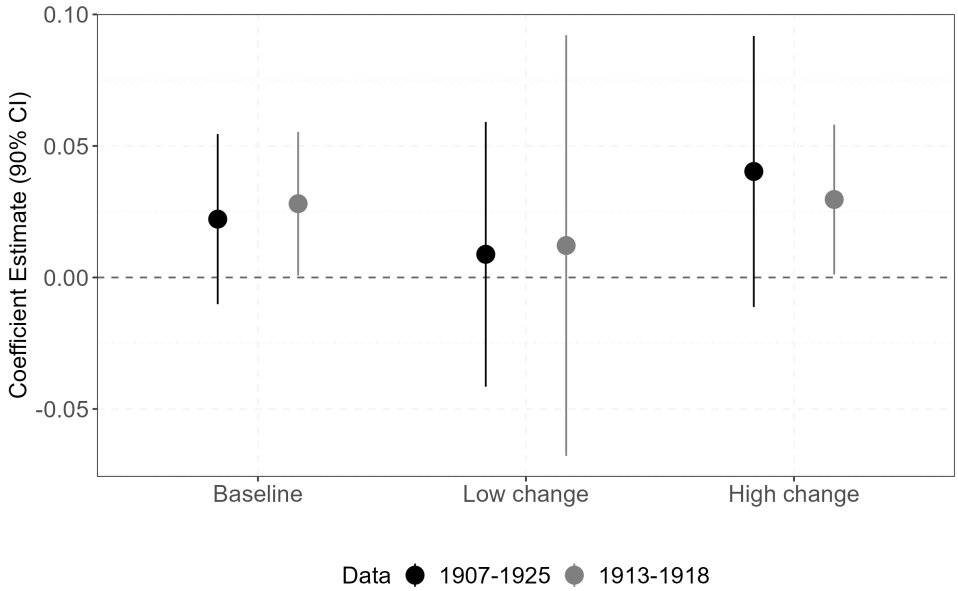
Source: Own illustration based on Reichsamt des Innern (1914-a); Reichsamt des Innern (1919-b).

To proxy economic need, we use two sources of data on employment by gender around WWI. The first allows regional comparisons between 1913 and 1918; the second provides finer county-level variation but covers only 1907 and 1925. Since the 1913–1918 data vary across 40 German regions, we assign each county the change in the female employment share from its corresponding region. Figure A8 in the appendix shows the regional distribution of this change. Results are robust to using either data source.

Figure 6 presents the results. We first replicate our baseline DiD estimates for the subsample of counties with employment data, confirming the positive effect of missing

men on suffragette club survival. We then split the sample by whether a county experienced an above- or below-median increase in the female employment share—our proxy for economic hardship and thus the benefits associated with enfranchisement. The effect of missing men is somewhat larger in high-hardship counties, but the difference is modest and the two estimates are not statistically distinguishable. Crucially, the missing men effect remains clearly positive even in low-hardship areas, indicating that male absence captures something beyond economic need—pointing towards the agency channel explored in the next section.

Figure 6: The effect of missing men on suffragette clubs: heterogeneity by change in female employment share



Notes: The figure shows DiD estimates of β from equation 2 comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Estimates are shown for three groups: all counties in the employment sample (pooled), counties below the median increase in female employment share (low), and counties above the median increase (high). For each group, estimates are shown separately for the change in the female employment share measured between 1907 and 1925 (black) and between 1913 and 1918 (grey). All regressions include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. 90% confidence intervals are shown. Standard errors are clustered at the recruitment area level; for regressions using 1913–1918 employment data, standard errors are additionally clustered at the regional level to account for the regional observation level of the employment data. See Table A8 in the appendix for the corresponding regression estimates.

Source: Own illustration. See Table 1 for data sources.

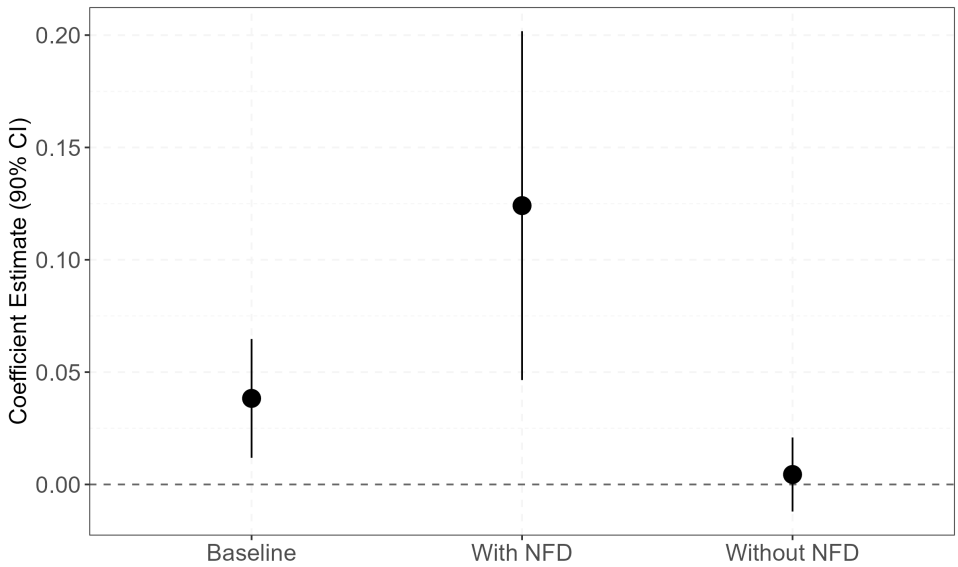
6.2 The role of agency

Next, we investigate the role of women's increased agency during the war. Agency increased in particular for women involved in the NFD who took on organisational, admin-

istrative, and leadership roles in cooperation with local government—giving them greater influence in public decision-making and plausibly strengthening their demand for formal political representation. As local leaders, these women were highly visible in public life, likely normalising women's authority and thereby reducing the social costs of campaigning for the vote.

To test this, we split the sample by the presence of a local NFD chapter, estimating equation 2 separately for counties with (304) and without (744) an NFD chapter. Figure 7 shows the results. In counties with an NFD chapter, the effect of missing men is positive, significant, and roughly three times the baseline estimate. In counties without NFD presence, the effect is precisely estimated at zero. These results suggest that the increased agency women gained through their wartime roles in the NFD was central to sustaining their demand for political representation. Our results are consistent with the interpretation that the high visibility of women in local leadership positions was likely a particularly important driver.

Figure 7: The effect of missing men on suffragette clubs: heterogeneity by National Women's Service presence



Notes: The figure shows DiD estimates of β from equation 2 comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Estimates are shown for three groups: all counties (pooled), counties with a local National Women's Service [German: *Nationaler Frauendienst*] chapter, and counties without one. 90% confidence intervals are shown. All regressions include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. See Table A9 in the appendix for the corresponding regression estimates.

Source: Own illustration. See Table 1 for data sources.

7 Political participation after the suffrage extension

The previous sections establish that male absence during the war shaped women's demand for political representation. We now ask whether this experience translated into sustained political participation once the franchise was granted at the end of WWI.

7.1 Female candidates

We begin by examining candidacy in the 1919 National Assembly election—the first election after the war and the first in which women could participate both as voters and as candidates. The Assembly's mandate was to draft and pass a constitution for the new state. We investigate whether areas with more missing men during the war saw greater female representation among candidates and elected members. To this end, we re-estimate equation 4 at the ballot level, with separate outcome variables for whether a woman appeared on the ballot and whether a woman from that ballot was elected. Since data are only available from after the war, a DiD specification is not feasible; we therefore rely on the cross-sectional setup throughout. To maximise power in this relatively small sample, we use the continuous female-to-male ratio rather than the binary definition. Baseline controls include industry and age structure, pre-war sex ratios, and pre-war suffragette club presence.

Table 6 presents the results, controlling for party political orientation in addition to baseline controls.[23] Liberal parties are 16.9 percentage points more likely than conservatives (the excluded category) to have a woman on their election list, whilst social-democratic parties show no such difference. In column (1), a one-unit increase in the female-to-male ratio is associated with an 88.9 percentage point higher probability of a woman appearing on the ballot—corresponding to a 19.1 percentage point increase when scaled by the mean change in the sex ratio (0.215). Splitting the sample by whether a constituency maintained a suffragette club during the war reveals that this effect is entirely driven by constituencies with continued demand for political representation. Importantly, this is unlikely to reflect a mechanical effect of male absence: By the time of the election, most men had returned, with the average female-to-male ratio standing at 1.09 in 1919, compared to 1.03 in 1910 and 1.26 in 1916 (Statistisches Reichsamt, 1920).

Columns (4) to (6) show that the association between missing men and the probability of a woman being elected is negative, driven by constituencies without continued demand for political representation. These results should be interpreted with caution,

[23] The Independent Social Democrats (*Unabhängige Sozialdemokratische Partei Deutschlands* and the Social Democrats (*Sozialdemokratische Partei Deutschlands*) are coded as Social-democrats; the German People's Party (*Deutsche Volkspartei*) and the German Democratic Party (*Deutsche Demokratische Partei*) are coded as liberal, and the German National People's Party (*Deutschnationale Volkspartei*) and the Centre Party (*Zentrum*) are coded as conservative.

Table 6: Missing men and the passive right to vote: female candidates, 1919

	(1)	(2)	(3)	(4)	(5)	(6)
	Candidate lists			Elected candidates		
	Any woman	No post-war club	Post-war club	Any woman	No post-war club	Post-war club
Change in female-to-male ratio	0.889**	−3.005***	1.158**	−1.091**	−5.182***	−0.781
	(0.362)	(0.163)	(0.460)	(0.522)	(0.183)	(0.602)
Liberal party	0.169***	0.484***	0.150***	−0.043	0.079	−0.043
	(0.051)	(0.141)	(0.052)	(0.050)	(0.091)	(0.057)
Social-democratic party	0.016	0.164***	0.006	0.108**	−0.141	0.126**
	(0.037)	(0.048)	(0.039)	(0.050)	(0.141)	(0.055)
Industry structure	Yes	Yes	Yes	Yes	Yes	Yes
Age structure	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.228	0.417	0.196	0.112	0.729	0.092
N	200	16	184	208	16	192

Notes: The table presents cross-sectional estimates from equation 4 for the 1919 National Assembly election, at the party list level (one observation per party and constituency). Columns (1) to (3) show the effect of the change in the female-to-male sex ratio on whether any woman appears among the candidates, for all observations (column (1)) and separately for constituencies without (column (2)) and with (column (3)) a suffragette club during WWI. Columns (4) to (6) show the effect on whether any woman from the list was elected, with the same sample splits. Party affiliation is defined as follows: social-democratic party includes the Social Democrats (*Sozialdemokratische Partei Deutschlands*) and the Independent Social Democrats (*Unabhängige Sozialdemokratische Partei Deutschlands*); liberal party includes the German People's Party (*Deutsche Volkspartei*) and the German Democratic Party (*Deutsche Demokratische Partei*); conservative party (omitted category) includes the German National People's Party (*Deutschnationale Volkspartei*) and the Centre Party (*Zentrum*). All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio) and state fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

however. Only 37 women were elected to the National Assembly in total, limiting statistical power, and the sample split yields very unequal group sizes—just 16 observations for constituencies without a wartime suffragette club. We therefore treat these findings as suggestive rather than conclusive.

7.2 Female voters

We next examine the effect of missing men on women's active voting behaviour. Using gender-disaggregated election data from 53 locations covering elections between 1919 and 1930, we estimate the cross-sectional setup of equation 4 at the election level, with the female vote share as the outcome variable. As above, we use the continuous female-to-male ratio to maximise power in this small sample. All regressions include election fixed effects and baseline controls, as well as the male vote share to absorb variation in overall levels of political participation. Given that the gender-disaggregated voting data are available for only a small subset of Germany, these results should again be interpreted

as suggestive evidence.

Table 7: Missing men and the active right to vote: female turnout and vote share, 1919–1930

	(1)	(2)	(3)	(4)	(5)	(6)
	Turnout	Turnout: no post-war club	Turnout: post-war club	Left vote share	Liberal vote share	Conservative vote share
Change in female-to-male ratio	3.866	2.074	13.546*	7.361***	2.187***	−5.565**
	(3.701)	(4.602)	(7.959)	(1.962)	(0.791)	(2.041)
Male voting	1.195***	1.322***	1.049***	1.270***	1.250***	1.422***
	(0.069)	(0.071)	(0.110)	(0.074)	(0.059)	(0.019)
Industry structure	Yes	Yes	Yes	Yes	Yes	Yes
Age structure	Yes	Yes	Yes	Yes	Yes	Yes
Election FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.966	0.972	0.972	0.981	0.986	0.996
N	133	66	67	69	69	69

Notes: The table presents cross-sectional estimates from equation 4 for the female vote share in elections from 1919 to 1930, at the election level. Columns (1) to (3) show the effect of the change in the female-to-male sex ratio on female turnout, for all observations (column (1)) and separately for constituencies without (column (2)) and with (column (3)) a suffragette club during WWI. Columns (4) to (6) show the effect on the female vote share for left, liberal, and conservative parties, respectively. Left parties are defined as the Social Democrats (*Sozialdemokratische Partei Deutschlands*) and the Communist Party of Germany (*Kommunistische Partei Deutschlands*); liberal parties as the German People's Party (*Deutsche Volkspartei*) and the German Democratic Party (*Deutsche Demokratische Partei*); and conservative parties as the German National People's Party (*Deutschnationale Volkspartei*) and the Centre Party (*Zentrum*). All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio) and election fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table 7 shows that missing men had no effect on female turnout overall (columns (1) to (3)). However, splitting the sample by whether a county maintained a suffragette club during the war reveals important heterogeneity: in locations with continued demand for political representation, male absence is associated with higher female turnout. Specifically, a one-unit increase in the female-to-male ratio is associated with a 13.5 percentage point increase in female turnout in these constituencies, though the effect is only significant at the 10% level.

Columns (4) to (6) examine the female vote share by party orientation. Missing men shifted women towards the left and, to a lesser extent, liberal parties, at the expense of conservative parties. This is notable given that women voted more conservatively than men overall—a pattern also present in our sample (Figure A9). These findings suggest that male absence, and particularly the experience of agency during the war, may have shifted women's political preferences, narrowing the gender gap in voting behaviour.

Taken together, these results suggest that male absence during the war led to higher female political participation after the franchise was granted, both in terms of candidacy and voter turnout. The effects are particularly pronounced in areas that maintained a local suffragette club during the war, suggesting that women's organisation to demand

political representation had effects on women's political behaviour that extended beyond the war itself.

8 Conclusion

In this paper, we shift the perspective from why men extended political rights to women toward understanding what shaped women's own demand for political representation. We study the German suffrage movement during WWI, exploiting quasi-random variation in mass conscription to identify how male absence shaped women's willingness to keep fighting for the vote during a period of particularly high costs. To make demand for political representation directly measurable, we construct a newly digitised dataset on the universe of local suffragette clubs across Germany between 1912 and 1918. Club presence constitutes a revealed-preference measure of demand: Maintaining a club was a costly endeavour, especially during wartime when the *Burgfrieden* placed political activism under considerable social and political pressure.

Our main findings show that women in counties with the largest male absence were 3.8 percentage points—37% of the baseline—more likely to keep their suffragette club open during the war. This effect is not a general collective-action response to disruption. We find no analogous effect for local chapters of charitable or professional women's organisations. Rather, the effect is driven entirely by counties with a chapter of the NFD, where women publicly led war relief efforts and took on visible leadership roles. This points to increased agency—and in particular, women's experience in public leadership positions—as the central mechanism, rather than economic need arising from wartime hardship.

Male absence during the war had lasting consequences. After the franchise was extended in November 1918, women in counties with greater wartime male absence were more likely to run as candidates in the first Weimar Republic elections. Voter turnout among women was also higher in these counties, particularly in areas with a wartime suffragette club, indicating that the demand for political representation cultivated during the war persisted beyond the extension of the franchise. Moreover, the gender gap in conservative voting was smaller in counties with greater male absence, suggesting that women's political preferences may have shifted due to their wartime experiences.

Our findings carry implications beyond the historical setting. Women's under-representation in leadership today is partly attributed to lower demand for representation among women themselves—their lower propensity to apply or run for office. Our results suggest that agency, and especially experience in public leadership roles, may contribute to expanding this demand. Our findings operate even under conditions highly unfavourable to activism, making it particularly relevant as conditions for women's rights and DEI face renewed resistance in many countries today.

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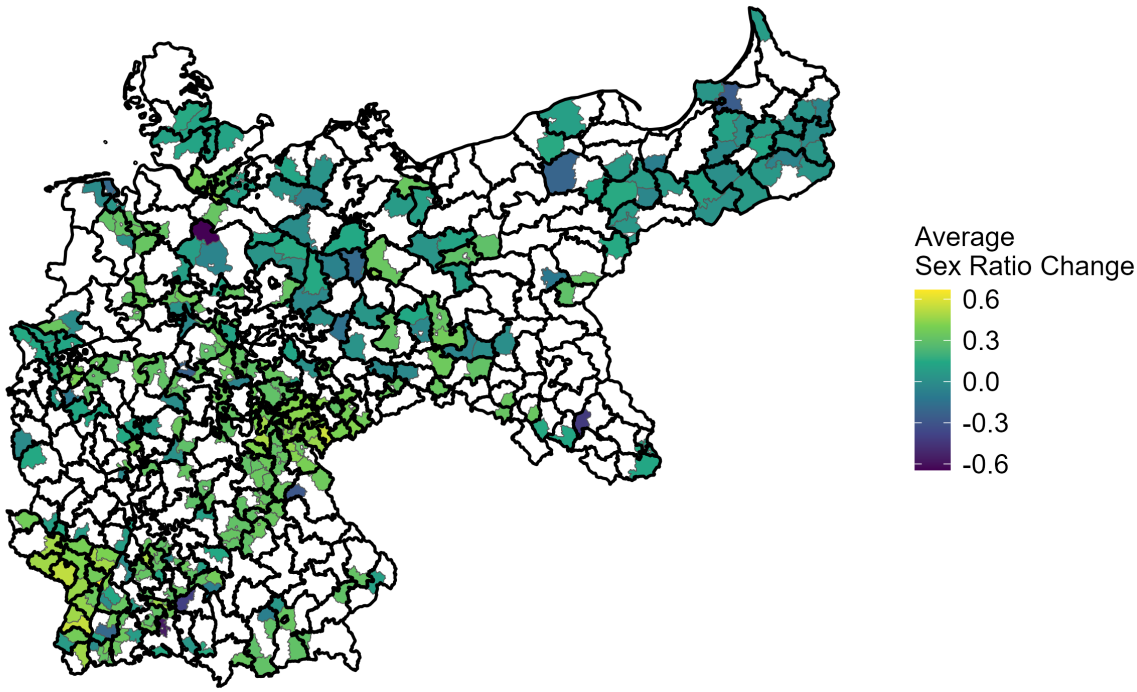
Online appendix A: Supplementary figures and tables

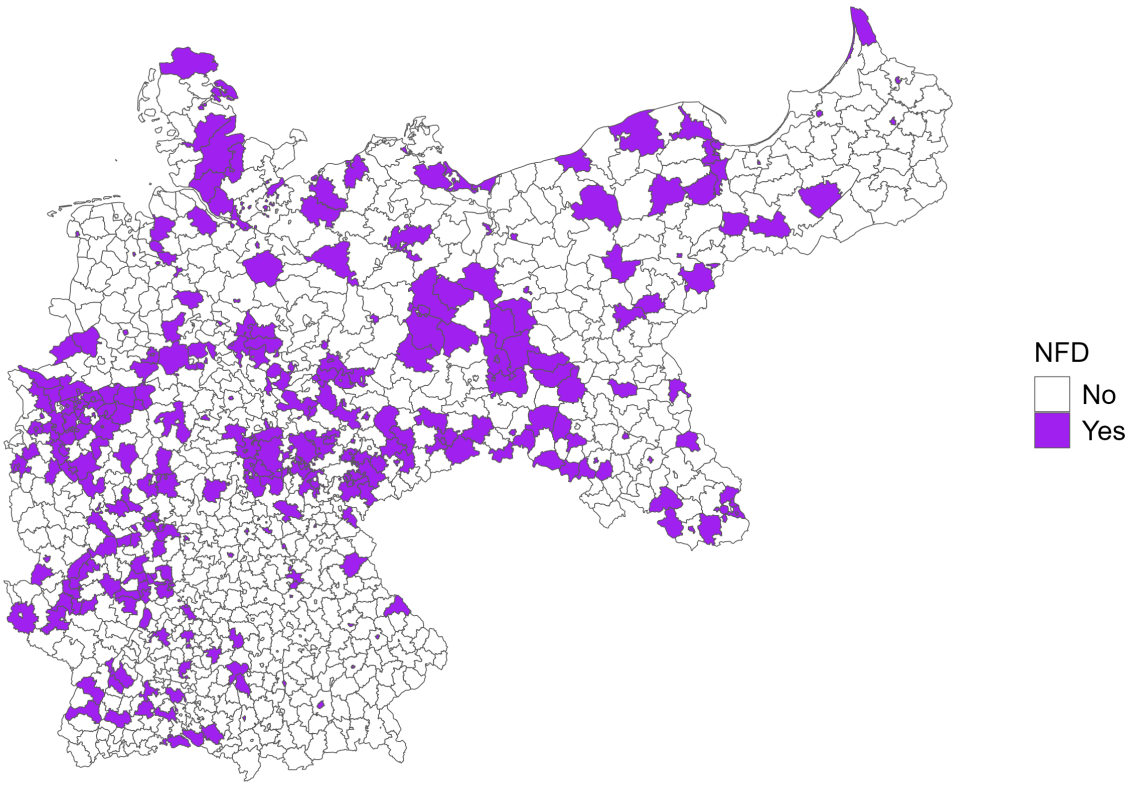
Figure A1: Change in the female-to-male sex ratio across German counties, 1910–1916: border discontinuity sample



Notes: The map shows the change in the female-to-male sex ratio between 1910 and 1916 for the border discontinuity sample, using 1907 county borders. The sample is restricted to neighbouring counties on opposite sides of a recruitment area (*Landwehrbezirke*) border, retaining only county pairs sharing a border of at least 2km. Bold black lines denote recruitment area borders.

Source: Own illustration based on Kaiserliches Statistisches Amt (1915); Kriegsernährungsamt (1916); Reichsamt des Innern (1914-b). Geospatial shapefiles from MPIDR (2011).

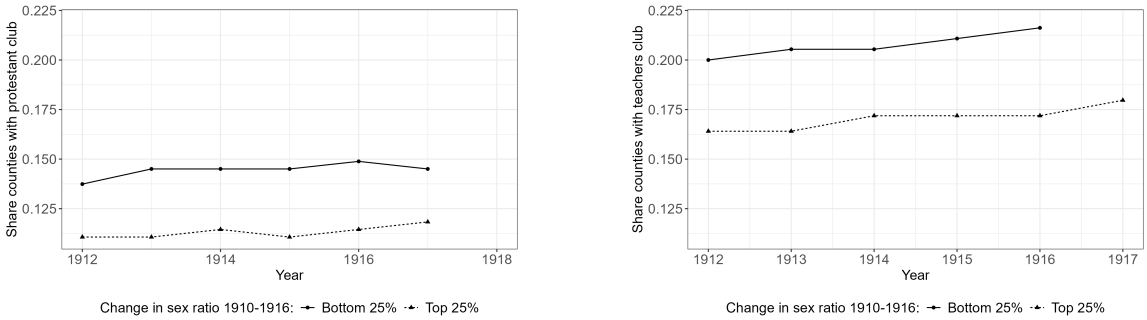
Figure A2: Presence of the National Women's Service across German counties, 1916



Notes: The map shows whether a German county had at least one chapter of the National Women's Service [German: *Nationaler Frauendienst*] (NFD) in 1916, using 1907 county borders.

Source: Own illustration based on Bund Deutscher Frauenvereine (1912–1918). Geospatial shapefiles from MPIDR (2011).

Figure A3: Evolution of other women's club presence by sex ratio change, 1912–1918

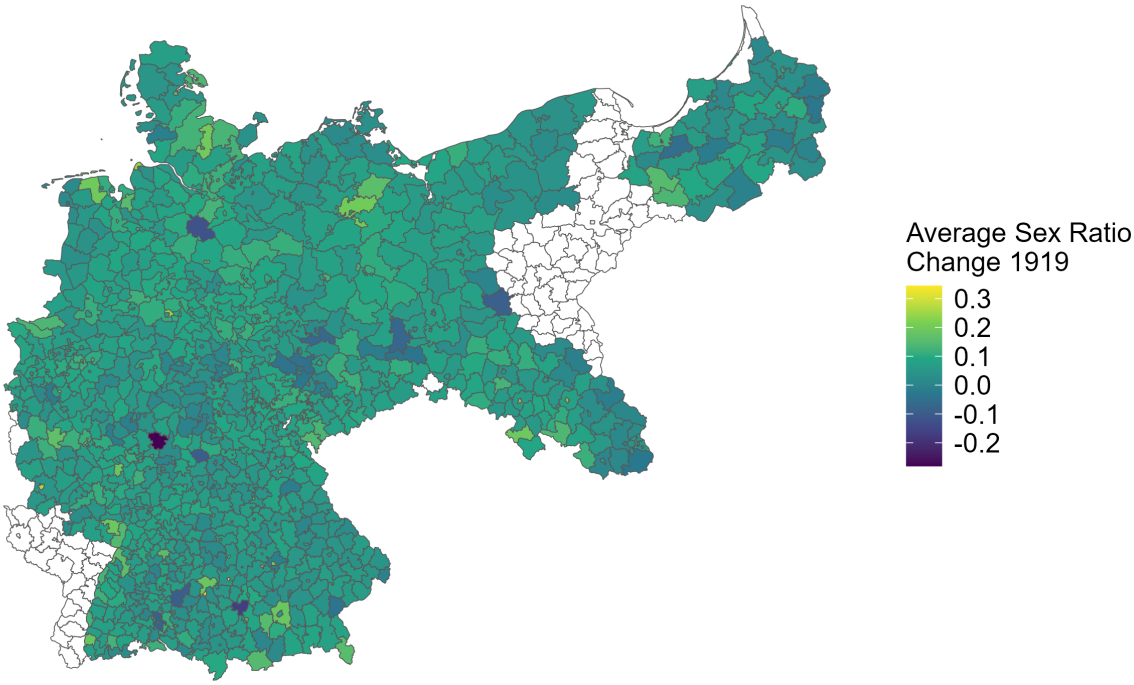


(a) Local DEF chapter **(b)** Local ADLV chapter

Notes: The figure shows the evolution of the share of counties with a women's club for counties that experienced the smallest increase in the female-to-male sex ratio between 1910 and 1916 (bottom 25% of the distribution, solid line) and those that experienced the largest increase (top 25%, dashed line). Part (a) shows the evolution for the German Protestant Women's Association (DEF) and Part (b) for the General German Women Teachers' Association (ADLV).

Source: Own illustration. See Table 1 for data sources.

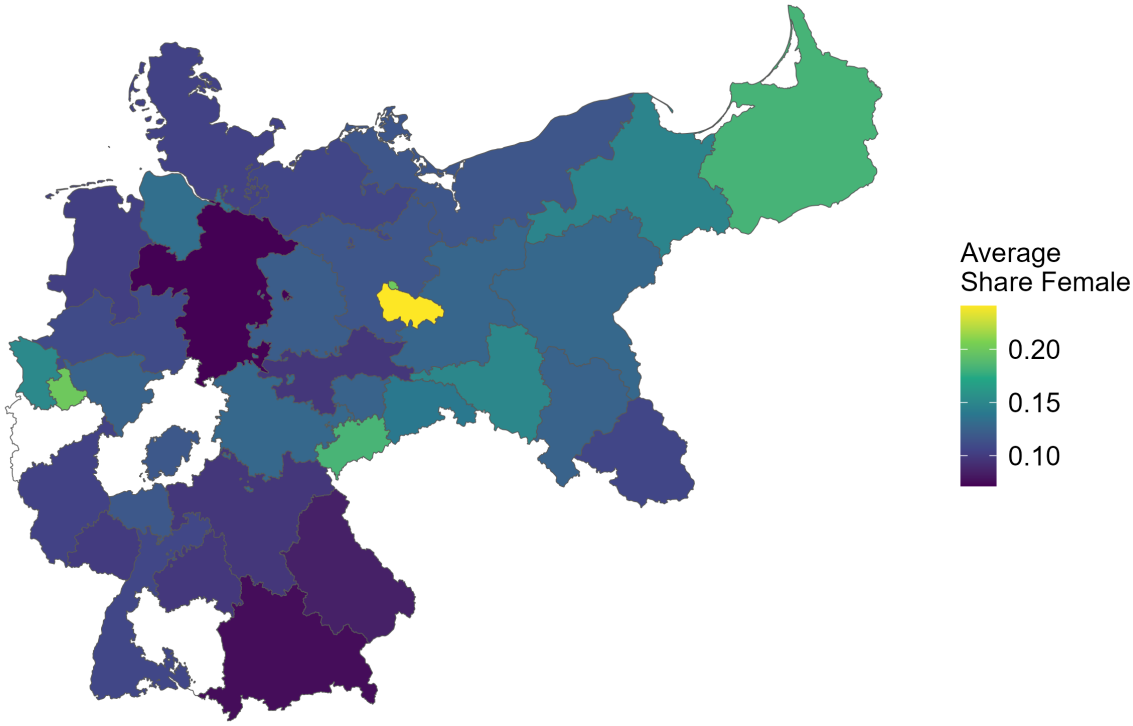
Figure A4: Long-run change in the female-to-male sex ratio across German counties, 1910–1919



Notes: The map shows the change in the female-to-male sex ratio between 1910 and 1919 for German counties within German borders as of 1919, using 1907 county borders.

Source: Own illustration based on Kaiserliches Statistisches Amt (1915); Statistisches Reichsamt (1920). Geospatial shapefiles from MPIDR (2011).

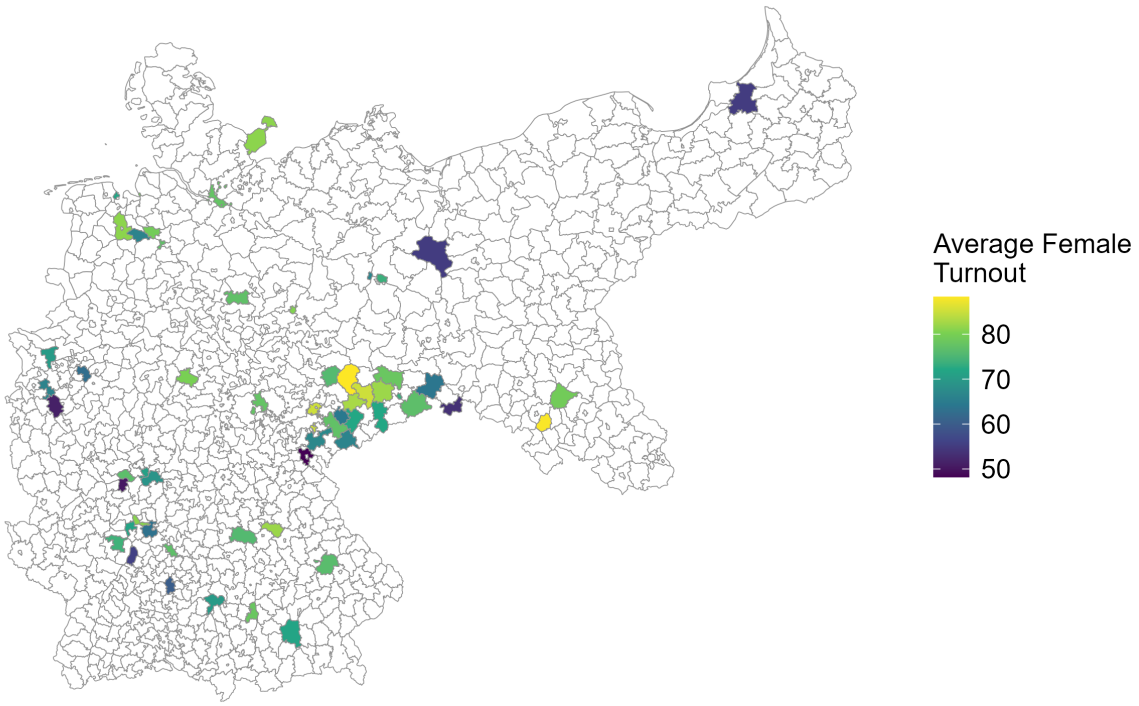
Figure A5: Female candidates across Germans constituencies, 1919 National Assembly election



Notes: The map shows the average share of women among candidates on the party list for each constituency in the 1919 National Assembly election, using 1907 county borders. White areas indicate missing data.

Source: Own illustration based on Reichsamt des Innern (1919-a). Geospatial shapefiles from MPIDR (2011).

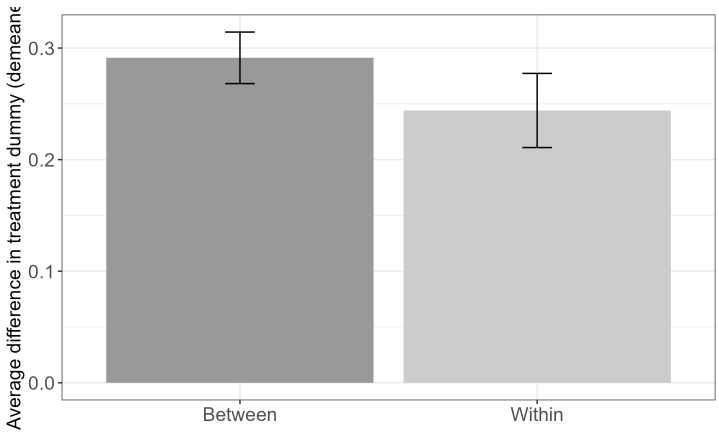
Figure A6: Female turnout across German counties, 1919–1930



Notes: The map shows average female turnout across elections from 1919 to 1930 with gender-disaggregated turnout data, using 1907 county borders.

Source: Own illustration based on Bremme (1956). Geospatial shapefiles from MPIDR (2011).

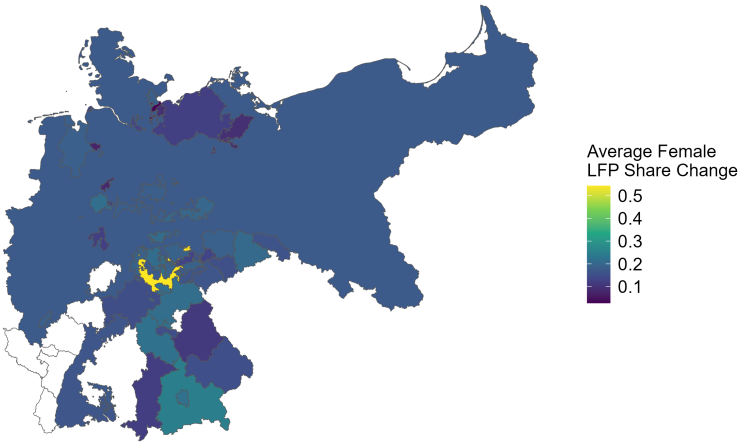
Figure A7: Treatment variation within and between recruitment area borders



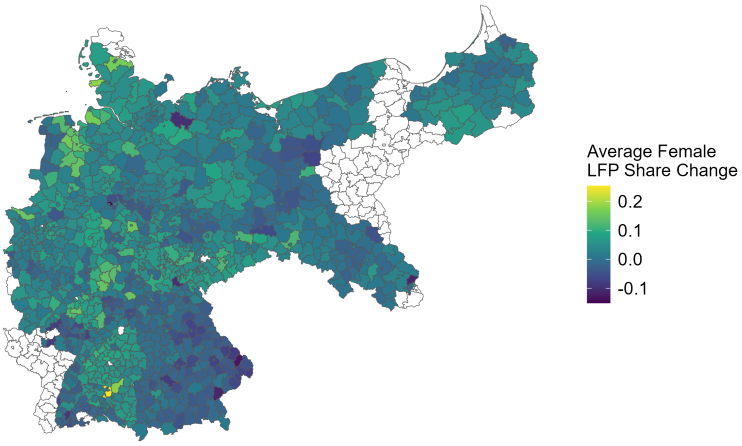
Notes: The figure illustrates treatment variation within and across recruitment area borders. Bars show the average difference in the treatment indicator between neighbouring county pairs sharing a border of at least 2km, retaining only the county pair with the longest shared border where multiple neighbours exist. The treatment indicator is constructed from the female-to-male sex ratio change between 1910 and 1916, residualised on the share of men employed in industry and the military in 1907 and the share of men aged 12–18 in 1910, with counties in the top 25% of the residualised distribution assigned to treatment (one) and those in the bottom 25% to control (zero). The dark grey bar shows the average difference for county pairs on opposite sides of a recruitment area border; the light grey bar shows the average difference for county pairs within the same recruitment area.

Source: Own illustration based on Kaiserliches Statistisches Amt (1915); Kriegsernährungsamt (1916); Reichsamt des Innern (1914-b)

Figure A8: Change in female employment share across German regions and counties



(a) Change in female employment share 1913–1918

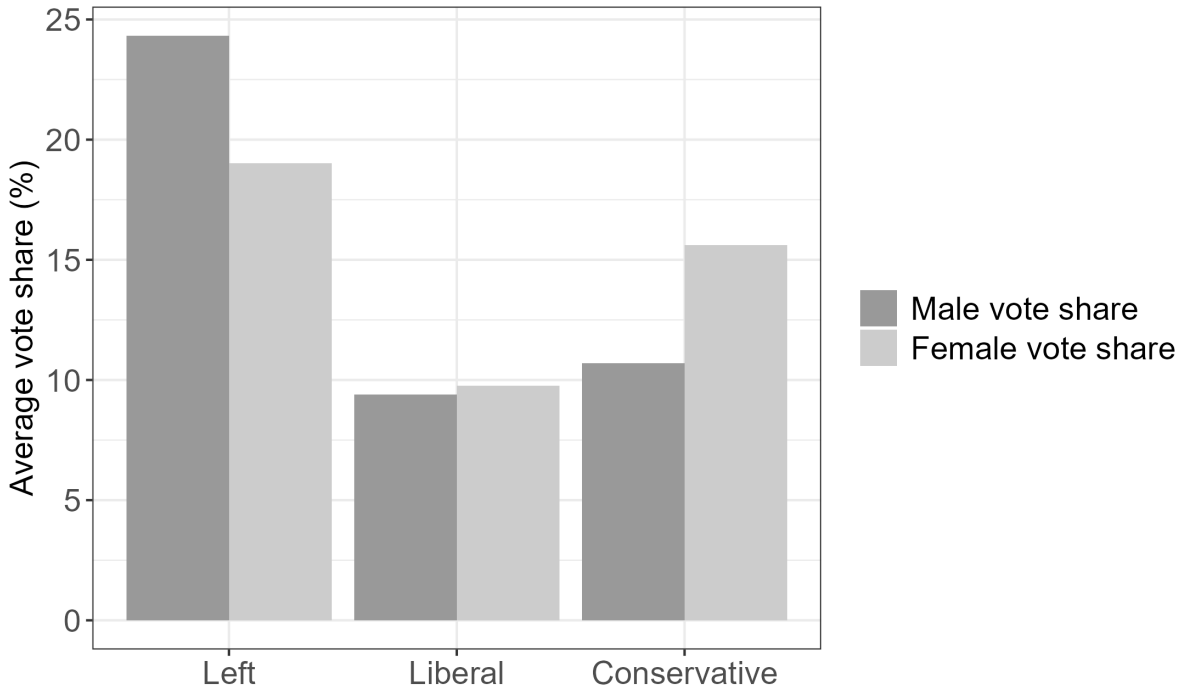


(b) Change in female employment share 1907–1925

Notes: The map shows the change in the female employment share across two alternative periods and geographic units. Part (a) shows the change in the share of female workers in total employment between 1913 and 1918, based on firms with at least 10 employees, across German regions. Part (b) shows the change in the share of full-time female workers between 1907 and 1925 across German counties. Both parts use 1907 borders.

Source: Own illustration based on Reichsamt des Innern (1914-a) and Reichsamt des Innern (1919-b) for part (a); Kaiserliches Statistisches Amt (1910) and Inter-University Consortium For Political And Social Research (2005) for part (b). Geospatial shapefiles from MPIDR (2011).

Figure A9: Average vote shares by party orientation and gender, 1919–1930



Notes: The figure shows the average vote shares for left, liberal, and conservative parties in elections from 1919 to 1930 with gender- and party-disaggregated vote data, separately for men (dark grey) and women (light grey). Left parties are defined as the Social Democrats (*Sozialdemokratische Partei Deutschlands*) and the Communist Party of Germany (*Kommunistische Partei Deutschlands*); liberal parties as the German People's Party (*Deutsche Volkspartei*) and the German Democratic Party (*Deutsche Demokratische Partei*); and conservative parties as the German National People's Party (*Deutschnationale Volkspartei*) and the Centre Party (*Zentrum*).

Source: Own illustration based on Bremme (1956).

Table A1: Balance check: pre-war characteristics by treatment status

	(1) Bottom 25%	(2) Top 25%	(3) Difference	(4) p-value	
Change in female-to-male ratio	0.036 (0.120)	0.357 (0.069)	0.321	0.000	***
Any clubs before the war	0.156 (0.364)	0.103 (0.305)	-0.053	0.069	*
Any DEF clubs before the war	0.149 (0.357)	0.115 (0.319)	-0.034	0.246	
Any ADLV clubs before the war	0.211 (0.409)	0.164 (0.372)	-0.047	0.295	
Female-to-male ratio before the war	1.004 (0.076)	1.041 (0.070)	0.037	0.000	***
Share of men employed in industry	0.375 (0.158)	0.451 (0.164)	0.076	0.000	***
Share of men employed in military	0.071 (0.091)	0.015 (0.042)	-0.056	0.000	***
Male share 12 to 18	0.128 (0.015)	0.126 (0.013)	-0.002	0.093	*
Urban population share 1900	0.526 (0.339)	0.415 (0.311)	-0.111	0.000	***
Lutheran population share in 1900	0.607 (0.378)	0.619 (0.377)	0.012	0.716	
Share foreign population in 1900	0.098 (0.212)	0.027 (0.110)	-0.071	0.000	***
Group size	262	262			

Notes: The table presents a balance check for the baseline treatment and control groups. Columns (1) and (2) show the mean and standard deviation (in parentheses) of the change in the female-to-male sex ratio and pre-war county characteristics for counties in the bottom 25% (least change, control) and top 25% (largest increase, treated) of the female-to-male sex ratio change between 1910 and 1916, respectively. Column (3) shows the difference in means and column (4) the associated p-value. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A2: Balance check: pre-war characteristics by pre-war suffragette club presence

	(1) No pre-war club	(2) Pre-war club	(3) Difference	(4) p-value	
Change in female-to-male ratio	0.216 (0.134)	0.203 (0.160)	-0.013	0.409	
Any DEF clubs before the war	0.090 (0.287)	0.389 (0.490)	0.298	0.000	***
Any ADLV clubs before the war	0.092 (0.289)	0.585 (0.497)	0.493	0.000	***
Female-to-male ratio before the war	1.025 (0.066)	1.034 (0.087)	0.009	0.292	
Share of men employed in industry	0.379 (0.166)	0.476 (0.125)	0.097	0.000	***
Share of men employed in military	0.023 (0.056)	0.056 (0.069)	0.033	0.000	***
Male share 12 to 18	0.130 (0.013)	0.118 (0.013)	-0.012	0.000	***
Urban population share 1900	0.368 (0.289)	0.753 (0.283)	0.385	0.000	***
Lutheran population share in 1900	0.565 (0.392)	0.610 (0.322)	0.045	0.187	
Share foreign population in 1900	0.074 (0.197)	0.041 (0.116)	-0.033	0.011	**
Group size	940	108			

Notes: The table presents a balance check for counties with and without a pre-war suffragette club. Columns (1) and (2) show the mean and standard deviation (in parentheses) of the change in the female-to-male sex ratio and pre-war county characteristics for counties without (column (1)) and with (column (2)) a suffragette club before the war, respectively. Column (3) shows the difference in means and column (4) the associated p-value. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A3: Balance check: pre-war characteristics by availability of turnout data

	(1) No turnout data	(2) Turnout data	(3) Difference	(4) p-value	
Change in female-to-male ratio	0.214 (0.136)	0.221 (0.155)	0.006	0.746	
Any clubs before the war	0.087 (0.282)	0.319 (0.470)	0.232	0.000	***
Any DEF clubs before the war	0.109 (0.311)	0.292 (0.458)	0.183	0.001	***
Any ADLV clubs before the war	0.126 (0.332)	0.452 (0.506)	0.325	0.001	***
Female-to-male ratio before the war	1.025 (0.068)	1.037 (0.068)	0.011	0.182	
Share of men employed in industry	0.379 (0.162)	0.529 (0.136)	0.150	0.000	***
Share of men employed in military	0.025 (0.059)	0.039 (0.052)	0.013	0.042	**
Male share 12 to 18	0.130 (0.013)	0.121 (0.013)	-0.009	0.000	***
Urban population share 1900	0.383 (0.300)	0.719 (0.286)	0.335	0.000	***
Lutheran population share in 1900	0.556 (0.389)	0.737 (0.288)	0.180	0.000	***
Share foreign population in 1900	0.076 (0.197)	0.011 (0.023)	-0.064	0.000	***
Group size	976	72			

Notes: The table presents a sample selection check for the turnout sample. Columns (1) and (2) show the mean and standard deviation (in parentheses) of the change in the female-to-male sex ratio and pre-war county characteristics for counties without (column (1)) and with (column (2)) gender-disaggregated turnout data, respectively. Column (3) shows the difference in means and column (4) the associated p-value. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A4: The effect of missing men on suffragette clubs: robustness to cut-off choice

	(1)	(2)	(3)	(4)	(5)
	10%	20%	30%	40%	50%
Top sex ratio change × post	0.068**	0.027	0.031**	0.030***	0.017*
	(0.030)	(0.018)	(0.014)	(0.011)	(0.010)
Controls × year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.895	0.891	0.899	0.897	0.893
N	1407	2842	4284	5691	7112

Notes: The table examines the robustness of the baseline DiD estimates of β from equation 2 to alternative percentile cut-offs for the treatment and control groups, comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (treated) to those with the smallest increase (control). Cut-offs vary incrementally across columns: column (1) uses the top and bottom 10%, and column (5) uses the top and bottom 50%. All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A5: The effect of missing men on suffragette clubs: robustness to outcome definition

	(1)	(2)	(3)	(4)
	Baseline	Only local chapters	Number clubs	Number local chapters
Top 25% sex ratio change × post	0.038**	0.033**	0.058**	0.042**
	(0.016)	(0.017)	(0.025)	(0.019)
Controls × year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.893	0.874	0.895	0.879
N	3549	3549	3549	3549

Notes: The table presents DiD estimates of β from equation 2 for alternative outcome definitions. Column (1) reproduces the baseline estimate from Table 2, column (2), comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (2) uses a binary indicator for the presence of local chapters only, excluding higher-level clubs. Columns (3) and (4) repeat columns (1) and (2) using the number of clubs rather than a binary presence indicator. All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A6: The effect of missing men on suffragette clubs: robustness to standard error choice

	(1) Recruitment area	(2) County	(3) Two-way	(4) Conley (100km)
Top 25% sex ratio change × post	0.038**	0.038**	0.038***	0.038**
	(0.016)	(0.017)	(0.014)	(0.018)
Controls × year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R^2	0.893	0.893	0.893	0.893
N	3549	3549	3549	3549

Notes: The table examines the robustness of the baseline DiD estimates of β from equation 2 to alternative standard error choices, comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Column (1) reproduces the baseline estimates from Table 2, column (2), with standard errors clustered at the recruitment area level. Column (2) uses standard errors clustered at the county level. Column (3) employs two-way clustered standard errors at the county and year level. Column (4) reports Conley and Kelly (2025) standard errors with a 100km cut-off. All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A7: The effect of missing men on suffragette clubs: cross-sectional estimates

	(1) Pre-war clubs and sex ratio	(2) Industry and age structure	(3) Population controls	(4) DiD sample
Change in female-to-male ratio	0.090**	0.083*	0.097**	0.124**
	(0.038)	(0.043)	(0.044)	(0.052)
Pre-war sex ratio	0.058	0.235**	0.123	−0.027
	(0.105)	(0.116)	(0.099)	(0.121)
Any suffragette clubs pre-war	0.679***	0.643***	0.642***	0.616***
	(0.047)	(0.049)	(0.052)	(0.068)
Industry structure	No	Yes	Yes	Yes
Age structure	No	Yes	Yes	Yes
Population controls	No	No	Yes	Yes
State FE	Yes	Yes	Yes	Yes
R^2	0.634	0.643	0.646	0.671
N	1048	1048	1016	507

Notes: The table presents cross-sectional estimates from equation 4. The dependent variable is a binary indicator for the presence of a local suffragette club in 1918. The main explanatory variable is the change in the female-to-male sex ratio between 1910 and 1916. Column (1) controls for pre-war suffragette club presence and the pre-war sex ratio. Column (2) additionally controls for the share of men employed in industry and the military in 1907 and the share of men aged 12–18 in 1910. Column (3) further adds the share of urban population, the share of Protestants, and the share of foreign population in 1900. Column (4) restricts the sample to counties used in the DiD analysis in Table 2. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A8: The effect of missing men on suffragette clubs: heterogeneity by change in female employment share

	(1)	(2)	(3)	(4)	(5)	(6)
	Female employment changes between					
	1913–1918			1907–1925		
	Baseline	Low FLP change	High FLP change	Baseline	Low FLP change	High FLP change
Top 25% sex ratio change × post	0.028*	0.012	0.030*	0.022	0.009	0.040
	(0.017)	(0.049)	(0.017)	(0.017)	(0.026)	(0.026)
Controls × year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.869	0.901	0.866	0.879	0.863	0.895
N	3840	792	3048	3648	1728	1920

Notes: The table presents the underlying regression estimates for Figure 6. Columns (1) and (4) reproduce the baseline DiD estimates of β from equation 2 for the subsample of counties with available employment data. Columns (2), (3), (5), and (6) compare the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control), estimated separately for counties above and below the median change in female employment share, for the change in female employment share measured between 1913 and 1918 (columns (2) and (3)) and between 1907 and 1925 (columns (5) and (6)). All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level; for regressions using 1913–1918 employment data, standard errors are additionally clustered at the regional level to account for the regional observation level of the employment data. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Table A9: The effect of missing men on suffragette clubs: heterogeneity by National Women's Service presence

	(1) Baseline	(2) Without NFD	(3) With NFD
Top 25% sex ratio change × post	0.038**	0.004	0.124***
	(0.016)	(0.010)	(0.047)
Controls × year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R^2	0.893	0.874	0.891
N	3549	2387	1162

Notes: The table presents the underlying regression estimates for Figure 7, comparing the presence of suffragette clubs (binary) in counties with the largest increase in the female-to-male sex ratio between 1910 and 1916 (top 25%, treated) to those with the smallest increase (bottom 25%, control). Estimates are shown for three groups: all counties (pooled, column (1)), counties without a local National Women's Service [German: *Nationaler Frauendienst*] (NFD) chapter (column (2)), and counties with one (column (3)). All columns include baseline controls (share of men employed in industry and the military in 1907, share of men aged 12–18 in 1910, pre-war club presence, pre-war sex ratio, share of urban population, share of Protestants, and share of foreign population in 1900), all interacted with year fixed effects. Standard errors are clustered at the recruitment area level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: See Table 1.

Online appendix B: Bounding the cross-sectional analysis

We follow the bounding approach by Oster (2019) to gauge to what extent unobserved confounding factors could reduce or increase the estimated effects of missing men on local suffragette clubs during WWI, assuming strong unobservable and non-random determinants of sex ratio changes. The approach estimates bounds from the difference between the effect when estimated unconditionally ($\dot{\beta}$) to the estimate obtained when conditioning ($\widetilde{\beta}$) on observed characteristics, i.e. 0.024 when only using state fixed effects (FEs) (column (1) of Table B1) and 0.094 when including the full set of controls (column (3) in Table A7 in the main text, displayed again for convenience in column (2) of Table B1). This difference is scaled by movements in the associated R^2 values.

Oster (2019) suggests a simplified formula to compute approximate bounds β^* around the conditional estimate of the effect of missing men $\widetilde{\beta}$ as follows:

$$\beta^* \approx \widetilde{\beta} - d\left(\dot{\beta} - \widetilde{\beta}\right)\frac{R^{max} - \widetilde{R}}{\widetilde{R} - \dot{R}}, \tag{B1}$$

where $\dot{R}$ and $\widetilde{R}$ denote the R^2 from the unconditional and conditional regression (i.e. 0.092 vs. 0.716). R^{max} is set by the researcher and determines to what extent observed and unobserved factors combined can explain the overall variation in the likelihood to keep a suffragette club open during the war. We set a value of $R^{max} = 1.3\widetilde{R}$ as suggested by Oster (2019) who argues that with a higher R^{max} estimates in more than 10% of cases in a set of well-published Randomised Control Studies would appear unstable (null effect cannot be rejected or bound outside the 99.5% confidence interval).

The parameter d governs the degree of proportionality of selection on observables to selection on unobservables and is set by the researcher. Values of 1 and -1 compute bounds for scenarios in which selection on unobservables is as strong as selection on observables and operates in the same or opposite direction as selection on observables. In our case this means that we compute bounds for omitted local variables that are correlated both with missing men and the local presence of a suffragette club and which determine suffragette club presence during the war to the same extent as our extensive set of controls, including pre-war club presence, sex ratio prior to the war and pre-war industry and age structure. Thus, a choice of $d = 1$ is a conservative assumption in our setting.

Columns (3) and (4) of Table B1 present the results of the bounding analysis based on such a choice of $d = 1$ and $d = -1$, respectively. The estimated bounds are sizeable in magnitude. Even the lower bound estimate of 0.06 indicates that a mean sex ratio change of 0.215 results in a 1.3 percentage point higher likelihood of having a local suffragette club open during the war (13% of the baseline probability). This holds under conservative assumptions on unobserved non-random determinants of sex ratio changes, specifically that they are of the same magnitude as observables but work in the opposite direction. Thus, we can rule out that plausible values of non-random determinants of sex ratio changes fully drive our main results.

Table B1: Coefficient bounds under unobserved non-random sex ratio changes

	(1) Restricted model	(2) Controlled model	(3) Bound for $d = 1$	(4) Bound for $d = -1$
Estimate	0.024	0.094	0.141	0.06
95% CI	(-0.110, 0.157)	(0.010, 0.178)		
R^2	[0.092]	[0.716]		

Notes: The table reports coefficient stability tests following Oster (2019). Columns (1) and (2) show the coefficient estimate and 95% confidence interval on the change in the female-to-male sex ratio between 1910 and 1916 from the cross-sectional regression in equation 4, along with the associated R-squared. The dependent variable is the presence of a suffragette club during WWI. Column (1) controls for state fixed effects only. Column (2) additionally includes controls for the share of men employed in industry and the military in 1907, the share of men aged 12–18 in 1910, the share of urban population, the share of Protestants, and the share of foreign population in 1900, as in column (3) of Table A7. Columns (3) and (4) report the upper and lower bounds of the effect of missing men, assuming a maximum R-squared of $R^{max} = 1.3\widetilde{R}$ and assuming selection on unobservables is in the same direction as selection on observables (column (3)) and in the opposite direction (column (4)). Confidence intervals are based on standard errors clustered at the recruitment area level.

Source: See Table 1.