

The Conscription of Wealth:
Mass Warfare and the Demand for Progressive Taxation¹

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Abstract

The dominant narrative of the politics of redistribution in political science and economics highlights the signature role of the rise of electoral democracy and the development of political parties that mobilize working class groups. We argue in this paper that this narrative ignores the substantial international origins of the development of redistributive public policies. Focusing attention on the determinants of progressive taxation, we suggest that mobilization for mass warfare changed public attitudes about taxation, and in particular about the fair burden that should be borne by high income groups. We then show empirically that over the last century mass mobilization for war has been associated with a notable increase in tax progressivity. In the absence of war neither the establishment of universal suffrage, nor the arrival of political control by parties of the Left is systematically associated with large increases in tax progressivity. In making these arguments we devote particular attention to a "difference-in-differences" comparison of participants and non-participants in World War I.

Those who have made fortunes out of the war must pay for the war; and Labour will insist upon heavily graduated direct taxation with a raising of the exemption limit. That is what Labour means by the Conscription of Wealth (Labour Party Manifesto, 1918).¹

1 Introduction

For well over a century, debates about redistribution have focused, among other issues, on the question of progressive taxation. Should individuals pay a tax proportional to their income, or should the rate of taxation actually increase with income, and by how much? Normative discussions have focussed on the trade-off between the benefits of progressive taxation in terms of minimizing sacrifice and reducing income disparities—to the extent this is seen as desirable—while also considering the associated costs involving altered labor supply and investment incentives. But precisely because choices about progressive taxation can have major distributional implications, it also makes sense to ask what conditions in practice lead actual governments to adopt tax policies in which the rich pay a higher percentage of their income when compared with other groups.

One common, and very plausible, response to this question is to suggest that the rise of progressive taxation has depended on the development of electoral democracy characterized by universal suffrage, as well as on the presence of political parties that mobilize lower income groups.² This account has dominated political science and economics scholarship on the development of progressive taxation and redistributive policies more generally. We argue in this paper that this narrative ignores the substantial international origins of the development of redistributive public policies. Specifically, we suggest that mobilization for mass warfare shifted public attitudes in favor of progressive taxation and led to the adoption of more progressive tax policies.

To support our argument and to test the alternatives we use evidence on top rates of income tax across countries, relying in particular on a comparison of participants and non-

¹For the full manifesto see Dale (2000 p.16).

²A prediction which could be derived from the conclusions of Acemoglu and Robinson (2000) and Boix (2003), as well as from the historical analysis of Lindert (2004).

participants in World War I. We focus on the top rates of income taxation because these taxes are a central factor in overall redistributive policy, particularly in the late 19th and early 20th century when spending policies were of much smaller magnitude than in the contemporary period. While we evaluate our argument using data covering more than a century of policymaking, our focus on World War I is due to the fact that it allows for a compelling estimate of the causal effect of mass mobilization employing a difference-in-differences comparison. This analysis of top rates is supplemented by evidence on the slope of income tax schedules, as well as by statements from observers and participants at the time. Our empirical results show that mass mobilization for war has been very closely correlated with the adoption of more progressive income tax policies. In the absence of war, we find significantly less evidence that the presence of either universal suffrage and free elections or the presence of parties of the left in a legislature made a difference for tax progressivity. We also argue that our evidence does not fit with a simple argument that governments during wartime needed money, and that they found it optimal to raise a disproportionate share of war revenues by taxing the rich. Our findings suggest a new way in which international events shape domestic politics, and they have two significant implications. They suggest first that the rise of progressive taxation may not have occurred without war. They suggest second that democracy on its own may be insufficient to generate redistribution without changes in attitudes about the fairness of different tax burdens.

Why would mobilization for war be associated with a shift in public attitudes towards progressive taxation? Our argument focuses on demands for progressive taxation as a means of ensuring equal sacrifice in the war effort. It is a characteristic of modern mass warfare that very large numbers of individuals make a sacrifice of time, foregone income, and potentially their lives for a collective cause. In many cases individuals make this sacrifice voluntarily, but the institution of conscription also raises the possibility that individuals can be compelled to sacrifice themselves for a collective objective even if the private return they receive from doing so is sufficiently low that they would choose otherwise. At the same time, outside the context of a command economy, sustaining a war effort also requires the continuing mobilization of

capital for normal economic production, and capital will only be supplied if its holders receive a sufficient private return from doing so. John Hicks (1942) emphasized that this creates the potential for a sense of unfairness to emerge if some individuals sacrifice themselves at the front as others remain home and potentially even earn profits out of the war. Hicks then suggested that this sense of unfairness could lead to demands for increased taxation of high incomes and accumulated wealth. The Labour Party manifesto of 1918 provides one example of such demands.

The core prediction we derive from our argument is that mass mobilization for war (and we will offer several operational definitions of mass mobilization) will be associated with a shift towards greater progressivity in a country's income tax schedule. Given the mechanisms we propose, we should expect to observe a particularly marked increase in tax rates for individuals near the top of the income distribution. In addition to observing this change in tax progressivity, if our argument is accurate we should also expect to observe evidence from political debates and individuals attitudes consistent with the mechanism we propose. Though we are limited in what we can present in the space of one paper, we will offer some additional qualitative and survey evidence to support our proposed interpretation. We present four types of empirical evidence in the paper.

First, we discuss the historical context for the development of income taxation. This shows that while by 1914 the income tax was established in many countries, and many observers saw it as the wave of the future, at this stage in time top marginal rates of income tax universally remained extremely low (often in the single digits). The year 1914 proved to be a watershed in countries that underwent mass mobilization for the war. It proved to be a break point in terms of policies, as top tax rates in countries participating in the war rose dramatically to levels that seemed beyond the realm of imagination in 1914. It also proved to be a turning point in other terms, as debates about the appropriate levels of taxation on top incomes became inextricably linked with debates about burden sharing during wartime. Interestingly, we observe that taxes became more progressive and the terms of the debate changed even in war participants where parties from the right of the political spectrum held

power. France provides one illustration of this phenomenon. When we look at countries such as the Netherlands and Sweden that did not participate in the war, we observe trends also seen in war participants, including debates about expansion of the suffrage and the development of parties of the left. Interestingly, however, in these countries there was no sharp break either in top income tax rates or, equally importantly, in the political debate about income taxation. The work of Sven Steinmo (2003, 1993) has been important in identifying the divergence between the Swedish, British, and American tax systems at this time. The empirical evidence we present in this paper suggests that this divergence was actually a more general phenomenon.

In addition to the qualitative evidence, we also make use of time-series data on top marginal rates of income tax to examine systematically whether war mobilization made a difference for progressive taxation. The bulk of the tax rate data, which covers eight countries, has been collected by authors involved in the project on top incomes over the twentieth century.³ Top marginal tax rates are only a proxy for progressivity, but they are available at annual frequencies. It is also inherently interesting to identify the factors that may prompt a society to tax its richest members heavily. We devote particular attention to a difference-in-differences comparison involving World War I. Since four of the eight countries were significant participants in World War I and four were not, we can conduct an analysis where the counterfactual for countries that mass mobilized for World War I is provided both by their own experience prior to the war and by the experience of other countries that did not mass mobilize for the war.⁴ Using this compelling identification strategy we conclude that there was a very significant causal effect of war mobilization on top tax rates while there is much less evidence that either universal suffrage or strong representation of the left were sufficient conditions for tax progressivity to dramatically increase. We do not interpret this as meaning that partisanship did not matter. Our country qualitative evidence certainly

³See the edited volume by Atkinson and Piketty (2007). A full detailing of rates, sources, and computations is presented in the appendix to this paper.

⁴Another benefit of the focus on World War I is that since it is known that redistributive spending through welfare state programs was limited at this time compared to the post-1945 period (see Lindert 2004), we are less subject to the problem that an absence of progressivity in taxation may have been compensated by progressivity in transfers.

suggests that those on the left pushed more heavily for high top tax rates than did those on the right. What it does suggest though is that if left and right had different levels of enthusiasm for progressivity, governments of both types felt compelled to tilt policies in this direction. These data provide one strategy for investigating whether the war effect on top tax rates is simply a function of governments needing money. We add to our specifications a measure of the magnitude of government revenues relative to the economy and find that although there is some evidence that governments were more likely to tax progressively as they collected more revenue, this effect does not significantly attenuate the estimates for the impact of war mobilization. Finally, we also obtain very similar results when conducting tests on individual country series, as well as tests on a longer time period 1850-1970.

As a third step in our empirical inquiry, we consider the direct evidence that is available on the extent to which taxation became more progressive in countries that participated in World War I and whether similar developments occurred in non-participants. This evidence serves to verify whether our tests using the top marginal tax rate are simply showing a general tax increase in war participants, as opposed to an increase in progressivity. The evidence strongly supports the latter interpretation. It also sheds further insights on the argument that increases in top income tax rates were a logical choice made by cash strapped governments. If governments were seeking to use the income tax to raise the maximum amount of revenue at the minimum cost in terms of collection, then we might well have expected them to concentrate on the wealthy. This was in fact the pattern of income tax collection in the early decades of the twentieth century (though not in later decades). But within the limited group of individuals subject to the income tax there would then be no logical reason to tax lower incomes more lightly. In fact, the pattern we observe for all World War I participants (but not for the non-participants) is that marginal rates of taxation rose very steeply even within the group of individuals subject to the income tax. If governments were concerned about the deadweight costs of taxation, we would also not have expected them to have opted for such a steeply progressive tax schedule, because it is suggested that elasticities of earnings with respect to taxation are the highest for those groups at the top of

the income distribution. The contemporary literature on optimal taxation in fact suggests that a government seeking to maximize revenue should adopt something close to a flat tax, or even a regressive tax schedule. If governments were also concerned about minimizing political costs of taxation, and such political costs were increasing in the number of citizens subject to income tax, this might create an incentive to tax the rich heavily, but this effect should apply to any country either at peace or at war. In the end, it is difficult to explain the wartime emergence of steeply progressive tax schedules by referring simply to the fact that governments needed money and they took it where they could find it.

As a final step in our empirical inquiry, we examine observed changes in public opinions about taxation before and after the United States mobilized for World War II. We show that across all different economic groups, the war had virtually no impact on how much taxes respondents thought relatively low and middle income families should pay but that mobilization for the war corresponds with substantially higher preferred income taxes for the rich—in most cases doubling at the higher income levels. In short, war mobilization is associated with greater demands for progressive taxation.

Our argument and empirical results, in addition to suggesting a new mechanism by which international politics influences domestic political development,⁵ cast new light on current debates about democracy, inequality, and redistribution. They suggest first that precisely because the rise of progressive taxation was a product of war, it was not an inevitable development. This claim about inevitability has relevance for political scientists like Mayhew (2005) who have made a similar observation with respect to US welfare state development. It also contributes directly to work on inequality by authors like Piketty (2003) who has suggested that much of the reduction in income inequality observed in advanced industrial countries during the twentieth century was an "accidental" product of war.⁶ According to Piketty, the reduction in income inequality can be explained by a story where events like wartime destruction and economic depression helped to destroy great fortunes, and following

⁵Other work in this tradition includes Gourevitch (1978), Katzenstein (1985), Rogowski (1987), and many others.

⁶The phrase is used by Piketty (2003) to characterize the evolution of income inequality in France between 1901 and 1998.

these events the presence of high top rates of income tax and inheritance taxation prevented fortunes from becoming reconstituted. But his analysis leaves open the question—what force made it politically possible to sustain high top tax rates in the first place? Our contribution is to suggest how the particular wartime conditions of the twentieth century created political pressures for the adoption of high top rates of taxation.

A second contribution of our study, which follows immediately from the above point, is that electoral democracy may be insufficient to produce a reduction in income inequality in the absence of some event, like a war, that serves to heighten demands for taxation of the rich. If true then this would call for revisiting the assumption in theoretical models like those of Acemoglu and Robinson (2000) or Boix (2003) where the expansion of the suffrage represents a commitment to redistribute.⁷

Given these other studies, it also seems important to investigate whether the war effect that we describe is something that only operates in democracies, because mass opinion can be translated into policy, or whether it might also operate in authoritarian systems if leaders nonetheless feel compelled to placate mass opinion so as to avoid protest. Our difference-in-differences analysis of World War I does not allow for examining whether the war effect is conditional on democracy, because all of the war participants for which we have full tax rate data were democracies (though we do also discuss the case of Germany in our qualitative analysis). For our long-run analysis, focusing on the 1850-1970 period, we can investigate whether the war effect was conditional on democracy, and we find little evidence that this was the case. Again, however, our sample of countries is limited, and so this possibility merits further research.

Finally, we should make clear that our study is specifically focussed on the question of progressive taxation, and we have not conducted empirical tests regarding overall wel-

⁷The same conclusion would apply to the assumption in Ticchi and Vindigni (2008) that wars generate incentives to expand the suffrage, precisely because suffrage expansions represent a commitment to future redistribution toward those who have fought for their country. There is a potentially important difference between the type of redistribution considered in these papers, which involves a proportional tax and a set transfer, and the question of tax progressivity. Under general assumptions, the design of an income tax system in which different individuals pay different rates becomes a multidimensional problem in which conventional median voter results do not hold. See Roemer (1999) for a proposition of a model where income tax progressivity can be observed as an equilibrium outcome even with nonlinear tax schedules.

fare state development or other policies with redistributive consequences. Our results can nonetheless have implications for these other debates. They may lend credence to the claims by authors like Esping-Anderson (1990), Amenta and Skocpol (1988), Skocpol (1992), and Mayhew (2005) that wars have been underemphasized as a causal influence on welfare state development.⁸

2 Mass Mobilization and Demand for Progressive Taxation

There is a long-standing argument that when states increase the extent to which they rely on the broad mass of citizenry for military service, then they also feel compelled to extend greater political rights to these same citizens.⁹ Perhaps the earliest example of this claim comes from Aristotle who made such a statement when referring to oligarchies in Greece.¹⁰ Similar claims have been made for China during the Warring States period as well as by Weber (1923) with regard to the expansion of citizenship rights in Western Europe.¹¹ It seems logical to expect that expansion of rights to hold political office or to vote would also translate into lower levels of economic inequality.¹² If so, then there would be a link between the breadth of military participation and economic inequality. The argument we develop in this section follows the above line of thought by emphasizing the effect of war on progressive taxation. However, by emphasizing the effect of war on public attitudes regarding equal sacrifice, we also suggest why the extension of political rights alone might be less likely to lead to greater progressivity.

⁸Amenta and Skocpol (1988) and Mayhew (2005) refer to the study of the US welfare state whereas in the introduction to the 1990 version of his book Esping-Anderson makes a more general claim.

⁹There is also a long-standing argument that warfare has been associated with an expansion in the ability of states to raise revenue through taxation. This idea dates back at least to Otto Hintze (1906) and has more recently been expressed by Charles Tilly (1990) and Besley and Persson (2008). We fully acknowledge this point, but this argument does not suggest why, given a certain ability to tax, war mobilization might influence choices about the relative tax burden between different segments of the population. The importance of warfare in the secular growth of government expenditure has been suggested by Peacock and Wiseman (1961).

¹⁰See p.188 in *The Politics*, edited by Ernest Barker, 1946.

¹¹See Hui (2005) for an interesting interpretation of the Warring States period.

¹²Discussions of the extension of suffrage in Europe have, at least since Bendix and Rokkan (1962), emphasized how the extension of new political rights was closely associated with redistributive measures. See Przeworski (2008) for a cross-national evaluation of the correlates of suffrage extension.

2.1 Mobilization, Equal Sacrifice, and Tax Progressivity

The core argument of this paper is that mass mobilization for war increases the demand for progressive taxation as a means of ensuring greater equality of sacrifice between different individuals with regard to the war effort. In developing this argument we draw on the work of John Hicks (1942) and his comments on fairness considerations as a motivation for the taxation of war wealth. Hicks suggested that "a sense of unfairness is particularly aroused when the high incomes are earned, not by those who are in the centre of the war effort, but by those who are on the edge of it."(1942 p.5) We emphasize three specific reasons why war might produce such a change in attitudes.

The first possibility is if it is perceived that high incomes are attributable to war profits. It has long been recognized that attitudes towards income inequality depend on beliefs about the process through which inequality was generated. Opinions about tax progressivity are likely to depend on whether high incomes are thought to be attributable to merit, or whether they are instead the result of luck or sacrifices made by others.

The second reason war might change attitudes about tax progressivity is if it is believed that those with high incomes and/or accumulated wealth are less likely to fight than are individuals lower down the income distribution. The work of Margaret Levi (1997a 1997b) has been particularly important in demonstrating why pressures emerge to adopt universal conscription to ensure equal sacrifice in war efforts. However, even after the adoption of universal conscription in the advanced industrial countries, there have remained reasons why some individuals are less likely to be required to fight. The most important of these is age, and older individuals on average have higher incomes and more accumulated wealth than younger individuals. The existence of deferment policies for educational or other reasons can also produce a de facto bias whereby those higher up the income distribution are less likely to be required to fight in the front lines.¹³

The third possible reason war might produce a change in attitudes is a rhetorical one. If individuals are compelled to supply their labor through the device of military conscription,

¹³See Smith (1947) for evidence on this effect for US servicemen during World War II.

then this can strengthen the rhetorical case for an analogous "conscription of wealth" or conscription of capital income. In the absence of a direct analogue for conscripting wealth, taxes designed to tax income from accumulated wealth can serve as a substitute.

The above discussion has provided reasons why the context of mass warfare might lead to a shift in attitudes regarding progressive taxation, but whose attitudes are we referring to, and how do we suggest that this change in attitudes will lead to an actual change in policies? First, we place particularly heavy emphasis on the attitudes of those who fought. If this is accurate, then the more individuals who fight, the more likely it is that a government will need to take their attitudes into account. This implies that the effect of a mass war should be very different from that of a more limited war in which a smaller number of individuals may still make a heavy personal sacrifice by fighting. Given that the attitudes of a large number of people change, this still leaves open the question of how this translates into policy. The most plausible mechanism would be in a democratic context where politicians would adopt more progressive tax policies in order to attract or retain electoral support. But we should not exclude the possibility of our argument applying outside of a democratic context to the extent that leaders in non-democratic systems still need to avoid popular protest.

The argument that we have laid out above refers to demands for tax progressivity that will emerge during wartime. Why would we not expect that after war's end, tax schedules will return back to their prior peacetime level? There are several reasons why the effect we describe is more likely to be long-lived. First, since wars are often financed by borrowing, the political debate over how to pay for them is often prolonged for a considerable time afterwards. This was certainly the case in countries like France and Great Britain after World War I. Second, if concerns about equalizing wartime sacrifice extend to subsequent obligations for war veterans, then this can also have direct implications for financing debates long after a war is over. Third and more speculatively, wartime sacrifices may have a permanent effect on perceptions of the generation that fought in the war about fair tax burdens for the wealthy, independent of what the revenue is spent on. All public goods must be eventually paid for, and the perceived fair distribution of these burdens may be permanently influenced for the

generation that fought in the war. Finally, it may also be possible that the persistence of the war effect on progressive taxation has less to do with the endurance of beliefs forged during wartime than with a more conventional account involving a bias towards status quo policies. Even if this final mechanism provided the only reason why top tax rates remained high, our identification of the war effect is still a critical part of the story. If there is a status quo bias in policy, war is one reason why policy might move away from a low progressivity status quo in the first place.

2.2 Alternative Arguments

One might ask how our argument is distinct from an account that simply says that taxes need to go up during wartime and that revenue maximizing governments will seek to raise funds both through taxation in kind and by taxation of income. The problem with this argument is that there is no particular reason to believe that a government seeking to raise the most revenue at minimum cost would necessarily decide to impose very high rates of taxation on the rich. The modern literature on optimal taxation suggests that a government purely interested in maximizing revenue should impose a tax schedule that is either flat or regressive. This is because earnings elasticities with respect to taxation are observed to be larger for high income individuals, and thus the deadweight costs of taxation increase as one taxes individuals higher up the income distribution.¹⁴ Even if government policymakers in 1914 did not have the benefit of modern econometric evidence, observers during this era were certainly aware of the incentive effects of taxation.¹⁵ These incentive costs were emphasized in the popular debate by opponents of steeply progressive tax schedules, just as is the case today. So if taxes need to go up during wartime, it is not clear why the optimal choice would be to tax the rich heavily. Keeping these considerations in mind, we nonetheless evaluate this argument empirically in this paper.

Another question one might ask about our argument is why it is necessary to refer to

¹⁴See Gruber and Saez (2000)

¹⁵For example, among late nineteenth century thinkers Henry Sidgwick demonstrated awareness of this issue in the following quote "...it is conceivable that a greater equality in the distribution of produce would lead ultimately to a reduction in the total amount to be redistributed..." (1883 p.520).

beliefs about equalizing wartime sacrifice when a more simple explanation is possible. Governments may have simply offered taxes on the rich as a quid pro quo necessary to obtain compliance with conscription by the working classes. We certainly agree with the observation made by Ticchi and Vindigni (2006) that governments may feel prompted to adopt redistributive policies in order to motivate those who fight. However, we also emphasize that beliefs about equalizing wartime sacrifice can help determine what types of policies soldiers are motivated by. Furthermore, our argument about attitudes can also help to explain why progressive taxation might be maintained even after soldiers return home.

It is also worth emphasizing how our argument differs from a further alternative that sees wars as allowing for policy innovation. This idea has been emphasized by Mayhew (2005) for policies in general. Steinmo (2003) makes a similar point with regard to the specific issue of progressive taxation, as in his view World War I created an opportunity to implement new ideas about progressive taxation that subsequently became institutionalized. While not disputing the idea that wars create windows of opportunity, we also wish to suggest that the nature of modern mass warfare also influences the direction in which policy innovations will tilt.

As a final note, while our argument implies that mass warfare should have a long-term effect on the demand for progressive taxation, probably lasting decades, there is no reason to expect that this effect should necessarily be permanent. As time goes on and war debts are repaid (or defaulted upon), and as a generation of veterans passes away, there should be less and less of a possibility of justifying high top tax rates for this reason. It would be intriguing to ask whether the disappearance of a consensus in favor of a steeply progressive income tax schedule in countries like the US and UK is related to this phenomenon, but without firmer evidence we offer this only as speculation.

3 Using World War I to Identify the Effect of Mobilization

Our principal goal in this paper is to empirically test the hypothesis that the experience of modern mass warfare produced new demands for progressive taxation. In the absence of this

war effect, extensions of the suffrage and the rise of the political left may have produced less of an increase in redistribution through the tax system than would commonly be expected. For part of these tests we will adopt a long run view, that helps establish the general applicability of our results. In this section, however, we will first consider developments with regard to progressive taxation around the time of the First World War. In addition to being of obvious historical interest, World War I allows us to observe what took place both in those countries that mobilized heavily for the war and in those that did not. It is more difficult to make this same sort of "difference-in-differences" comparison for World War II, given that almost all European countries were participants in the conflict. More generally, we suggest that the World War I period meets the assumptions necessary for identifying the causal effect of mass warfare on demands for progressive taxation through a difference-in-differences comparison and thus focus our attention on this case. In this section we begin by presenting the historical background on the development of the income tax and on debates about tax progressivity. This is followed by a discussion of changes in income tax policy in our eight sample countries. We then present econometric tests of our argument, followed by a closer look at two cases that support the plausibility of our account.

3.1 Pre-1914 Development of Progressive Taxation

Great Britain in 1799 was the first country to create something resembling a modern income tax, a measure adopted to raise war finance against the major threat posed by Napoleon's armies. As a consequence, discussions of income taxation often begin with this event. The British income tax was not progressive to the extent that all households liable paid a single rate regardless of their level of income, a rate that reached a peak of 10%. The tax was progressive, however, to the extent there was an exemption limit that exempted all but high income households from the tax. This exemption of the large majority of households from tax would also be a hallmark of income tax systems in almost all other countries up to 1945. The British income tax had an uncertain initial history, as it was phased out completely between 1816 and 1843. The tax was reinstated for good in 1843, but rates were kept extremely

low by modern standards. From the late nineteenth century there were heated debates over whether the income tax should be graduated, with higher income groups bearing a heavier burden than other taxpayers. The principle of graduation was first introduced as part of Lloyd George's "people's budget" in 1909 with the creation of a "super tax" that effectively raised the top tax rate to 8.33% (the standard rate stood at 5.83%). What is particularly striking here is that by modern standards both the level of rates and the extent of graduation seem extremely low.

During the nineteenth century the possibility of establishing an income tax also became a subject of debate in numerous other European countries, in no small part because of the perceived success of the British innovation. During periods of significant unrest some individuals even proposed graduated tax systems with top rates that resembled modern rates.¹⁶ By all accounts, however, the idea that up to half of an individual's income might be drawn away in taxes was seen by most observers at the time as what *The Economist* called a "preposterous system of finance."¹⁷ In the decades leading up to World War I a number of states joined the United Kingdom by creating an income tax, including Japan in 1887, Prussia in 1891 (there was no German federal income tax until 1919), the Netherlands in 1893, and Sweden in 1903. The United States first adopted a federal income tax in 1862 in connection with the civil war, but after 1872 the tax was not renewed by Congress, and a federal income tax was not reinstated until 1913.

So it seems clear from the above developments that there was a general trend towards the adoption of an income tax. It was also the case that a graduated income tax became the norm, and that many countries more or less simultaneously established graduated inheritance taxes. These developments were certainly significant, but what is most striking is that even after the adoption of graduated income taxes, during the pre-World War I era top earners paid only a small portion of their income in the form of tax. On the eve of World War

¹⁶In 1848 a deputy to the German Federal Assembly proposed a progressive income tax with a top rate of 33.3%. Also in 1848, Pierre-Joseph Proudhon proposed to the French Constituent Assembly that it establish an income tax with a top rate of 50%. See Seligman (1911 p.235 and p.279).

¹⁷*The Economist* March 10, 1883.

I, among countries that had an income tax, the top rate stood at 7% in the United States, 8.33% in the UK, 12% in Sweden, and 3.2% in the Netherlands. The extensive early study by Kennan (1910) presents information on income tax rates for different groups in a very broad set of countries circa 1910. It confirms the initial impression that even when they had an income tax with a graduated rate schedule, it was very rare for countries at this time to adopt top rates of more than 10%. In sum, for an observer of international events in early months of 1914 it may have appeared that the income tax was the wave of the future, but it would have been seen as unlikely that within a matter of a few years, some countries would adopt taxes that saw the richest members of society pay as much as 50% of their income in taxes.

3.2 Progressive Taxation and World War I

World War I placed substantial financial demands on the countries that were major participants in the conflict. Governments needed to respond to this demand by some combination of an immediate tax increase and increased issuance of debt, which implied future tax commitments. What was new about this conflict, though, when compared with other wars, such as those waged during the eighteenth century, was that heavy burdens were placed on top income groups. Debates about top marginal tax rates also took on a new political salience. Either during or soon after the end of the war, participant countries adopted steeply graduated rate schedules with top rates that *The Economist* had previously seen as "preposterous". In Great Britain a series of war budgets saw the top rate of income tax increased from 8.33% in 1914 to 60% by 1920. Observers at the time also suggested that in a country like the United Kingdom the changes in the tax system had an important effect on the distribution of both income and wealth.¹⁸ In the United States the top marginal rate of income tax rose from 7% at the outset of the war to 77% by the end. A very similar pattern of events took place in Canada which first established a federal income tax in 1917 with a top rate of 21.9%

¹⁸For one early discussion of the effect of the increase in taxation on the distribution of incomes and wealth see Bowley (1930).

and which subsequently raised this rate to 72.5% by 1920.¹⁹ In France, a national income tax was first implemented in 1915 with a top statutory rate of 2%. By 1919 the top rate had risen to 50%.

It should be emphasized that the top income tax rates referred to above certainly applied to a very small percentage of households, and more generally only a small fraction of households in these countries were liable for any income tax at this time. In the case of the United Kingdom the super tax was initially paid by something on the order of 0.1% of households, and the number of households paying the top rate of super tax was considerably smaller.²⁰ In other countries, such as France and Canada, the fraction of households liable at the top rate of income tax was on the order of 1000 households and 500 households respectively.²¹ While this implies that the revenues generated by this top rate were certainly too small to solve France's post-war fiscal problems, the move to a high top marginal tax rate obviously had major implications for the large fortunes to which it applied.

One particularly interesting aspect of the World War I period is that at the same time we observe the evolution of tax systems in countries that mobilized heavily for the war, we can also observe what happened in those countries that either remained neutral or which were relatively minor participants. Historical series on top income tax rates exist for four such countries: Sweden, the Netherlands, Spain and Japan. As noted above, Sweden, the Netherlands, and Japan had established income taxes at the end of the nineteenth century (Spain did not adopt an income tax until 1932). The Swedish and Dutch cases are particularly interesting for our purposes, because these two countries were subject to many of the same political developments that occurred in war participants like France and the United Kingdom. In both Sweden and the Netherlands universal male suffrage was adopted around this time.²² In addition, in both of these countries parties of the political left first gained a significant share of parliamentary seats at this time, and both countries experienced episodes of working

¹⁹See Perry (1955 p.162)

²⁰See Atkinson (2007 p.95).

²¹See Piketty (2001 p.556) and Saez and Veall (2007).

²²In 1911 in Sweden and 1918 in the Netherlands.

class unrest similar to those in participant countries.²³ Yet, despite these shared political conditions, outcomes with regard to top tax rates were very different in Sweden and the Netherlands when compared with France and the UK. For the Netherlands, Van Zanden (1997) notes the lack of movement toward progressive taxation as right and center-right governments in the interwar period maintained a system based primarily on indirect taxation and relatively low top income tax rates. This raises the possibility that progressive income taxes failed to develop early in the Netherlands because the left was not yet in government. But among the war participant countries that adopted progressive tax systems, such as Canada, France, and the UK, parties of the left were not in power either.

Figures 1 through 3 present the available information on top tax rates between 1900 and 1930 for our four sample countries that were heavily mobilized and that participated in World War I and in the four sample countries that were either neutral or which did not mobilize heavily. In Figure 1 we average together top income tax rates within each group. Figures 2 and 3 then present the disaggregated information for each country. It is apparent that in participant countries World War I was accompanied by a huge shift towards greater tax progressivity, at least in terms of the willingness to tax the richest members of society. No such break is observable in any of the four non-participants. It is particularly striking to see this in Sweden and the Netherlands where one otherwise might have thought that the political context would have been associated with higher taxation of top earners.

There was an evident connection in political debates of the time between increases in tax progressivity and the idea of equalizing sacrifice in wartime. This pattern was typically characterized by new demands for the taxation of "war wealth" and "war profits" often most vocally from labor organizations and left parties. What distinguished these demands from previous ones of a similar flavor was their connection to the war and the logic of equal sacrifice and their resonance with the public and governments across the political spectrum. There developed a perception in many countries that certain individuals were reaping large profits as a result of the increased demand for certain goods. In a context where many individuals

²³See, for example, Andre (1975) on labor unrest in Sweden in the 1917-1918 period, particularly in the wake of the Russian Revolution.

were conscripted into service at the front, it became a common rallying cry that those who profited from the war should have their wealth conscripted in the same manner that others had been obliged to make more direct sacrifices. It is important to note that we are by no means implying that this perception was always completely accurate. In the case of Great Britain it is known that the upper classes volunteered heavily for the war, and based on figures cited by Marwick (1965), the fatality rate among Oxford undergraduates by the end of the war may have actually exceeded that for the general population.²⁴ What is also certainly true though is that in all countries older individuals were more likely to be exempted from military service, and older individuals tended on average to have higher incomes and higher levels of wealth. In English language countries frequent calls appeared for "the conscription of wealth", a phrase that seems to have in particular been used by groups that had originally been most reluctant in their support for the war. Elsewhere the language differed but the policy demands were similar. Grotard (1996) emphasizes how discussions of the war profits tax in France were linked in the popular press to the sacrifices of soldiers. She notes that during the parliamentary debate over the war profits tax, it was specifically stated that given that many individuals were sacrificing themselves at the front "it was necessary to reestablish equal sacrifice for all" (Grotard 1996, p. 264). After the conclusion of the war such calls continued as the issue shifted to being one of how to repay war debts. The issue of how to finance benefits for war veterans also rose to prominence, and in the case of the United States, Alstott and Novick (2006) have shown that debates about veterans benefits were explicitly linked with debates over tax progressivity, and in particular whether the US government should maintain the very high top tax rates established during the war.

All of the countries that mobilized heavily for World War I ended up adopting "excess profits" or "war profits" taxes of one form or another, in parallel with the major increases they adopted in top rates of income tax. In public debate these different types of taxes were often described as satisfying similar objectives. In the United Kingdom the government

²⁴Marwick (1965 p.290) cites a figure of 9% for the percentage of all men in the United Kingdom under 45 who were war fatalities. Among Oxford University's roll of service of 14,561 individuals there were 2680 fatalities.

adopted an excess profits duty in 1915 that was maintained through 1921 at an average rate of 63 percent.²⁵ In the United States an excess profits tax was levied that by 1918 reached a rate of 80 percent.²⁶ Similar schemes were adopted in France where the top rate on this tax reached 80% by 1917, as well as in Canada.

One final question one might ask is whether the conclusion we draw from Figure 1, which will be supported by statistical tests in the next section, is biased by the omission of Germany from the sample. Germany did not have a federal income tax prior to 1919 though its constituent states did have income tax systems with generally low rates prior to the war. After 1919, however, Germany closely resembled other war participants as it created a federal income tax with a high top marginal rate of 60%. In introducing this new rate Minister of Finance Mathias Erzberger of the Weimar government made an explicit attempt to justify it based on the same solidarity among citizens as had been required during the war.²⁷ It should also be emphasized that the Weimar government's actions followed on the heels of significant war profits levies during the war itself.²⁸ Overall then, while no one would dispute the fact that the course of economic and political events in Germany was much different from that which took place in other war participants, we can nonetheless suggest that in Germany war participation also increased demands for tax progressivity.

To reiterate our main points, the evidence in Figures 1 through 3 supports our idea that participation in mass warfare was associated with dramatic increases in income tax rates on top income groups. In what follows we will consider this issue econometrically while controlling for other potential political factors that might influence the choice of progressive taxation including the extent of the suffrage and the extent to which parties of the left have representation in a country's legislature.

²⁵Hicks et al (1942 p.72).

²⁶Hicks et al. (1942 p.121).

²⁷*New York Times*, December 5, 1919 "Erzberger Offers Great Tax Budget"

²⁸See Kuczynski (1923).

3.3 Difference-in-Differences Analysis, 1900-1930

We now evaluate the impact of mass mobilization in the First World War more formally by examining how top income tax rates were set in our full sample of eight countries. This difference-in-differences evaluation allows us to use the behavior of top rates in non-participant countries throughout the 1900 to 1930 period, in addition to the value of top rates before the war, to construct the counterfactual for what would have happened to top rates in participant countries had they not entered the war.²⁹

For this analysis, we define the variable *Top Rate* equal to the highest marginal income tax rate for a country in a given year. This variable is set equal to zero for years in which a country did not yet have an income tax.³⁰ The key independent variable is *WWI Mobilization* which is set equal to 0 in each year before the country enters the war and 1 thereafter.³¹ In some specifications, we include controls for levels of economic development, the representation of left parties in the legislature, the extent of the franchise, and the magnitude of government revenues. The variable *GDP per capita* is equal to gross domestic product divided by population.³² The variable *Left Seat Share* is equal to the percent of seats in the national legislature held by a Left party in a given year.³³ To measure the extent of the franchise, we constructed the variable *Male Universal Suffrage* equal to 0 for each year preceding universal male suffrage and 1 for each year after the onset of universal male suffrage.³⁴ The variable *Revenue to GDP* is equal to the ratio of central government revenues

²⁹In a separate analysis supplied in the Appendix for this paper we report results of regressions where we conducted interrupted time series tests country by country in order to examine the effect of World War I. These regressions produced very similar substantive conclusions to those in our pooled analysis. The specific dates for the initial and final years of this analysis are somewhat arbitrary but do not influence the results. The key idea is to begin early enough to establish a baseline and to end before the new shocks of the 1930s and 1940s influence the tax policies of these countries. A long run analysis including a period of more than a century is presented below.

³⁰See Appendix for sources and further description of this variable.

³¹For Canada, France, and the UK, the entry year is 1914 and for the US, it is 1917.

³²The source for the gross domestic product data is Maddison (2007). The source for the population data is Correlates of War Project, National Material Capabilities Data, Version 3.0 (2005).

³³See Appendix for sources and further description of this variable.

³⁴We use male universal suffrage rather than universal suffrage because it is not clear that the expansion of the franchise to women significantly affects the distribution of income among voters which is the primary mechanism by which expanding the franchise is expected to make the tax system more progressive. Our results, however, are robust to substituting universal suffrage for male universal suffrage. The sources for this variable are Caramani (2000) and Mackie and Rose (1982).

to gross domestic product.³⁵ Note that we add this revenue measure separately from the other control variables because it is not clearly exogenous to the top rate and thus could bias the estimates. We are, nonetheless, interested in exploring this specification to evaluate the “need for financing” alternative explanation of the impact of war on progressivity. If the need for finance was driving the war effect, then we would expect our estimate of the war mobilization coefficient to be attenuated once we include the extent of government revenues relative to the economy.

The *Top Rate* is modeled as:

$$TopRate_{it} = \alpha + \beta WWI_{it} + \gamma \mathbf{X}_{it} + \eta_i + \theta f(T_t) + \epsilon_{it}$$

where i indexes each country and t indexes each year; *Top Rate* is the top tax rate measure; *WWI* is our measure of war mobilization, *WWI Mobilization*; X_{it} is a vector of control variables and is excluded in some specifications; $f(T_t)$ is a function of time, either a simple linear trend or vector of dummy variables for each year between 1900-1930; $\alpha, \beta, \gamma,$ and θ are parameters to be estimated; η_i are country fixed effects parameters also to be estimated; and ϵ_{it} is the error term. We report Newey-West standard errors to account for serial autocorrelation.³⁶ The initial specifications that exclude the control variables are essentially difference-in-differences tests that compare the changes before and after participation in the war for countries which mass mobilized for the war, compared with changes over the same period for countries that did not mobilize. The specifications that include the control variables make this same comparison but adjust for differences in the top rate that are a function of levels of economic development, the representation of Left parties in the legislature, the extent of the franchise, and the magnitude of government revenue extraction.³⁷

³⁵The source for the revenue data is Mitchell (2003a, 2003b, 2007).

³⁶The reported standard errors assume a single-period lag. The main results reported are robust to allowing for additional lags in the calculation of the Newey-West standard errors and for alternatively using robust standard errors clustered on country.

³⁷One possible concern with this set of specifications is that it fails to explicitly account for the fact that in a number of years countries choose to have no income tax—a corner solution outcome. We estimated tobit models to explore this issue and found our main results robust to this alternative. Another possible concern which applies to both the linear specifications reported in the paper and the tobit models is that they assume that the data generating process that determines if an income tax is adopted at all is the same as the data

Table 1 reports the ordinary least squares estimates for this analysis. The results in the first column include only the key war mobilization variable, a year trend, and country fixed effects. The estimated coefficient for the variable *WWI Mobilization* in this specification is equal to 32.8 with a standard error of 4.5. As indicated in the second column, the estimate for this coefficient is slightly higher once the controls *GDP per capita*, *Left Seat Share*, and *Male Universal Suffrage* are added to the specification (coefficient estimate is 36.4 with standard error of 4.1). Adding the control for the magnitude of government revenues relative to the economy, yields an almost identical estimate for the *WWI Mobilization* coefficient. Thus, across these specifications which include country fixed effects and a linear time trend, there is substantial evidence that the top rate increased significantly more over time in those countries that participated in the First World War than those that did not. Further, this difference remains significant even after we adjust for differences in economic development, the strength of Left parties, the extent of the franchise, and the magnitude of government revenues.

The estimates in the last three columns of Table 1 substitute dummy variables for each year for the linear time trend. The estimated coefficient for the variable *WWI Mobilization* is 31.1 with a standard error of 3.5 for the specification excluding the control variables and is of similar magnitude in the specifications including the control variables. Given that each specification includes both country fixed effects and year dummy variables, this is compelling evidence that mass mobilization for the First World War was associated with a statistically and substantively significant increase in the top tax rate.

Across both sets of specifications in Table 1, the results for the control variables are quite similar. There is little evidence of a significant partial correlation between the representation of Left parties in the national legislature and top tax rates. However, the estimated coefficient for the variable *Male Universal Suffrage* is positive and statistically significant in all four specifications. For example, the estimate is 7.0 with a standard error of 2.5 for the spec-

generating process setting how progressive the system is. We adopted a hurdle analysis to explore this issue as well. Again, our main finding is robust to this possibility and the evidence suggests that participation in mass warfare is important both for the adoption of income tax systems and how progressive the system is.

ification in column five with year dummy variables. But the magnitude of this effect is quite small compared to our estimated effect of war mobilization on the top tax rate. Table 1 also indicates a negative and significant partial correlation between *GDP per capita* and the *Top Rate*. Finally, there is some evidence in these estimates that as countries collected greater revenues relative to the size of their economies, they adopted more progressive income taxes with higher top rates. The estimated coefficient for the variable *Revenue to GDP* is positive and statistically significant in both specifications in which it is included. The inclusion of this variable does not, however, significantly attenuate the estimate for war mobilization. This result is therefore consistent with our view that while the need for finance was certainly part of the story of the adoption of progressive taxation during wartime, it does not account for dramatic impact of war mobilization on the willingness of governments to tax the rich at particularly high rates.

There are a couple of potential concerns about these estimates of the causal effect of war mobilization on progressivity. First, the implicit assumption in this approach is that, whatever the initial differences in top tax rates between participant and non-participant countries, absent mass mobilization for the war these differences would have remained constant over the 1900-1930 period (i.e. these countries would have parallel trends) or at least that the differences after taking account of the time-varying control variables would have remained constant. Visual inspection of Figures 1 through 3 before the beginning of the war suggest that this assumption is at least plausible and is bolstered by the relatively good performance of the control variables.

One might also ask whether the effect of the First World War on tax progressivity is limited to its impact on the very highest earners that pay the top rate. We think the result would be important even if this were true, but in our view, the finding indicates a larger impact of the war on progressivity.³⁸ To explore this claim further, we highlight three pieces of evidence.

First, and most simply, a complete assessment of British tax changes during World War

³⁸We choose to focus our main econometric analysis on top rates because it is for these that we have the most complete data across countries and time.

I shows a marked increase in tax progressivity at almost all levels of income. Samuel (1919) conducted a painstaking analysis designed to estimate the tax burden including all types of national taxation and at all different levels of income before and after the war.³⁹ Figure 4 reports his main results. The overall picture is striking. The tax schedule on earned income for 1913-1914 was essentially flat over most of the income distribution though moderately progressive for those with the highest incomes. By the end of the war it was significantly progressive across the entire distribution. Overall, Samuel's evidence rules out the possibility for the British case that even if income taxes on the rich increased, other forms of taxation, the incidence of which fell primarily on the poor, may have increased even more.⁴⁰

Second, we replicated our statistical analysis for an alternative measure of tax progressivity, *Income Tax Share*, equal to the percentage of central government revenues raised by the income tax.⁴¹ Use of this measure depends on the assumption that income taxes are more progressive than alternative sources of revenue such as customs, excise, and general sales taxes. It should be remembered that 10% or less of the population was subject to income taxation at this time. In the specification with country and year fixed effects and control variables for *GDP per capita*, *Left Seat Share*, and *Male Universal Suffrage*, the estimated coefficient for *WWI Mobilization* is equal to 6.87 with a standard error of 2.20 (p-value is equal to 0.002). This estimate is statistically and substantively significant as mass mobilization for the war is associated with an increase of about 7 percentage points (a bit over one standard deviation of the variable *Income Tax Share*) in the percent of central government revenues raised by the income tax. Again, to the extent that war profits taxes fell more heavily on the wealthy, and certainly in light of the fact that it does not take into account increased inheritance taxes, this figure underestimates the effect of the war on progressivity. The result is consistent with the claim that mass warfare has a general impact on tax progressivity that

³⁹Taxes included in the analysis are income and super tax, death duties, inhabited house duty, and numerous indirect taxes such as those on purchases of tea, sugar, tobacco, and alcohol.

⁴⁰Shirras (1943) conducts a similar analysis of overall changes in effective tax rates before and after the UK's entry into World War II (1937-38 versus 1941-42) and finds a significant increase in progressivity.

⁴¹The main source for this variable is Flora et al (1983). The source for Canada is Perry (1955, pp. 626-7). The source for the United States is the Historical Statistics of the United States. The source for Japan is Shiomi (1957, pp. 136-7).

is not limited to the highest income tax rates.

Third, we examined changes in progressivity within the top ten percent of income earners. Table 2 reports the changes in participant and non-participant countries in average marginal income tax rates for individuals at the 90th, 99th, and 99.9th percentiles and in top rates before and after World War I.⁴² The table shows that the war was associated with increased taxes in participant countries compared to non-participants at all of these high income levels but that these differences increased as incomes increased. For example, effective taxes at the 90th percentile increase by 3.8 percentage points more in participant than non-participant countries compared to a difference of 20.6 percentage points at the 99.9th percentile (51.8 percentage points for top rates). The tax rates reported here make it clear that the increases in income tax rates adopted as a result of World War I involved the very rich being asked to pay a much larger fraction of their incomes than were individuals who merely had incomes within the top decile. As we have already noted, very high top marginal tax rates adopted during World War I were generally paid by a small number of individuals, numbering in the hundreds. But when we look at a larger grouping, such as the top 0.1% of earners (generally 30,000 to 50,000 individuals in the countries considered here), the increase in taxes was also dramatic. In sum, we have every indication from the above information that the interpretation we have given to our analyses of top tax rates is accurate—mobilization for World War I was associated with a dramatic increase in tax progressivity.

3.4 Further Evidence on the Demand for Progressive Taxation

In this section, we consider how evidence on the timing of policymaking in participant countries and the political debates surrounding war finance lends additional support to our argument. Among our participant countries, Canada and the UK, are particularly enlightening because the extent and nature of mobilization for the war effort varied significantly within each. Each country relied on a volunteer army for a significant portion of the war before introducing conscription. While our argument suggests that mass mobilization under a vol-

⁴²See Data Appendix for sources and further information on the calculation of these rates.

unteer army is likely to push attitudes about taxation toward greater progressivity, the logic of the argument implies that conscription will generate further pressures toward progressive taxation.

In Canada, the war arrived with a Conservative government led by Robert Borden. Canada was initially quite successful in recruiting volunteers with many of them being recent immigrants from the United Kingdom. To finance the war, the government relied at first on tariffs, increased consumption taxes, and debt. As the war progressed, Canada did adopt a war profits tax in 1916, which in 1917 was revised to have a progressive scale.⁴³ Interestingly, it did not initially enact an income tax, and as late as April 1917, the Minister of Finance Thomas White noted the use of the income tax in Great Britain and the United States in his annual budget remarks, but citing a number of considerations such as administrative expense and fairness in a time of rising prices, he concluded that in Canada "it would appear to me that income tax should not be resorted to."⁴⁴ However, at the end of July 1917 White yielded to increasing pressure to tax the wealthy more heavily and introduced income tax legislation. Two characteristics of this policy change are significant. First, it followed the government's announcement in May that it intended to introduce conscription.⁴⁵ Second, it was adopted in a political environment demanding greater sacrifices on the part of the wealthy in response to war sacrifices. For example, Canadian Trade and Labor Congress leaders met with Borden in December 1916 seeking a commitment from him to not implement conscription and to equalize war burdens. Borden refused to tie his hands on conscription but even then acknowledged that "the government accepted and acted on the principle that the accumulated wealth of the country should bear its due proportion of contributions and sacrifices in the war."⁴⁶ Once the government enacted conscription, organized labor pushed even harder for various versions of the "conscription of wealth."⁴⁷ Though the more radical

⁴³Hicks et al. (1942, p. 171).

⁴⁴April 24, 1917 speech in House of Commons printed in *The Globe*, April 25, 1917, p.4.

⁴⁵The Military Service Act was passed on July 6, 1917. Note that conscription was not implemented until a bitter election was fought in December 1917 primarily over the issue of conscription. Borden, running in coalition with many Liberal MPs under the Unionist Party label but against the Liberal Party's leader Wilfred Laurier, won a landslide victory.

⁴⁶Borden Papers, cited in Robin (1966), p. 63.

⁴⁷See Robin (1966).

proposals did not find mainstream acceptance, arguments for greater sacrifices on the part of wealthy certainly did. The Liberal Platform for the election in the fall of 1917, argued, even after the government had introduced the income tax and war profits tax, that "A fundamental objection to the government's policy of conscription is that it conscripts human life only, and that it does not attempt to conscript wealth..."⁴⁸ The government's Unionist Platform, however, clearly also recognized the importance of the principle as it promised that "In order to meet the ever-increasing expenditure for war purposes and also to ensure that all share in common service and sacrifice, wealth will be conscripted by adequate taxation of war profits and increased taxation of income."⁴⁹ In short, in Canada, with greater mobilization from conscription, across the political spectrum support for progressive taxation on fairness grounds increased.

In the United Kingdom, the government at the start of the war was led by Herbert Asquith and the Liberal Party, though by May 1915, Asquith was forced to form a new coalition government with the Conservatives. Further set backs in the war in 1916 led to yet another coalition government in December 1916 with Lloyd George as the new Prime Minister. Like Canada, but on a much larger scale, the United Kingdom began the war with a successful voluntary recruitment campaign. The effect of the war on the progressivity of taxation was nonetheless more immediate than in Canada. Prior to the outbreak of hostilities, the government's 1914 budget proposal slightly reduced the income tax rate and proposed a combination of increased customs and excise taxes and reduced spending to balance the accounts.⁵⁰ It is clear that at least for 1914, the UK was not going to have a more progressive tax system absent the war. With the war, however, the first and second war budgets in 1914 and 1915 increased income tax rates significantly making the tax system more progressive.

In January 1916, the government introduced the Military Service Bill adopting conscription which passed quickly into law and was expanded several times throughout the remainder of the war. Importantly, once conscription was adopted it became central to political debates

⁴⁸Liberal Party Platform in Carrigan (1968), p. 72.

⁴⁹Unionist Platform in Carrigan (1968), p. 77.

⁵⁰"The Income-Tax Muddle," *The Times*, June 24, 1914, p. 9, col. G.

about how the war was to be financed and certainly appeared to lead to policy changes that made taxation even more progressive. Calls for progressive taxation to equalize sacrifices in the war, particularly those associated with conscription, came primarily in two forms. The first was simply more progressive income taxation, the “conscription of income,” while the second was a capital levy or literally the “conscription of wealth.” These demands came in part from the expected places such as the Trades Union Congress, which held “that, as the manhood of the nation has been conscripted to resist foreign aggression . . . this Congress demands that such a proportion of the accumulated wealth of the country shall be immediately conscripted. . . .”⁵¹ but they were also reflected in publications such as *The Economist*, which, as indicated above, previously opposed high levels of income taxation. To be clear, *The Economist* opposed a capital levy but supported “direct taxation heavy enough to amount to rationing of citizens’ incomes” and explicitly endorsed an article in the *Economic Journal* by Harvard Economist O.M.W. Sprague entitled “The Conscription of Income,”⁵² in which he argued that “Conscription of men should logically and equitably be accompanied by something in the nature of conscription of current income above that which is absolutely necessary.”⁵³

In the United Kingdom policy responded to demands for greater progressivity in income taxation. The third war budget, introduced in April of 1916 just after the conscription bill was passed, significantly increased the income tax with revenues from higher income taxes expected to generate over twice as much additional revenue as increases in indirect taxes.⁵⁴ The capital levy debate also intensified following the introduction of conscription though the levy was never adopted.⁵⁵

⁵¹Trade Union Congress resolution, September 1916, cited in Daunton (1996), p. 890.

⁵²*The Economist*, March 31, 1917, p. 579.

⁵³Sprague (1917, p. 5). Note also that Sprague played an important role in the U.S. debate about funding the war lobbying publicly for high income and profits taxes.

⁵⁴*The Economist*, April 8, 1916, p. 663.

⁵⁵This was in part because the UK Treasury judged that the imposition of a levy of this type would actually significantly reduce the revenues generated from the recently adopted high top rates of income tax and estate duty. See Daunton (1996) on this subject.

3.5 Summary

We have examined the impact of the First World War on top income tax rates in order to evaluate the main argument of this paper that the experience of modern mass warfare produced new demands for progressive taxation. We find considerable evidence that participants in the war raised their top income tax rates substantially and that this increase far exceeded growth in top rates in non-participant countries. We also find that within cases, greater mobilization and in particular the use of conscription was associated with greater demands for progressive taxation to equalize sacrifices among citizens. Further, there is some evidence that the effect of the war on the progressivity of taxation was persistent. Although countries did lower rates as the 1920s progressed, rates did not return to their pre-war levels and generally remained above the rates in countries that did not mobilize significantly for the war.

4 War and Progressive Income Taxation in the Long Run

In this section, we analyze the impact of mass warfare on progressive taxation for the period 1850 to 1970. The main objective of this analysis is to evaluate whether our findings for the First World War generalize to a much longer time period. The pattern of participation and non-participation in World War I may be helpful in cleanly identifying the effect of mass warfare on demands for progressive taxation, but ultimately we are also of course interested in knowing whether mass warfare more generally might have had such an effect. In what follows we focus on reporting the results of our analyses pooling the eight countries in our sample together.⁵⁶

To indicate whether or not a country engaged in mass warfare between 1850 to 1970, we constructed the variable *War Mobilization* equal to 1 if in a particular year, the country was engaged in an interstate war and at least 2 percent of the population was serving in

⁵⁶We also conducted time series analyses for each country individually that allow for heterogeneity in the impact of war mobilization across cases. The results, reported in the Appendix, are consistent with the main claim of the paper that mass warfare raises the demand for progressive income taxation.

the military and equal to 0 otherwise.⁵⁷ This variable measures well the key characteristics necessary for conflict to have its hypothesized effect on progressive taxation. There must be an active war being fought in which the citizens who fight in the conflict sacrifice not only their time and livelihood but also risk their lives. It must also be a conflict that involves a significant proportion of the population. This operationalization captures not only the high mobilization years during the First World War featured in the previous section but also country years for many of the participants in the Second World War as well as the Franco-Prussian and Korean wars.⁵⁸ Our data do not track civil conflicts.

The dependent variable for this analysis is the *Top Rate* variable described above. The main independent variable is *War Mobilization* and the control variables are *GDP per capita*, *Left Seat Share*, *Male Universal Suffrage*, and *Revenue to GDP* as defined above.

The *Top Rate* is modeled as:

$$TopRate_{it} = \rho TopRate_{it-1} + \alpha + \beta WarMobilization_{it} + \gamma \mathbf{X}_{it} + \eta_i + \theta f(T_t) + \epsilon_{it}$$

where i indexes each country and t indexes each year; *Top Rate* is the top tax rate measure; *War Mobilization* is the key measure of participation in mass warfare in a given year; X_{it} is a vector of control variables and is excluded in some specifications; $f(T_t)$ is a function of time, either a simple linear trend or vector of dummy variables for each decade between 1850-1970; $\rho, \alpha, \beta, \gamma,$ and θ are parameters to be estimated; η_i are country fixed effects parameters also to be estimated;⁵⁹ and ϵ_{it} is the error term. Because some countries experience more than one case of mass warfare in this analysis, our modeling strategy has changed in at least two important ways from the World War I analysis. First, rather than coding mass mobilization in terms of before and after, the variable *War Mobilization* is simply equal to one for mass

⁵⁷Our data for incidents of war comes from the Militarized Interstate Dispute Data, Version 3.0 (2003). Our data on mobilization is from the Correlates of War Project, National Material Capabilities Data, Version 3.0 (2005).

⁵⁸More precisely, our war mobilization variable is coded one for Canada in 1941-1945 (mobilization data is missing for Canada before 1920 and these years are not included in the analysis for this measure); for France in 1871, 1914-1920, 1940-1943; for Japan in 1941-1945; for the Netherlands in 1951-1952; for the UK in 1915-1918, 1940-1945; and for the US in 1918, 1942-1945, 1951-1953.

⁵⁹We omit one country due to the constant.

mobilization war years and zero otherwise. Second, we include a lagged dependent variable to model the dynamics for the top rate series as an autoregressive process in which current realizations of the top rate variable depend on past realizations. These two changes in the specification are important for interpreting the results. Any shift in top rate taxation due to mass mobilization from war has a long run impact that is a function of precisely how responsive current values are to past realizations.⁶⁰

Table 3 reports the ordinary least square regression estimates for this analysis with panel-corrected standard errors. The results in the first three columns use a common linear trend for the $f(T_t)$ function with and without control variables. The estimates in the last three columns use decade dummy variables for the $f(T_t)$ function.⁶¹ Across all six specifications, the estimated coefficient for the variable *War Mobilization* is positive and statistically and substantively significant. In the specification reported in column two with a linear trend and control variables, the estimated coefficient is 4.19 with a standard error of 1.11. This estimate implies a long-run effect of 67.5. In the analogous specification with decade dummy variables, the implied long-run effect is 41.9. This is strong evidence consistent with the main argument of the paper. Across the specifications in Table 3, the results for the control variables are negative. There is little evidence of a significant partial correlation between *GDP per capita*, *Left Seat Share*, *Male Universal Suffrage* and *Revenue to GDP* and top tax rates. This lack of evidence of a partial correlation between *Revenue to GDP* and top tax rates undermines the idea that over the course of the twentieth century, variation in top marginal income tax rates has been determined above all by changes in the need for revenue, and not the type of political changes associated with war that we emphasize. The explanation for this null result do doubt lies in the fact that if during the first half of the twentieth century top marginal tax rates rose along with the overall ratio of revenues to GDP, during the latter half of the twentieth century revenues have continued to increase while top income tax rates have almost invariably been reduced.

⁶⁰Note again here that we explored alternative specifications that take into account censoring and that model adoption of an income tax and the degree of progressivity separately. Our main finding is robust to both these alternative specifications.

⁶¹Our key results are robust to substituting separate year dummy variables for the decade dummy variables.

One interesting possibility we explored is whether the impact of war mobilization is greater in countries for which the left is well represented or for which suffrage rights are more extensive. We might, for example, expect the effect of mass wars on progressive taxation to operate more clearly or even exclusively in democratic regimes. We explored these hypotheses by adding interaction terms between the war mobilization measures and the suffrage and partisanship variables. While the estimate for the interaction term for mobilization and partisanship was in the hypothesized positive direction, it was not statistically significant. The estimate for the interaction term between mobilization and male universal suffrage was not in the anticipated direction nor was it statistically significant. Given the limited sample and intuitive appeal of these ideas, both hypotheses, nonetheless, merit further investigation.

In assessing these results, it is also useful to consider alternative measures of participation in mass warfare. We explored three. The first, *War Mobilization 2*, simply adjusts the threshold that needs to be mobilized for the war to count as a mass mobilization war up to five percent. The second, *War Mobilization 3*, codes only the two twentieth century world wars as mass mobilization conflicts. The third, *War Mobilization 4*, is equal to one if the country experienced a war year for which fatalities in the conflict exceeded one thousand deaths.

In specifications that mirror those reported in Table 3 but substitute these alternative measures of mass warfare for *War Mobilization*, the results are substantively quite similar. The coefficient estimates for each of the alternative measures is positive and statistically significant. Perhaps more important than the robustness of the results is how variation in the magnitude of the estimates reflects the logic of the main argument of the paper. Focusing attention on the results with decade dummy variables and control variables included, the implied long-run effect for the most restrictive definition of what constitutes a mass war, *War Mobilization 2*, is equal to 54.3 and is the largest of the estimates for the alternative measures. The estimate for *War Mobilization 3*, which is the alternative measure closest to our preferred definition, is 45.8 which is somewhat larger than the estimate reported in Table 3 for *War Mobilization*. Finally the coefficient estimate for *War Mobilization 4*, the least

restrictive definition of what counts for a mass mobilized war is 24.4. One interpretation of this pattern of estimates is that the more extensive is mobilization for a war, the greater is the impact on progressive income taxation.

Finally, another approach for evaluating whether mass war mobilization influences progressive taxation beyond the World War I case is to focus on the years before and after World War II. Although this conflict does not offer as clean of test as World War I, because few countries were not significantly affected by World War II, we estimated the coefficient for World War II mobilization using data from 1931 to 1960 and again found that mobilization for the war had a significant positive effect on the adoption of higher top tax rates.

5 Evidence on Individual Attitudes

One observable implication of our claim that mobilization for mass warfare increases demands for progressive taxation as a means of ensuring equal sacrifice is that war mobilization should lead citizens to prefer more progressive tax policies. While a complete evaluation of this implication is beyond the scope of this paper, we present in this section one such test using survey data for the United States during World War II.⁶²

In July 1941, when U.S. participation in World War II was still an open question, Gallup asked the following question to a sample of the national adult population:⁶³

"In order to help pay for defense, the government will be forced to increase income taxes. If you were the one to decide, how much income tax, if any, would you ask a typical family of four with an income of \$X to pay?"

Using a split ballot questionnaire, the survey elicited preferred tax rates for eight different income categories ranging from \$1,000 per year to \$100,000 per year.⁶⁴ Then in March 1942, after the attack on Pearl Harbor lead the U.S. to mobilize for the war, Gallup asked

⁶²For context on American public opinion about taxation, see Campbell (Forthcoming).

⁶³See Berinsky (2006) on the methodological issues involved with using U.S. public opinion data from the 1930s and 1940s.

⁶⁴Note that in the 1941 survey, the data were top coded for the lower income categories. This is why we report the median responses to measure central tendencies in the data. The results look quite similar when making a few assumptions and analyzing mean responses.

the identical questions with the exception that the words "the war" were substituted for "defense". The timing of the surveys and the corresponding difference in question wording allow for a before and after test of our claim that mobilization for mass warfare increases public demands for progressive taxation. Did the public's preferred tax schedule become more progressive?⁶⁵

Figure 5 presents the observed changes in opinions about taxation after the U.S. mobilized for the war. The three panels in Figure 5 report data for respondents in different socioeconomic status (SES) groups as determined by the interviewer's coding of the respondent on a subjective class scale. The scale ranged from "poor" to "average" to "wealthy" and the "low", "middle", and "high" SES respondents in Figure 5 correspond to these categories.⁶⁶ In each panel, the preferred effective tax rate of the median respondent is plotted against the income of the hypothetical family of four referred to in the question. There are several important features of the data. First, across all three SES groups, the war had virtually no impact on how much taxes respondents thought relatively low and middle income families should pay. Second, across all respondents, mobilization for the war corresponds with substantially higher preferred income taxes for the rich—in most cases doubling at the higher income levels. Third, the increased progressivity in these tax schedules is, if anything, larger for middle and high SES respondents. This final observation is important because it is consistent with the claim that war sacrifices changed beliefs about what constituted a fair tax system across all income groups not just the poor. The evidence in Figure 5 is strongly consistent with main argument of this paper.

⁶⁵While the entry of the U.S. into the war may have been inevitable, the timing certainly was not and so we are not concerned that the U.S. selected into the war because citizens were now willing to tax the rich at a higher rate. That said, as for any before and after comparison, there could be other factors disconnected from war mobilization during these months driving changes in tax preferences that happened to coincide with U.S. entry into the war. We are skeptical, however, that there are such factors and would further emphasize that to some extent war mobilization had already begun in 1941 and thus our comparison may underestimate the impact of the war on tax preferences.

⁶⁶The intermediate category "poor plus" was coded with "poor" and "average plus" was coded with "wealthy".

6 Conclusion

We have argued that mobilization for mass warfare produces demands for progressive taxation as a means of ensuring equal sacrifice in the war effort. There is substantial evidence consistent with this hypothesis. Focusing attention on the First World War, we find a significant upward shift in top tax rates in those countries that participated and mobilized for the war. Further, we find a substantial positive war mobilization effect based on difference-in-differences estimates that compare changes in top rates from 1900 to 1930 in participant and non-participant countries. This effect is not limited to top tax rates but reflects changes in other measures of progressivity as well. The paper also reports several forms of additional evidence to support our argument. First, the timing and political rhetoric of war financing debates during World War I is consistent with our claim that progressive taxation was a response to demands for equalizing war-time sacrifice. Second, we provide evidence of an effect of mass warfare on top income tax rates over a much longer period from 1850 to 1970. Finally, we also report an analysis of survey data from the World War II era that is consistent with our argument.

Our argument and empirical results suggest a new mechanism by which international politics influences domestic political development and have important implications for debates about the determinants of redistribution and progressive taxation. It is often suggested that the rise of progressive taxation has depended on the development of electoral democracy as well as on the presence of political parties that mobilize lower income groups. Our findings are at best mixed on the claim that these developments alone account for the pattern of progressive taxation over the course of the twentieth century. Within this literature it is also often asked why there isn't more progressive taxation, that is why don't the poor soak the rich in electoral democracies? An important class of answers to this question focuses on beliefs about fairness. Our argument and evidence about the influence of war contribute to this class of answers by suggesting that financial sacrifices required of the wealthy depend on the type of sacrifices society demands from the rest of its citizens.

Finally, our findings also cast new light on current debates about progressive taxation

and income inequality. Recent work on income inequality over the twentieth century has argued that much of the reduction in top income shares can be explained by events like wartime destruction and economic depression, which helped to destroy great fortunes, and that following these events the presence of high top rates of income tax and inheritance taxation prevented fortunes from becoming reconstituted. Our paper sheds light on the unanswered question of what force made it politically possible to sustain higher top tax rates. In the absence of mass warfare there may have been nothing inevitable about the development of highly progressive tax systems.

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A Appendix: Interrupted Time Series Analysis, 1900-1930

In this section we report an analysis of the determinants of top marginal tax rates over the 1900-1930 period in which we allow for heterogeneity in the effect of mass mobilization across the cases. This approach allows for differences in the tax systems that might make comparisons across countries misleading.

For this analysis, we define the variable *Top Rate* equal to the highest marginal tax rate for a country in a given year. This variable is set equal to zero for years in which a country did not yet have an income tax. The key independent variable is *WWI Mobilization* which is set equal to 0 in each year before the country enters the war and 1 thereafter.⁶⁷ In some specifications, we include controls for levels of economic development, the representation of left parties in the legislature, and the extent of the franchise. The variable *Left Seat Share* is equal to the percent of seats in the national legislature held by a Left party in a given year.⁶⁸ The definition of the variable *% Electorate* varies across the four participant countries and as such is only used in the individual country analyses. For France and the UK, it is equal to the percent of the enfranchised population defined by age and sex that is eligible to vote.⁶⁹ For the US, *% Electorate* is equal to the percent of adults 21 years of age or older that are eligible by law to vote.⁷⁰ For Canada, *% Electorate* is equal to the percent of the total population that is registered to vote.⁷¹

The *Top Rate* series for each country is modeled as:

$$TopRate_t = \alpha + \beta WWI_t + \gamma \mathbf{X}_t + \epsilon_t$$

where t indexes year; *Top Rate* is the top tax rate measure; *WWI* is the key measure of war mobilization, *WWI Mobilization*; \mathbf{X}_t is a vector of control variables and is excluded in the initial regression for each country; α , β , and γ are parameters to be estimated; and ϵ_t is the error term. We report Newey-West standard errors to account for serial autocorrelation.⁷² The initial specifications that exclude the control variables are essentially difference-in-means

⁶⁷For Canada, France, and the UK, the entry year is 1914 and for the US, it is 1917.

⁶⁸As this variable is used elsewhere in the paper for all eight countries in our sample, this footnote describes the sources and coding for all eight cases. We adopt a relatively strict definition of a "Left" party that generally includes Socialists, Social Democratic, and Communist parties only. For France, Netherlands, Sweden, and UK, the source for this data is Flora et al (1983). French parties of the left include the Socialist Party, Independent Socialist Party, Socialists, Communist Party, and the United Socialist Party. Dutch parties of the left include the Social Democratic League, Social Democratic Workers, Socialist Party, Communist Party, Revolutionary Socialist Party, and the Pacifist Socialist Party. Swedish left parties include Social Democrats, Left Socialists, Communists, Høglund Communists, Socialists, and Kilborn Communists. Left parties in the UK include Independent Labour Party, Labour Party, National Labour, Communist Party, and Social Democratic and Labour Party. For Canada, the source for this data is Mackie and Rose (1991). The Canadian Labour Party is coded a left party but the Canadian Liberal Party is not. For Japan, the source for this data before 1945 is Scalapino (1968) and after 1945 is Mackie and Rose (1991). The Japanese Socialist Party is coded as a left party. For Spain, the source for this data is Caramani (2000). Spanish left parties include the Socialists and the Communists. Following Bartolini's classification, the Democratic party is not coded as a left party and therefore the US is always coded a zero.

⁶⁹The source of this data is Flora et al (1983).

⁷⁰The source for this data is Rusk (2001, p. 50).

⁷¹The source for this data is Elections Canada, A History of the Vote in Canada, Appendix Voter Turnout Since Confederation, <http://www.elections.ca>.

⁷²The results reported assume a single-period lag in the calculation of the Newey-West standard errors though they are robust to longer lag structures.

tests before and after the start of the war. The specifications that include the control variables make this same comparison but adjust for before and after differences in the top rate that are a function of levels of economic development, the representation of Left parties in the legislature, and the extent of the franchise.

Table A1 reports the ordinary least square estimates for this analysis for each country. In the specifications without control variables, the estimated coefficient for the variable *WWI Mobilization* (β) is positive, statistically significant, and ranges in magnitude between 35.5 for France and 45.7 for the US. This confirms the before and after differences apparent in Figure 3 in the paper. Participant countries raised their top marginal tax rates during the war and kept them at higher levels throughout the decade that followed. The resulting average increase was quite large—around 40 percentage points.

A strength of this initial analysis is that the comparisons are within countries and not threatened by unobserved country differences. A weakness of the analysis is that for it to be a reliable estimate of the effect of the war, one must assume that top income tax rates would have remained approximately the same had each country not participated.

We can relax this assumption somewhat by including time-varying control variables for levels of economic development, the representation of left parties in the legislature, and the extent of the franchise. Table A1 reports these results for each of our four cases. Inclusion of the control variables has a substantial effect on the magnitude of the estimates for Canada, the UK, and the US, but in all four cases the differences in top rates after entry into the war are positive and statistically significant at least at the 0.10 level.

For Canada, the available GDP per capita data does not start until 1920 and so this variable is omitted from the analysis. The estimates for *Left Seat Share* and *% Electorate* are not statistically significant, but their inclusion reduces the estimate for *WWI Mobilization* to 23.2 with a standard error of 12.5 (p-value is 0.075). For France, all three control variables are available, but none of the coefficient estimates for these measures are statistically significant and their inclusion has no impact on the estimated effect of *WWI Mobilization* (34.9 with a standard error of 6.7 and p-value equal to 0.000). For the UK, again all three controls are available. In this case, there is some evidence of the expected positive correlation between the percent of the electorate enfranchised and the level of the top income tax. The estimate for *% Electorate* is 1.0 with a standard error of 0.4 indicating that a 1 percentage point increase in the eligible electorate is associated with a 1 percentage point increase in the tax rate. This is a relatively large and substantively meaningful estimate. The inclusion of the control variables results in a coefficient estimate for *WWI Mobilization* of 19.7 with a standard error of 10.3 (p-value is equal to 0.067). Finally, given that our coding of *Left Seat Share* is constant throughout for the US, this variable cannot be included in the US analysis. For the specification with control variables for the US, the coefficient estimate for *WWI Mobilization* increases to 83.7 and is precisely estimated.

Overall the evidence in Table A1 indicates that there remain, consistent with our argument, significant differences in top income tax rates before and after mass mobilization for the First World War controlling for levels of economic development, the representation of Left parties in the legislature, and the extent of the franchise. The weak results with respect to the extent of the franchise are undoubtedly explained by the fact that in all four war participants a large fraction of the adult male population had the right to vote well before the onset of the war. The results with regard to Left parties are more surprising given the

common assessment that the aftermath of World War I was associated with the rise of the Left.⁷³

B Appendix: Interrupted Time Series Analysis, 1850-1970

In this section, we analyze the impact of mass warfare on progressive taxation for the period 1850 to 1970 and allow for heterogeneity in the effect of mass mobilization across the cases. We model the top rate of income taxation for the four countries in our sample that have experienced wars that required mass mobilization and for which we have data for nearly the entire 120 year period.

To select these cases, we construct a variable indicating whether or not a country engaged in mass warfare between 1850 to 1970. We constructed the variable *War Mobilization* equal to 1 if in a particular year, the country was engaged in an interstate war and at least 2 percent of the population was serving in the military and equal to 0 otherwise.⁷⁴ The merits of this measure and the alternatives that we examined are discussed in the main text of the paper.

For our eight countries, six—Canada, France, Japan, the Netherlands, UK, and the US—experience mass interstate wars and two do not—Spain and Sweden. Our series for Canada is missing both mobilization data and *GDP per capita* data before 1920, and so we omit it from our individual country time series analysis. Similarly, the Netherlands has missing data problems that prevent a convincing time series analysis.

The dependent variable for this analysis is the *Top Rate* variable described above. The main independent variable is *War Mobilization* and the control variables are *GDP per capita*, *Left Seat Share*, and *% Electorate* as defined above.

The *Top Rate* series for each country is modeled as:

$$TopRate_t = \rho TopRate_{t-1} + \alpha + \beta WarMobilization_t + \gamma X_t + \theta T + \varepsilon_t$$

where t indexes year; *Top Rate* is the top tax rate measure; *War Mobilization* is the key measure of participation in mass warfare; X_t is a vector of control variables and is excluded in the initial regression for each country; T is a linear trend variable; $\rho, \alpha, \beta, \gamma$, and θ are parameters to be estimated; and ε_t is the error term. Note that because some countries experience more than one case of mass warfare in this analysis, our modeling strategy has changed in at least two important ways. First, rather than coding mass mobilization in terms of before and after, the variable *War Mobilization* is simply equal to one for mass mobilization war years and zero otherwise. Second, we include a lagged dependent variable to model the dynamics for the top rate series as an autoregressive process in which current realizations of the top rate variable depend on past realizations. These two changes in the specification are important for interpreting the results. Any shift in top rate taxation due to mass mobilization from war has a long run impact that is a function of precisely how responsive current values of the top rate are to past realizations.

⁷³Our results regarding the absence of an effect of partisanship on top tax rates parallel those of Atkinson and Leigh (2007).

⁷⁴Our data for incidents of war comes from the Militarized Interstate Dispute Data, Version 3.0 (2003). Our data on mobilization is from the Correlates of War Project, National Material Capabilities Data, Version 3.0 (2005).

Table A2 reports the ordinary least square estimates for the analysis for each country. Across all eight specifications, the coefficient for the variable *War Mobilization* (β) is positive and in all but one—Japan in the specification without controls—statistically significant. These results are consistent with the main claim of the paper that mass warfare raises the demand for progressive income taxation. The estimate of β divided by one minus the coefficient on the lagged dependent variable yields the implied long-run effect of war mobilization on top tax rates. In the specifications with control variables, this estimate is equal to 53.8, 21.6, 108.3, and 74.1 for Canada, Japan, the UK, and the US respectively. Although there is significant variation in the magnitude of these estimates across countries, the substantive size of the estimated effects is quite large. At least for these cases, it appears that mass warfare matters a lot for how progressive the tax system is and that these effects persist. It is particularly interesting that we observe this effect, though somewhat smaller in magnitude, for Japan which would not conventionally be described as democratic for the years in which it experienced mass warfare.⁷⁵

The results for the control variables are generally negative. There is little evidence in the individual country time series that *GDP per capita*, *Left Seat Share*, and *% Electorate* are systematically related to the top tax rate measure. Two partial exceptions to this generalization are the estimate for *% Electorate* for France and the estimate for *Left Seat Share* for Japan. The estimated coefficient for *% Electorate* for France is equal to 0.345 with a standard error of .119 and p-value equal to 0.074 and the estimate for *Left Seat Share* for Japan is 0.114 with a standard error of 0.068 and p-value equal to 0.099. Each of these estimates is suggestive of the expected impact of the expansion of the franchise and political representation of the Left on progressive taxation.

Overall, the evidence in Table A2 resonates strongly with our analysis of the First World War and with the pooled analysis in the text. Examining the record of income taxation from 1850-1970 suggests that countries that experience wars that require mass mobilization increase their top income tax rates substantially, and this response has long run consequences for the progressivity of the tax system. There is much less evidence consistent with the usual claim that expansion of the franchise and the rise of Left parties have driven progressive income taxation over the long run. As we pointed out in the discussion of the First World War results, the country time series analysis has the advantage of allowing heterogeneity in the impact of war on taxation but relies heavily on assumptions about how well we can project what would have happened to tax rates in the absence of mass warfare. In this long run analysis, we rely on the assumption of an autoregressive process with a single lag, a linear time trend, and our control variables. The analysis in the text pooling the data from all eight of our cases including information from countries that did not participate in mass warfare in the same years as others to construct an alternative set of comparisons for estimating the effect of war mobilization.

⁷⁵The smaller magnitude but significant effect for Japan is consistent with the main argument of the paper that mobilization for mass warfare increases tax progressivity generally but is also consistent with the possibility that this effect may be greater in democracies, a possibility for which the test discussed in the paper does not find evidence for but for which the paper suggests merits further research.

Appendix: Data Description for Marginal Tax Rates

United States - We use the top marginal tax rate as reported in Senate Committee on Finance (2001) for the years 1913-1970 and Kennan (1910) for 1862-1872. In both cases the rates presented are statutory top marginal tax rates, and these include any surtax. In order to estimate marginal tax rates at the 90th, 99th, and 99.9th percentiles of the income distribution we use the information in Piketty and Saez (2007) on the total number of tax units. McCubbin and Scheuren (1989) provide information on the number of individuals with income above specific levels. We have used rates in 1914 for pre-war and 1918 for post-war World War I.

United Kingdom - For the top rate during the period between the inception of the income tax in 1799 and 1919 we refer to the standard rate of income tax as reported in Mitchell (1988) and to super tax rates as reported by Mallett and George (1929 p.399). For the period between 1920 and 2002 we use data on the top marginal tax rate on wage income provided by Anthony Atkinson and Andrew Leigh. In order to provide an estimate of marginal tax rates facing individuals at the 90th, 99th, and 99.9th percentiles we used Atkinson (2007), who provides an estimate of the total number of tax units, and Mallett and George (1929), who provide information on marginal rates for income tax and super tax, as well as information on the number of individuals earning income above specific levels. We have used rates for 1913/1914 for pre-war and 1918/1919 for post-World War I.

Netherlands -For the top rate Salverda and Atkinson (2007 p.455) report effective top share tax rates for the period following the establishment of the modern Dutch income tax 1914-1999. We use the series for the effective tax rate on the top 0.05% income group. For the period prior to 1914 we rely on Seligman (1908 p.79) and Kennan (1910 pp.135-145) who suggest a top rate of 3.2% on business (including salaried income) for this period. For tax rates at the 90th, 99th, and 99.9th percentiles we use the data in Salverda and Atkinson (2007 p.455). It should be noted that the rates they report are for effective tax rates for all individuals at or above a specific point in the income distribution, a measure that differs from one reporting the marginal rate faced by an individual at a specific point in the income distribution.

Japan - Moriguchi and Saez (2007 Table A0) report statutory top marginal tax rates for Japan for all years 1886-2005. In order to estimate marginal rates facing individuals at the 90th, 99th, and 99.9th percentiles prior to and following World War I we use data from Shiomi (1957) who reports marginal tax rates in 1914 and 1918, the total number of taxpaying families, and a breakdown of the number of taxpaying families by income level. We have referred only to rates on Class III income.

Canada - Saez and Veall (2007 p.301) report a top marginal tax rate series for the period 1920-2000 calculated by taking the income for someone at a given threshold and then calculating tax liability by consulting the income tax schedule applicable in the given year. We use the maximum rate reported for each year (column 10). For 1917-1920 we refer to the top statutory marginal tax rate reported in Perry (1955 ch.10). For the pre and post-World War I comparison of marginal tax rates at the 90th, 99th and 99.9th percentile, rates are zero in the pre-war period due to the absence of a federal income tax. For the post-war rates we use the rates for 1920 reported in Saez and Veall for each of these income levels.

Sweden - Roine and Waldenström (2008) report top share tax rates for the years 1903-2004 including both the state (national) income tax and the communal (local) income tax.

We use their series for the highest marginal tax rate. We also use their series for the marginal tax rates facing individuals at the 90th, 99th, and 99.9th percentiles of the income distribution. Sweden had no income tax prior to 1903. We used rates in place in 1911 for pre-World War I and 1920 for post-World War I.

France - For purposes of measuring the top marginal tax rate in France Piketty (2001 ch.4) provides full schedules showing marginal income tax rates for France for the years 1915 to 1998. He also reports a series for the top marginal tax rate that takes into account surcharges (*majorations*), including those levied only on certain types of households, such as those without children (p.325, 566). His goal is to consider the marginal tax rate faced by the household in the most unfavorable position. Our goal is slightly different in that we seek exclusively to measure the marginal tax rate faced by the richest households. In addition, we also face some uncertainty whether any surcharges of the sort reported by Piketty for France have been taken into account in the other country series that we use. In order to maximize the likelihood of inter-country comparability, we constructed a top rate series for France based exclusively on the top marginal rates (*barèmes d'imposition*) reported in Piketty (2001 Tables 4-1 to 4-5). The main difference between the two series is that focusing exclusively on the *barèmes d'imposition* results in a lower tax rate for the period immediately after World War I and for the Second War War. As a result, our choice here would if anything bias our results against finding a significant effect of war mobilization on tax progressivity. In order to obtain an estimate of the marginal tax rate faced by individuals at the 90th, 99th, and 99.9th percentiles prior to and following World War I we used the tax schedules reported by Piketty, his figures for the total number of tax units (p.566 Table A1), as well as his figures for the number of tax units by income threshold (p.566 Table A-2 column 1). For the pre-WWI rate we have used the earliest available rate (1915) and the rate in 1920 for the post-war rate, the year in which a very sizeable increase in income taxation was implemented as part of a package to finance war debts.

Spain - Alvaredo and Saez (2007 Table F1) report top statutory marginal income tax rates for Spain for 1933-1973 onwards. Prior to this date Spain did not have a national income tax, implying that pre and post World War I rates were set at the same level (zero).

<i>WWI Mobilization</i>	32.811 (4.461) 0.000	36.378 (4.115) 0.000	32.882 (4.410) 0.000	31.068 (3.503) 0.000	34.006 (3.408) 0.000	30.722 (3.603) 0.000
<i>GDP per capita</i>		-10.317 (2.427) 0.000	-9.638 (2.405) 0.000		-5.943 (2.418) 0.015	-5.606 (2.494) 0.026
<i>Left Seat Share</i>		-0.123 (0.099) 0.214	-0.156 (0.096) 0.108		-0.087 (0.117) 0.460	-0.127 (0.119) 0.291
<i>Male Universal Suffrage</i>		7.856 (2.356) 0.001	6.097 (2.326) 0.009		6.998 (2.514) 0.006	5.466 (2.642) 0.040
<i>Revenue to GDP</i>			58.287 (18.690) 0.002			48.269 (17.359) 0.006
Linear Trend	Yes	Yes	Yes	No	No	No
Year Fixed Effects	No	No	No	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	248	228	222	248	228	222

Table 1: World War I and Progressive Income Taxation, 1900-1930, Pooled Estimates. The Table reports the results of OLS regressions for the variable *Top Rate* on the indicator variable for mass mobilization in World War I, *WWI Mobilization*, and various control variables for the years 1900-1930 for the eight countries in our sample. Each specification includes fixed effects for each country. The first three specifications condition on a common linear trend and the last three specifications include indicator variables for each year. The table reports the OLS coefficient estimates for each variable, their Newey-West standard errors in parentheses, and p-values. A constant term is included in each regression but not reported in the table.

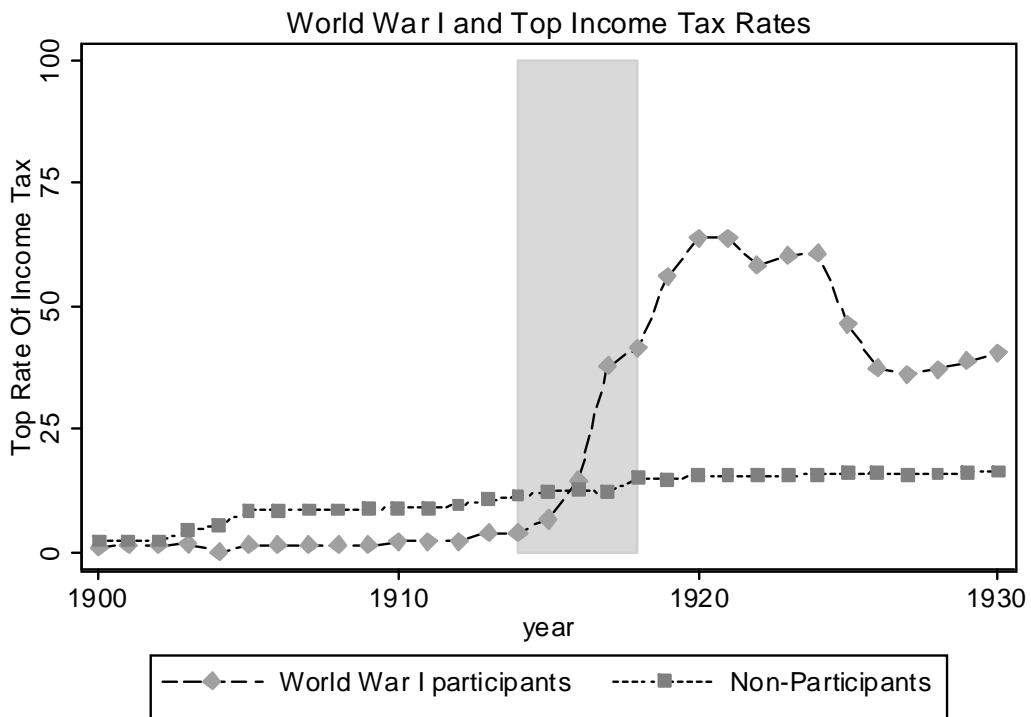


Figure 1: Compares average top marginal income tax rate in four high mobilization countries (US, UK, France, Canada) and four low mobilization countries (Sweden, Netherlands, Japan, and Spain). High mobilization is defined as participation and mobilization of more than 2.0% of population. See data appendix and text for full description of rate definitions and sources.

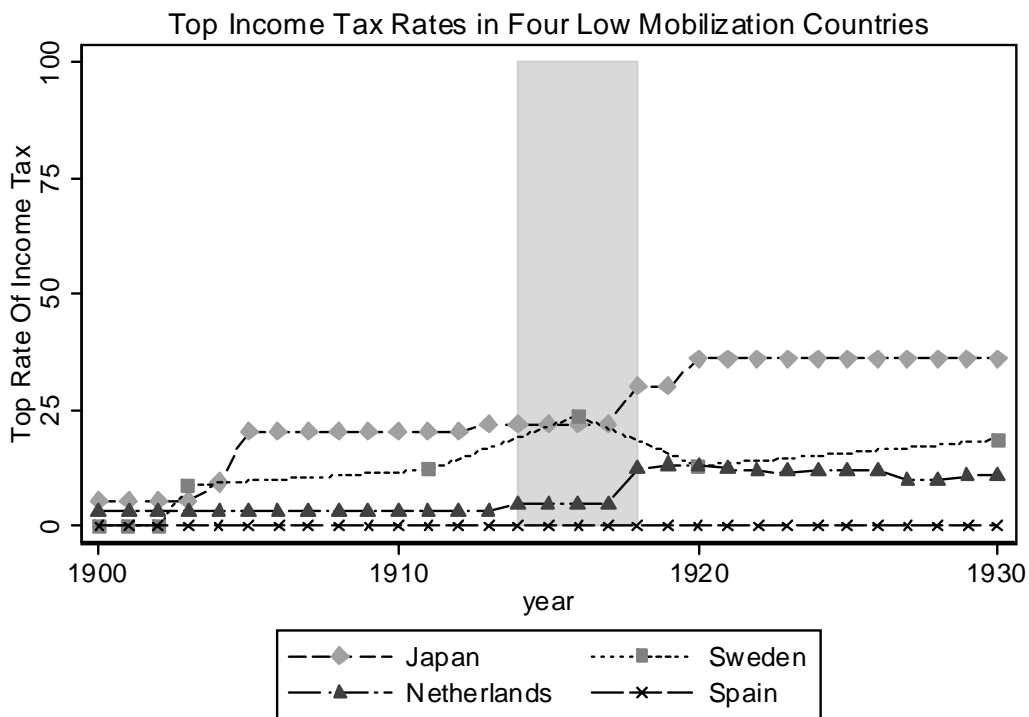


Figure 2: Low mobilization is defined as non-participation in World War I or participation with less than 2.0% of population mobilized. Sources: Japan (Moriguchi and Saez, 2007) Netherlands (Salverda and Atkinson, 2007) Sweden (Roine and Waldenstrom, 2007) Spain (Alvaredo and Saez (2007)). See text and data appendix for full description.

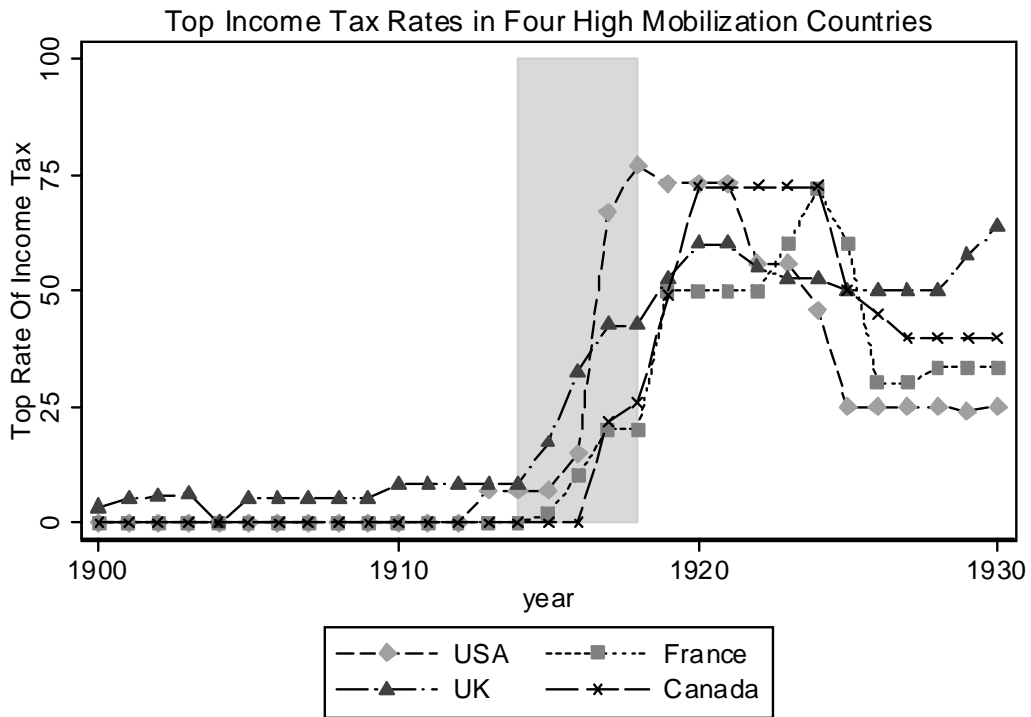


Figure 3: High mobilization defined as participation in World War I with more than 2.0% of population mobilized. Sources: USA (Senate Committee on Finance, 2001) UK (Atkinson and Leigh 2007) France (Piketty, 2001), Canada (Saez and Veall 2007; Perry 1955). See text and data appendix for full description.

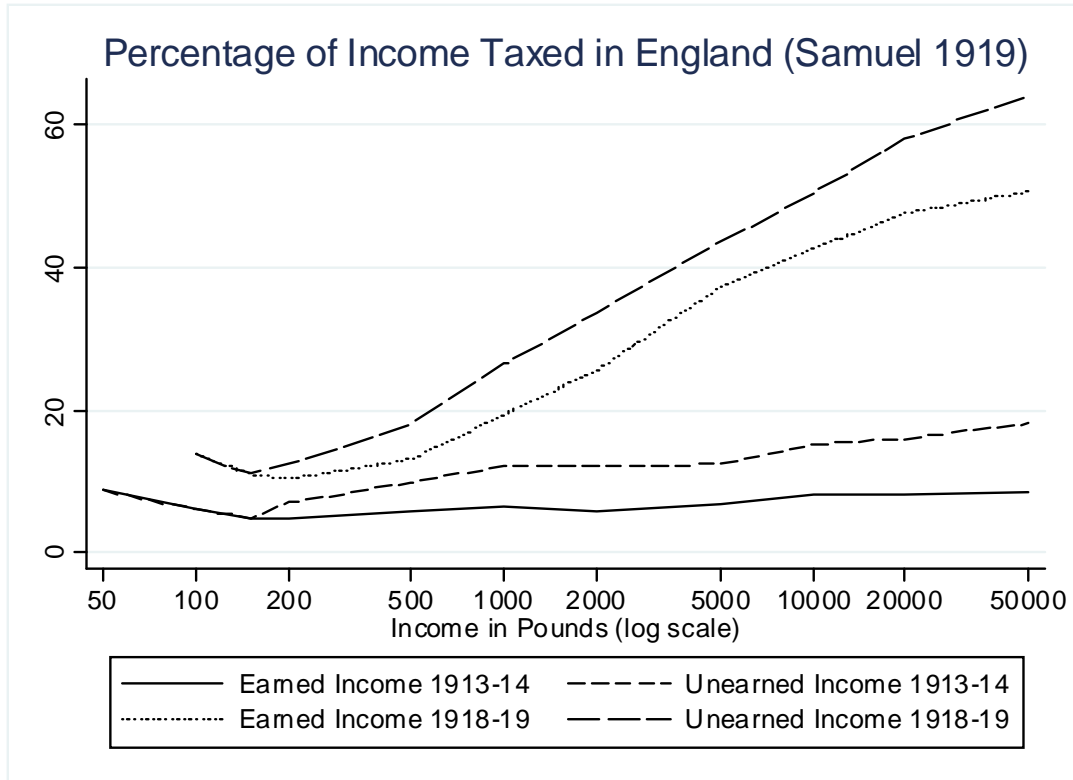


Figure 4: Reports Samuel's (1919) estimates of total taxes paid as a percentage of income before and after World War I. Includes income taxation, inheritance taxation, and all forms of indirect taxation. These calculations do not include the incidence of excess (war) profits duties.

U.S. Public Opinion on Income Tax Progressivity Before and After Onset of World War II

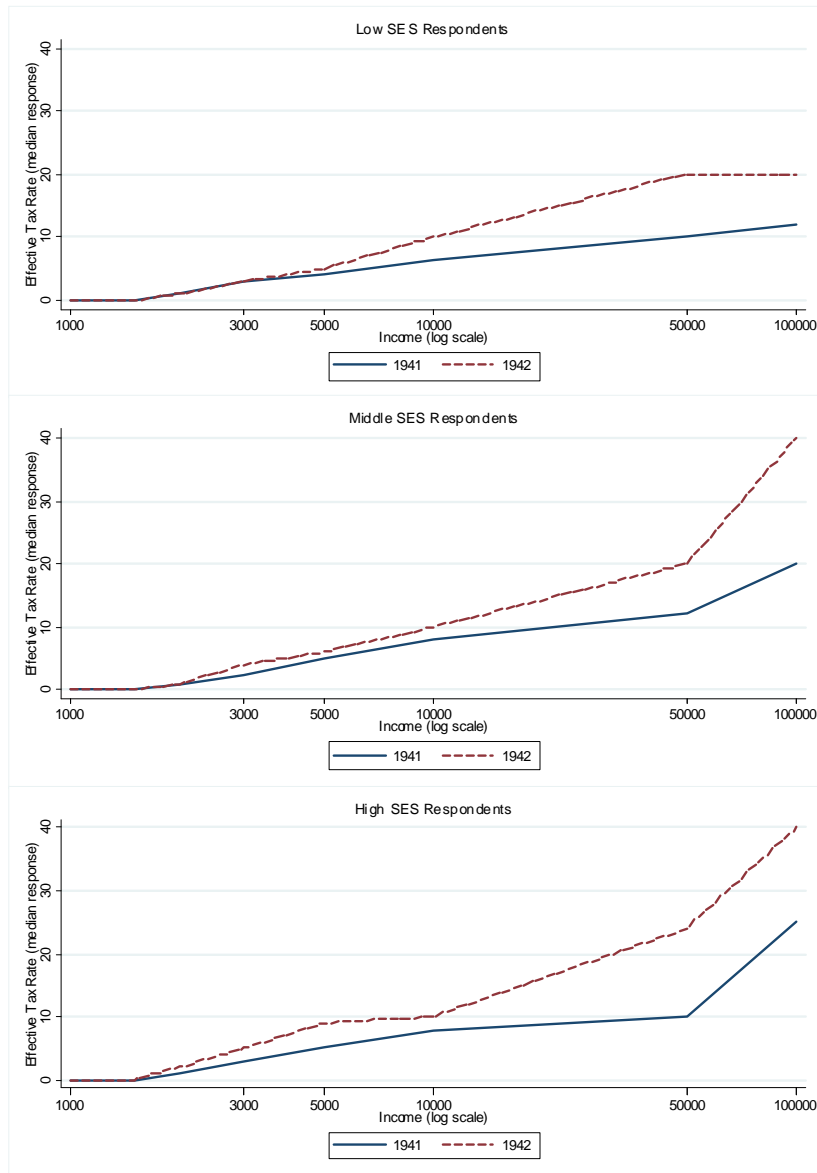


Figure 5: Reports median responses to Gallup questions eliciting effective income tax preferences in the U.S. public before and after the onset of World War II for a family of four with various levels of income. Preferred tax schedules are reported separately for low, middle, and high SES respondents as determined by the interviewer’s coding of the respondent on a subjective class scale. The data sources are Gallup Poll #1941-0242 and Gallup Poll #1942-0263.

	Pre-War	Post-War	Difference
<i>90th Percentile</i>			
Participant Countries	0.0	4.3	4.3
Non-Participant Countries	2.8	3.3	0.5
Difference-in-differences			3.8
<i>99th Percentile</i>			
Participant Countries	1.4	12.1	10.7
Non-Participant Countries	3.7	5.0	1.3
Difference-in-differences			9.4
<i>99.9th Percentile</i>			
Participant Countries	2.6	25.0	22.4
Non-Participant Countries	5.7	7.6	1.9
Difference-in-differences			20.6
<i>Top Rate</i>			
Participant Countries	4.3	63.0	58.7
Non-Participant Countries	9.7	16.5	6.8
Difference-in-differences			51.8

Table 2: World War I and Progressive Income Taxation, Changes in Average Marginal Tax Rates. The table reports pre- and post-war average marginal income tax rates for the 90th, 99th, and 99.9th percentiles in participant and non-participant countries. See Data Appendix for sources.

<i>Top Rate</i> _{<i>t</i>-1}	0.937 (0.013)	0.938 (0.015)	0.907 (0.020)	0.918 (0.018)	0.916 (0.018)	0.885 (0.023)
	0.000	0.000	0.000	0.000	0.000	0.000
<i>War Mobilization</i>	4.158 (1.113)	4.187 (1.110)	4.603 (1.112)	3.475 (1.091)	3.521 (1.100)	3.899 (1.118)
	0.000	0.000	0.000	0.001	0.001	0.000
<i>GDP per capita</i>		-0.118 (0.177)	-0.316 (0.195)		-0.036 (0.209)	-0.276 (0.232)
		0.506	0.106		0.863	0.234
<i>Left Seat Share</i>		0.021 (0.016)	0.004 (0.019)		0.008 (0.017)	-0.016 (0.020)
		0.180	0.836		0.647	0.431
<i>Male Universal Suffrage</i>		-0.620 (0.678)	0.045 (0.801)		-0.892 (0.706)	-0.299 (0.879)
		0.360	0.955		0.207	0.734
<i>Revenue to GDP</i>			5.883 (4.961)			4.180 (4.911)
			0.236			0.395
Linear Trend	Yes	Yes	Yes	No	No	No
Decade Fixed Effects	No	No	No	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
S.E.R.	4.647	4.673	5.103	4.589	4.618	5.052
Observations	881	871	715	881	871	715

Table 3: War Mobilization and Progressive Income Taxation, 1850-1970, Pooled Estimates. The Table reports the results of OLS regressions for the variable *Top Rate* on its lagged values, the indicator variable for war mobilization, *War Mobilization*, and various control variables for the years 1850-1970 for the eight countries in our sample. Each specification includes fixed effects for each country. The first three specifications condition on a common linear trend and the last three specifications include indicator variables for each decade. The table reports the OLS coefficient estimates for each variable, their panel-corrected standard errors in parentheses, and p-values. A constant term is included in each regression but not reported in the table.

	Canada		France		UK		US	
<i>WWI Mobilization</i>	42.012 (8.500) 0.000	23.162 (12.512) 0.075	35.529 (6.692) 0.000	34.915 (6.749) 0.000	41.246 (4.763) 0.000	19.694 (10.295) 0.067	45.740 (8.104) 0.000	83.667 (9.393) 0.000
<i>GDP per capita</i>				2.906 (10.168) 0.777		-0.699 (5.317) 0.896		-14.459 (8.175) 0.088
<i>Left Seat Share</i>		-21.236 (32.364) 0.517		-0.183 (0.606) 0.765		-0.052 (0.212) 0.807		
<i>% Electorate</i>		1.936 (1.435) 0.188		1.455 (1.166) 0.223		1.046 (0.436) 0.024		-0.570 (0.222) 0.016
Observations	31	31	31	31	31	31	31	31

Table A-1: World War I and Progressive Income Taxation, 1900-1930, Individual Country Estimates. The Table reports the results of OLS regressions for the variable *Top Rate* on the indicator variable for mass mobilization in World War I, *WWI Mobilization*, and various control variables for the years 1900-1930. The table reports the OLS coefficient estimates for each variable, their Newey-West standard errors in parentheses, and p-values. A constant term is included in each regression but not reported in the table.

	France		Japan		UK		US	
<i>Top Rate</i> _{<i>t</i>-1}	0.923 (0.036)	0.925 (0.037)	0.827 (0.052)	0.730 (0.067)	0.963 (0.015)	0.952 (0.022)	0.912 (0.034)	0.922 (0.048)
<i>War Mobilization</i>	0.000 (1.614)	0.000 (1.780)	0.000 (2.392)	0.000 (2.830)	0.000 (0.923)	0.000 (1.020)	0.000 (2.786)	0.000 (2.864)
<i>GDP per capita</i>	0.000	0.025 (0.482)	0.255	0.042 (0.445)	0.000	0.000 (0.532)	0.079	0.046 (0.496)
<i>Left Seat Share</i>		0.601 (0.058)		0.496 (0.068)		0.485 (0.037)		0.122
<i>% Electorate</i>		0.530 (0.119)		0.099		0.414 (0.038)		0.004 (0.078)
<i>Year</i>		0.074 (0.028)		0.017 (0.043)		0.799 (0.058)		0.959 (0.058)
	0.051 (0.028)	0.017 (0.043)	0.151 (0.046)	0.233 (0.065)	0.039 (0.017)	0.046 (0.058)	0.076 (0.036)	0.136 (0.058)
	0.069	0.687	0.001	0.001	0.021	0.428	0.036	0.020
S.E.R.	5.222	4.709	4.681	4.811	2.720	2.736	6.980	6.966
Observations	121	116	111	101	121	121	121	121

Table A-2: War Mobilization and Progressive Income Taxation, 1850-1970, Individual Country Estimates. The Table reports the results of OLS regressions for the variable *Top Rate* on its lagged value, the indicator variable for mass mobilization in war, *War Mobilization*, a year trend, and various control variables for the years 1850-1970. The table reports the OLS coefficient estimates for each variable, their standard errors in parentheses, and p-values. A constant term is included in each regression but not reported in the table.