The Conscription of Wealth:

Mass Warfare and the Demand for Progressive Taxation

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Abstract

Recent scholarship argues that progressive taxation, characterized by high tax rates for upper income groups, played a significant role in reducing income inequality for much of the twentieth century. Moves away from tax progressivity may likewise help explain the recent increase in inequality observed in some countries. But what factors made progressive taxation politically sustainable in the first place? For scholars in political economy, a common answer to this question is to refer to the role played by the expansion of the suffrage and by the development of political parties that mobilize working class groups. We propose a different explanation that emphasizes how participation in mass warfare created demands for increased tax progressvity as a means of ensuring equal sacrifice between those who fought and those with high incomes. 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 increased 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 tradeoff between the benefits of progressive taxation in terms of equal sacrifice and reducing income disparities (to the extent this is seen as desirable) while also considering the associated costs involving altered work incentives. But precisely because choices about progressive taxation inevitably 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 in taxes when compared with other groups. For scholars in political economy, by far the most common response to this question has been to suggest that the rise of progressive taxation (as well as other redistributive policies) 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. In this paper we propose a different explanation involving the way in which mass warfare led to the development of new demands for progressive income taxes characterized by very high rates for those at the top of the income distribution. As one way of supporting this argument, we then show empirically that mass mobilization for war has been very closely correlated with the adoption of more progressive income tax policies. Further evidence regarding the political context in which tax rates became more progressive is also supportive of our interpretation. In the absence of war, we find significantly less evidence that the presence of either universal suffrage and free elections or presence of parties of the left in a

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

legislature made a difference for tax progressivity.

It has frequently been argued that participation in total war during the twentieth century has led to important social changes, often involving the extension of new political and social rights in cases where they were previously restricted. Our core argument fits with this broad observation while making a more specific claim about the link between war and income taxation. In constructing this argument we rely in particular on the observations of John Hicks (1942) regarding economic incentives in wartime and pressures to tax war wealth. 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, sustaining a war effort also requires the continuing mobilization of both labor and capital for normal economic production. Outside of the context of a command economy, individuals will only supply labor and/or capital for production if they enjoy a sufficient private return from doing so. This creates the potential of a disparity between individuals who sacrifice themselves at the front and others who enjoy war profits, a disparity that can lead to demands for the taxation of war wealth and war profits. One way of taxing war profits (or perceived war profits) is to adopt a more progressive income tax structure characterized by high marginal rates for top earners. From this we derive the prediction that mass mobilization for war should be associated with increases in tax progressivity.

Our empirical tests involve the use of time series on top income tax rates for a group of eight countries. The bulk of this data has been collected by authors involved in the project on top incomes over the twentieth century.[2] We suggest that in the absence of complete in-

[2] A full detailing of rates and sources is presented in the appendix. The eight countries and principal sources include the United States (Senate Committee on Finance, 2001); France (Piketty 2001 ch.4); Sweden (Roine and Waldenström, 2007, Japan (Moriguchi and Saez, 2007), Canada (Saez and Veall, 2007), the Netherlands (Salverda and Atkinson, 2007), Spain (Alvaredo and Saez, 2007), and the United Kingdom. We would like to thank Jesper Roine and Daniel Waldenström for generously providing us with their data on top tax rates over the twentieth century in Sweden. We would also like to thank Anthony Atkinson and Andrew Leigh for

formation on a country's tax system top marginal rates of income tax can nonetheless provide a useful if imperfect indication about the extent of tax progressivity. Where possible we also supplement this with evidence from alternative measures of progressivity. This measurement issue aside, we believe that for scholars in political economy 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 World War I, because of the specific possibilities provided by this conflict for identifying the effect of war on tax progressivity. It should be emphasized though that the robustness of our empirical results does not depend on focusing on this war to the exclusion of other mass wars of the twentieth century. We adopt two different empirical strategies.

The first approach involves considering each country series separately and using a standard interrupted time series approach to consider whether mass mobilization for war was associated with a significant upward shift in top tax rates, controlling for other potential political determinants such as the percentage of the adult male population that was enfranchised, and the representation of parties of the left within a country's legislature. This approach has the advantage of not making any assumptions about the effect of war being homogenous across countries. It also allows for the fact that there are significant differences in the tax systems of all eight countries we consider, and that this heterogeneity complicates the objective of using a comparison of top income tax rates across countries in order to draw inferences about differences in the tax burden on the rich. Based on these tests we conclude that there is a very significant effect of war on top tax rates, both when focusing on relatively short before and after comparisons for World War I as well as when considering the series over a much longer period from 1850 to 1970. There is much less evidence in our results in favor of the interpretation that either universal suffrage or strong representation of the left were sufficient conditions for tax progressivity to dramatically increase.

Our second approach involves pooling together the time series for the eight countries and testing for the effect of war. This design has the disadvantage of ignoring the heterogeneity

kindly providing us with their data on top income tax rates in the United Kingdom.

of tax systems across the eight countries (though our inclusion of country fixed effects in these regressions should mitigate this concern to some extent), in addition to the risk of bias if the effect of war is not constant across countries. When considering World War I in particular, however, the pooling approach also has a very significant advantage. 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 participated in World War I is provided both by their own experience prior to the war and by the experience of other countries that did not participate in the war. Using this approach we obtain very similar substantive conclusions about the effect of war on tax progressivity. We also continue to find little robust evidence of an effect of either the extent of suffrage, or of the representation of parties of the Left within a country's legislature.[3]

Our argument and empirical results cast new light on current debates about democracy, 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 has been "accidental".[4] It can be explained by a story where events like wartime destruction and economic depression helped to destroy great fortunes, and following these events the presence of high top rates of income tax and inheritance taxation prevented fortunes from becoming reconstituted. The empirical evidence in favor of this interpretation is certainly far from conclusive, but even if it were conclusive it would leave an important question unanswered—what force made it politically possible to sustain high top tax rates in the first place?[5] The simple need for war finance cannot answer this question, because many wars across the centuries have been financed with indirect taxes for which the incidence is likely to be far from progressive. One possibility, following existing political economy accounts, is that the implementation of high top tax rates has been a direct product of democratization. If so,

[3] This latter result parallels a similar finding by Atkinson and Leigh (2007) when considering five Anglo Saxon countries.

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

[5] Two recent studies by Atkinson and Leigh (2007) and Roine, Vlachos, and Waldenström (2008) find evidence of a negative correlation between top marginal tax rates and top income shares in a cross-country setting. Atkinson (2004) discusses the difficulties in measuring whether higher top rates actually reduce top income shares or merely induce individuals to shift income between different categories.

then twentieth century reduction in income inequality may have been less accidental than it appears; the steady march forward of democracy may have led to the adoption of high top tax rates, and the presence of steeply progressive taxation would have inevitably led to a reduction in top fortunes, potentially accelerated by shocks. 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 As a result, our paper reinforces and helps complete the interpretation that much of the observed reduction in income inequality may have been accidental rather than inevitable, to the extent that very high top tax rates may have been a product of war rather than an inevitable product of democracy.

2 Mass Mobilization and the Demand for Progressive Taxation

At least since Otto Hintze (1906) it has been observed that participation in large scale warfare has had an important effect on state development, including in particular the capacity to tax.[6] Simultaneously, scholars have suggested that large scale warfare can lead to the extension of new political rights or new economic benefits for those who fight.[7] This process is most commonly associated with the experience of mass warfare between the industrialized countries during the twentieth century, but it is hardly exclusive to it, and examples also abound from more distant times or places.[8] Our argument fits squarely within this tradition, but it also depends upon a more specific set of observations that can help to explain why participation in mass warfare would lead to new demands for progressive taxation.

Proponents of progressive income taxation, and in particular those during the early twentieth century, have offered as a justification for this policy, the principle of equal sacrifice—

[6] More recently this argument has been associated with the work of Charles Tilly (1990). Besley and Persson (2007) have recently argued that the reason wars generate investments in state capacity has to do with the fact that defense is a public good. Even if defense is a public good, however, there may nonetheless be significant divisions over how this public good is financed.

[7] This could also apply to those who participate in the war effort more generally. See Marwick (1974 ch.1) for a concise review of historical writing on the social consequences of war.

[8] What one author has suggested may be Europe's first social revolution, which took place in Flanders during the fourteenth century, was triggered by the demands of popular groups that had successfully repelled an invasion by King Philip IV of France. Blockmans in Blickle p.261.

taxation should be based on the principle that each individual should be expected to surrender the same degree of utility that they derive from their income. As long as individuals have utility functions characterized by diminishing marginal utility of income, then those with high incomes can contribute more without incurring the same loss.[9] To the extent that notions about the relative sacrifice of different individuals have any effect on actual attitudes towards progressive taxation, then we might logically expect attitudes to shift in favor of more progressive taxation during or in the aftermath of wars. Modern mass warfare involves the mobilization of a significant fraction of a country's population, often through the mechanism of conscription, and individuals mobilized are expected to sacrifice time, income, and potentially their lives for a collective cause in the same way as if they were paying a tax. A second feature of modern mass warfare is that it places particular production demands on a nation's economy, and, outside the context of a command economy, increased demand for certain goods can result in some individuals deriving a higher profit than they would otherwise, either in the form of increased wages or increased returns on capital investments. For observers like Hicks (1942) it is this disjuncture between individuals who are compelled to sacrifice themselves at the front and others who profit from the war economy that can lead to demands for taxation of war wealth and war profits. This includes taxes such as capital levies which, because of their scope, can have perverse effects on economic incentives.

We argue that this same wartime context should also lead to demands for more progressive income tax schedules, to the extent that those who fight are seen to be drawn principally from the bottom and middle of the income distribution while the bulk of war profits are enjoyed by those at the top of the distribution. Even without war profits becoming an issue, however, we can still expect that participation in mass warfare can lead to demands for more progressive taxation. This would be the case if it is perceived that lower income groups have sacrificed more heavily for the war effort, and that higher income groups should thus bear a heavier share of the burden in financing a war as well as in financing benefits for returning soldiers. Because wars are often financed by borrowing, which implies long-run tax commitments, and

[9] See Atkinson (1973) and Blum and Kalven (1952) for discussions of the evolution of this principle.

because commitment to veterans benefits also implies a long-run commitment, we can also therefore expect that mass warfare may have durable, and not just temporary, effects on tax progressivity.

What evidence can we bring to bear to test our hypothesis? Our argument has clear implications for the evolution of tax progressivity over time and across countries, and the bulk of the empirical evidence in this paper will concentrate on this issue. We can also support our intuitions by referring to contemporary debates and the fact, for example, that a newspaper like *The Economist*, which initially opposed the principle of progressive taxation, by 1940 could publish an editorial suggesting that "In time of war, excess profits taxes, luxury duties and very heavy taxation on the rich are all needed."[10] Ultimately, because our argument involves a specific prediction about individual attitudes towards progressive taxation, it also has clear implications at the micro level. When a country participates in a mass war we should also observe a shift in the expressed preferences of individuals with regard to tax progressivity. Possibilities for testing this implication are limited by the dearth of survey data for the pre-1945 period. However, in the case of the United States where the existence of Gallup opinion polls allows us to consider individual opinions towards progressive taxation going back to the 1930s, it is interesting to note that we actually observe a significant shift towards increased support for progressivity during World War II. Figure 1 reports the responses from two separate Gallup polls, one from 1937 and 1942, which asked specific questions about the rate at which individuals with different incomes should be taxed. As can be seen, the tax schedule implied by the 1942 responses is significantly more progressive than for the pre-war survey.

Though we acknowledge that participation in mass warfare may also be associated with the demanding and granting of new political rights, it should be emphasized that we make no claim either that mass warfare will only result in more progressive taxation in democracies, or that democratization will necessarily result in more progressive taxation. This distinguishes us from the arguments of Acemoglu and Robinson (2000) about universal suffrage

[10] *The Economist*, January 13, 1940 p.46.

as a mechanism for committing to redistribution, as well as with the arguments of Ticchi and Vindigni (2006) who suggest that an elite group may be prompted in anticipation of war to grant universal suffrage as a means of committing to redistribution.[11] In either of these two models democratization by assumption produces a change in the identity of the median voter and thus a shift in favor of increased redistribution.[12] The argument that we have sketched out informally in this section suggests that mass warfare may lead to increased tax progressivity due to a change in attitudes regarding equal sacrifice. In the absence of such a change in attitudes, democratization may do far less to produce a shift in the nature of taxation. Whether this is the case is an issue for empirical investigation that we will tackle in the rest of this paper. Likewise, it is also possible that a shift in attitudes could have an impact on the tax system of a non-democracy, provided that there is some other mechanism that could prompt a ruler to take citizen attitudes into account.[13] This could involve the threat posed by unrest. It could also involve the desire to improve compliance with military conscription.[14]

Just as our argument makes no claim about democracy, we also make no suggestion that the political dominance of parties of the Left is either a necessary or a sufficient condition for progressive taxation to be adopted. It is undoubtedly the case that calls for the "conscription of wealth" have more frequently been associated with parties on the left of the political spectrum, as hinted by our opening quote. As a result, one might plausibly expect that war participation would only result in more progressive taxation if the left is in power, or

[11] 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. Cukierman and Meltzer (1991) consider a set of conditions under which a shift in the identity of the median suffer, such as due to an expansion of the suffrage, would result in an increase in tax progressivity.

[12] More generally, discussions 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. Aidt et al (2004) have presented empirical evidence that questions this assertion, while Lindert (2004) has presented evidence to support it. See Przeworski (2007) for a cross-national evaluation of the correlates of suffrage extension.

[13] Steinmo (1993 p.23) suggests that in the absence of universal suffrage it is unlikely that World War I would have resulted in high top tax rates.

[14] Levi (1997) emphasizes the way in which governments may offer important concessions to citizens in terms of rights or policies so as to improve compliance with military conscription.

if the left represents a sufficiently serious electoral threat that it prompts other parties to adopt similar policies with regard to income taxation. But while the presence of a strong left may well lead to increased redistribution in this manner, it is also entirely possible that mass warfare could produce a shift in attitudes that prompts parties across the political spectrum to advocate more progressive income tax policies even in the absence of a serious electoral threat from socialist or social democratic parties.[15]

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 is commonly believed. 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

[15] The artice by Hoffmann (1961) provides an interesting early example of the observation that two political groupings which were diametrically opposed, the Vichy government and the French Resistance during World War II, each when faced with the need to respond to wartime conditions responded with a similar extension of social policies.

this same sort of "difference-in-differences" comparison for World War II, given that almost all European countries were participants in the conflict. The experience of World War I may thus be particularly useful for identifying the effect of mass warfare on demands for progressive taxation. In this section we first begin by presenting 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 around the time of the war. We then present econometric tests of our argument based first on individual country time series and subsequently a pooled estimate that allows a difference-in-differences comparison.

3.1 Pre-World War I Development of Progressive Taxation

Great Britain in 1799 was the first industrial country to adopt a direct tax on income, a measure adopted to raise war finance against the major threat posed by Napoleon's armies. As a consequence, discussions of the modern income tax often begin with this event.[16] 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 which 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

[16] This is the case, for example, with the classic early account on the income tax by Seligman (1911).

seem extremely low. But for contemporaries such as Seligman (1911) the British adoption of a graduated income tax was seen as a watershed event. What was not anticipated was how subsequent events during World War I would drastically change the picture.

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. In 1848 a deputy to the German Federal Assembly proposed a progressive income tax with a top rate of 33.3%.[17] Also in 1848, Pierre-Joseph Proudhon proposed to the French Constituent Assembly that it establish an income tax with a top rate of 50%.[18] By all accounts, however, that 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."[19] 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 of 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 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

[17] Seligman (1911 p.235).
[18] Seligman (1991 p.279).
[19] *The Economist* March 10, 1883

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%.[20] In sum, for an observer of international events in early 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, multiple countries would adopt taxes that saw the richest members of society pay more than 50% of their income in taxes.

3.2 Progressive Taxation and World War I

World War I placed unprecedented 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. 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.[21] As one indication of the trend towards progressivity, the bottom or "standard" rate increased by much less, rising from a little less than 6% in 1914 to 30% in 1920. More complete assessments of British tax changes during World War I show a very marked increase in tax progressivity at almost all levels of income.[22] Observers at the time also suggested that in a country like the United Kingdom the changes

[20] Japan was an outlier with a top rate of 22% in 1913, but it should also be remembered that Japan had mobilized for the Russo-Japanese war of 1904-1905.

[21] Mallet and George (1929 p.395, 399).

[22] Samuel (1919) conducted a painstaking analysis designed to estimate the tax burden including all types of taxation and at all different levels of income. According to his estimates a household earning 200 pounds sterling in annual income would have paid 4.8 percent of this income just before the war and 10.3% after the war. A household with an annual earned income of 1000 pounds sterling would have paid 6.6% of this income in taxes just before the war whereas after the war this proportion rose to 19.4%. The increase in taxes for a household nearer the top of the distribution earning 5,000 pounds was much steeper, amounting in a shift in the overall tax rate from 6.8% to 37.2% over the same period.

in the tax system had an important effect on the distribution of both income and wealth.[23] In the United States a dramatic wedge also appeared between the top and bottom rates of income tax, with the top rate rising from 7% at the outset of the war to 77% by the end, while the bottom rate increased from 1% to 6%.[24] Data on average tax rates paid by households at different levels of income further suggest that there was a general increase in progressivity of federal income tax at all levels of the income distribution. So if the increase in the top tax rate was the most dramatic, this was not the whole story.[25] 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% and which subsequently raised this rate to 72.5% by 1920.[26] In France, a national income tax, which had been under consideration for some time, was first implemented in 1915 with a top statutory rate of 2% and a bottom rate of 0.4%. By 1919 the top rate had risen to 50% while the bottom rate remained low at 2%.[27] It should be remembered that the tax rates cited above are not fully comparable across countries, due especially to differences in exemption limits and thresholds. We can, however, use these rates with greater confidence to consider change within countries over time, and here we see that World War I was associated with a dramatic shift in favor of progressive taxation. We can also use these rates with greater confidence to make comparisons about the rates at which different societies were willing to tax their richest members.

It should be emphasized that the top income tax rates referred to above certainly applied to a very small percentage of households, and that 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 paid by something on the order of 0.1% of households,

[23] For early discussions of the effect of the increase in taxation on the distribution of incomes and wealth see Hirst (1934) and Bowley (1930).

[24] See Senate Committee on Finance (2001). Similar developments took place with regard to inheritance tax and corporate taxation.

[25] See Carter et al. (2006) Table Ea758-772. Federal income tax rates, by income group-average rates: 1913-1970

[26] See Perry (1955 p.162)

[27] Piketty (2001) ch.4 presents an overview of the development of the income tax during this period. As part of this he emphasizes how World War I represented a significant break in terms of what was seen as a desirable tax rate on top incomes. The rate we quote here does not include any surcharges imposed, which in 1919 had the effect of raising the top marginal rate to 62.5%. In the data appendix we discuss the reasons for excluding these surcharges for reasons of inter-country comparability.

but this fraction increased over time as the threshold was dropped.[28] The increase in the standard rate of income tax during the war also meant that a broader section of households experienced a significantly greater increase in taxation than did working class groups. In other countries, such as France and Canada the fraction of households liable at the top rate of income tax was substantially smaller, on the order of 1000 households and 500 households respectively.[29] 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. More generally, as emphasized by Piketty (2001 pp.259-261) the move to a 50% top tax rate in 1920 represented an action of huge symbolic importance as a sitting government dominated by the Right for the first time felt compelled to heavily tax France's richest households. As stated above, we believe that it is an important task for political economy to ask what factors might prompt a society to tax its richest members at such rates. Nonetheless, in the analysis that follows, we also consider broader measures of tax progressivity such as the proportion of central government revenues raised through the income tax.

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. A historical series on top income tax rates exists 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.[30] In addition, in both of these countries parties of the political left first gained a significant

[28] See Atkinson (2007 p.95).
[29] See Piketty (2001 p.556) and Saez and Veall (2007).
[30] In 1911 in Sweden and 1918 in the Netherlands.

share of parliamentary seats at this time. What is interesting is that despite these similar political conditions, outcomes with regard to top tax rates were very different in Sweden and the Netherlands when compared with France and the UK.

Figures 2 through 4 present the available information on top tax rates between 1900 and 1930 for our four sample countries that were heavily mobilized and participated in World War I and in the four sample countries that were either neutral or which did not mobilize heavily. In Figure 2 we average together top income tax rates within each group. Figures 3 and 4 then present the disaggregated information for each country. It is apparent from these figures 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. While the lack of a sharp upward break in tax progressivity in Sweden and the Netherlands raises questions about the effect of universal suffrage, Figure 2 does match closely with previously political economy work on income taxation by Steinmo (1993) who emphasized how, throughout a significant part of the twentieth century the United States and United Kingdom had top tax rates that were as high or higher than Sweden.

What was the political context in which top income tax rates in countries that participated in World War I were raised to unprecedented levels? One way of gaining perspective on this question is to remember that the First World War was associated with the emergence of new demands for the taxation of "war wealth" and "war profits".[31] 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 either volunteered or 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

[31] It was also a feature of the war that in countries like the United Kingdom, France, and Germany sitting governments actively sought the support of parties of the political left by bringing their representatives into governments. This was the case with Arthur Henderson, who entered the British government in 1915, with Léon Jouhaux in France, and with several leaders of Social Democratic Party in Germany.

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.[32] A similar point was made in a *New York Times* editorial of August 24, 1917, but such observations seem to have done little to weaken calls for new taxation of top income groups.[33] 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.[34] 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 taxes or duties of one form or another, in parallel with or immediately preceding the major increases they adopted in top rates of income tax. Moreover, in each case these taxes were set at rates that prior to the war would have seemed confiscatory. In the United Kingdom the government adopted an excess profits duty in 1915 that was maintained through 1921 at an average rate of 63 percent.[35] In the United States an excess profits tax was levied

[32] Marwick (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.

[33] The *New York Times* article suggested with regard to calls for the conscription of wealth that "Rich men are doing, and willing to do their part in this war. They are ready to pay, some of them have already paid, their children's lives to the defense of democracy; and they should be taxed, and are willing to be taxed, high. They ought not to be maligned in addition."

[34] Grotard and Hautcoeur (200?) emphasize how discussions of taxation of corporate profits in France between 1914 and 1926 focused on the idea of taxing corporations that had profited from the war and that doing so would be a means to counterbalance the losses of war victims.

[35] Hicks et al (1942 p.72) note that the actual yield as lower at only 34%.

that by 1918 reached a rate of 80 percent.[36] Similar schemes were adopted in France where the top rate on this tax reached 80% by 1917, as well as in Canada. Interestingly, this was also the case for Germany and for Austria which also both adopted war profits taxes with very high top rates.[37] There was a difference, however, in that in these latter two countries the administration of these taxes proved less effective than in the US or UK.

Finally, it is also of particular interest that the three Scandinavian countries also adopted wartime profits taxes. Even though they were not direct participants, as explained in Hicks et al. (1942 ch.XVIII) high German demand for certain products such as iron and butter helped raise prices on basic consumption goods while simultaneously raising the issue of war profiteering. If even neutral countries adopted taxes on war profits, then one might think that this would undermine our claim that such taxes were adopted under political pressures for equal sacrifice on the part of those who were not risking their lives at the front. A closer look shows that experience in the three Scandinavian countries is actually very consistent with our core argument. In each of the three countries a progressive tax on war profits was levied, but in no case was the top rate of this tax very high. Hicks et al. (1942 p.166) suggest that the Swedish tax of 1916, which imposed a 24 percent tax on profits above a certain level, was the highest rate.

One question one might ask is whether the conclusion we draw from Figure 2, 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. Its constituent states did have income tax systems, generally with graduated rates, though the levels of these rates remained low even during World War I. 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.[38] It should also be emphasized that as in a country

[36] Hicks et al. (1942 p.121).

[37] See Kuczynski (1923) for evidence on German war taxation and Bogart (1919) for evidence on Austrian taxes during the war.

[38] *New York Times*, December 5, 1919 "Erzberger Offers Great Tax Budget".

like France, which did not increase its top marginal income tax rate substantially during the war but which did so afterwards, in Germany the Weimar government's actions also followed on the heels of significant war profits levies during the war itself. 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.

The evidence in Figures 2 through 4 lends significant support to our idea that participation in mass warfare was associated with drastic 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.

3.3 Interrupted Time Series Analysis, 1900-1930

We start this more formal analysis by examining the differences from 1900 to 1930 in the top rate of taxation before and after entry into the First World War for the four participant countries in our sample. This analysis allows for heterogeneity in the effect of mass mobilization on the progressivity of taxes across the cases. It also 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.[39] 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.[40] 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 *GDP per capita* is equal to gross domestic product divided by population.[41] The variable *Left Seat Share* is

[39] See Appendix for sources and further description of this variable.

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

[41] The 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).

equal to the percent of seats in the national legislature held by a Left party in a given year.[42] 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.[43] For the US, *% Electorate* is equal to the percent of adults 21 years of age or older that are eligible by law to vote.[44] For Canada, *% Electorate* is equal to the percent of the total population that is registered to vote.[45]

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

$$TopRate_t = \alpha + \beta WWI_t + \gamma X_t + \varepsilon_t$$

where t indexes year; *Top Rate* is the top tax rate measure; *WWI* is the key measure of war mobilization, *WWI Mobilization*; 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. The initial specifications that exclude the control variables are essentially difference-in-means 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

[42] As 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, Hoglund 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 Candian 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.

[43] The source of this data is Flora et al (1983).

[44] The source for this data is Rusk (2001, p. 50).

[45] The source for this data is Elections Canada, A History of the Vote in Canada, Appendix Voter Turnout Since Confederation, `http://www.elections.ca`.

legislature, and the extent of the franchise.

Table 1 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 4. 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 1 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 at least 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 1 indicates that there remain, consistent with our argument, significant differences in top income tax rates before and after participation in the First World War controlling for levels of economic development, the representation of Left parties in the legislature, and the extent of the franchise.[46] 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 aftermath of World War I was associated with the rise of the Left.[47] Finally, it is of course still possible that the differences we observe between the pre-war and post-war period are a function of a secular trend or other factors not captured by our control variables. The analysis that follows addresses this concern by comparing changes in the top rate in participant and non-participant countries.

3.4 Pooled Analysis, 1900-1930

This section evaluates the impact of participation in the First World War on progressive income taxation by examining how top rates were set in our full sample of eight countries. Our approach in this section requires the assumption that the impact of war is homogeneous across countries, which is a more restrictive assumption than required in the preceding individual

[46] In unreported results, we replicated these country analyses for France, the UK, and US employing an alternative measure of progressivity defined as the top income tax rate minus the bottom income tax rate. The results were quite similar. We do not have data on bottom rates for Canada or for most of the non-participant countries in our sample.

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

country analysis. However, our pooled evaluation has the substantial advantage of allowing 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 for participant countries to construct the counterfactual for what would have happened to top rates in participant countries had they not entered the war.

For this pooled analysis, we employ the same dependent and independent variables as in the individual country analysis with one exception. We do not have comparable measures of the *% Electorate* variable for each country. Therefore, 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.[48]

The *Top Rate* is modeled as:

$$TopRate_{it} = \alpha + \beta WWI_{it} + \gamma X_{it} + \eta_i + \theta f(T_{it}) + \varepsilon_{it}$$

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; $f(T_{it})$ is a function of time, either a simple linear trend or vector of dummy variables for each year between 1900-1930;[49] α, β, γ,and θ are parameters to be estimated; η_i are country fixed effects parameters also to be estimated;[50] and ϵ_{it} is the error term. We again report Newey-West standard errors to account for serial autocorrelation. 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 participant countries with changes over the same period for non-participant countries. 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

[48] We 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).

[49] The initial year is excluded due to the constant.

[50] Again, we omit one country due to the constant.

representation of Left parties in the legislature, and the extent of the franchise.

Table 2 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 32.811 with a standard error of 4.461 and p-value of 0.000. 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). Thus, across both these specifications which include country fixed effects and a linear time trend, there is substantial evidence that the top rate increased substantially 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, and the extent of the franchise.

The estimates in columns three and four of Table 2 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 34.0 with a standard error of 3.4 for the specification including the control variables. Given that each specification includes both country fixed effects and year dummy variables, this is rather compelling evidence that mass mobilization for the First World War is associated with a statistically and substantively significant increase in the top tax rate.

Across both sets of specifications in Table 2, 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 both specifications. For example, the estimate is 7.0 with a standard error of 2.5 for the specification with year dummy variables. This indicates that male universal suffrage was, all else equal, associated with a higher top tax rate of 7 percentage points. Although overall the evidence in this paper is at best mixed on the impact of the expansion of the franchise,

the estimates in Table 2 are the strongest in the paper for such an effect. With this said, the magnitude of this effect is still not very large compared to our estimated effect of war participation on the top tax rate. Finally, Table 2 reports a negative and significant partial correlation between *GDP per capita* and the *Top Rate.*

There are a number of potential concerns about the pooled estimates. First, the implicit assumption in this approach is that, whatever the initial differences in top tax rates between participant and non-participant countries, absent participation in 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 2 through 4 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.

Another potential concern about these estimates is the possibility that countries select into the war based on its anticipated impact on progressive taxation. A few considerations suggest that this is unlikely. First, a large literature on entry into the First World War suggests that few initial participants expected the long costly, mass mobilized war that ensued but rather anticipated a short and decisive conflict.[51] Second, it seems implausible given what was at stake that countries would choose to participate in the war even in part based on considerations about the impact of the war on the progressivity of taxation. In the vast literature on the causes of the First World War, we are not aware of such an argument being made. Third, at least some accounts would suggest that with the partial exception of the US, that the participant countries in our sample did not select into the war at all much less as function of its anticipated effect on progressive taxation. A common account is that the event that precipitated the war was of course a political assassination and the participation of France, the UK, and Canada was not certain until Germany decided to follow the Schlieffen Plan for a general European war that started with a Western offensive.

Finally, one might ask whether the effect of the First World War on tax progressivity is

[51] The often cited quote from Kaiser Wilhem to the departing troops in August 1914 is "You will be home before the leaves have fallen from the trees."

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 does indicate a larger impact of the war on progressivity. To explore this claim further, we replicated our analysis for an alternative measure of tax progressivity, *Income Tax Share*, equal to the percentage of central government revenues raised by the income tax.[52] 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. 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 coefficent 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. This result is consistent with the claim that mass warfare has a general impact on tax progressivity that is not limited to the highest income tax rates.

3.5 Summary

In this section, 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. 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.[53] The evidence during this period for more conventional accounts is mixed. There are

[52] The 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 (XXXX, pp. 136-7).

[53] Japan is a partial exception to this general pattern.

almost no results consistent with an emphasis on the rise of the political Left leading a move to more progressive taxation, but there is some evidence consistent with the argument that expansion of the franchise facilitated greater tax progressivity over time. We will, however, revisit this result in the analysis of progressive taxation over the long run that follows.

4 War and Progressive Income Taxation in the Long Run

4.1 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. The main objective of this analysis is to evaluate whether our findings for the First World War generalize. We start our evaluation of this period by modeling 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.[54] 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 risk their lives as well, and it must 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.[55] Note that we think that there are good reasons to expect that the effect of mass civil wars may be different than

[54] Our 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).

[55] More precisely, our war mobilization variable is coded one for Canada in 1941-1945 (as discussed below, mobilization data is missing for Canada before 1920); 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.

the impact of mass interstate wars. Our data do not track civil conflicts. That said, it is interesting to note that the two most salient civil wars during this time period for our cases seemed to result in an increase in progressive income taxes. The United States adopted an income tax with an initial top rate of 5 percent which was eventually raised to 10 percent during its Civil War. The tax was in effect for a decade. Almost immediately after the Spanish Civil War, Francisco Franco raised the top income tax rate from 11 percent to 44 percent. Nonetheless, we do not include civil conflicts in our coding of mass mobilized wars. We will consider alternative operationalizations to our measure in what follows.

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.

Table 3 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.

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 3 resonates strongly with our analysis of the First World

War. 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 that follows pools 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.

4.2 Pooled Analysis, 1850-1970

This section evaluates the impact of war participation on progressive income taxation by examining how top rates were set in our full sample of eight countries for the period 1850 to 1970. For this pooled analysis, we employ the same dependent and independent variables as in the individual country analysis but again substitute the variable *Male Universal Suffrage* defined above for the variable *% Electorate* due to data availability and comparability.

The *Top Rate* is modeled as:

$$TopRate_{it} = \rho TopRate_{it-1} + \alpha + \beta WarMobilization_{it} + \gamma X_{it} + \eta_i + \theta f(T_{it}) + \varepsilon_{it}$$

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; $f(T_{it})$ is a function of time, either a simple linear trend or vector of dummy variables for each decade between 1850-1970; ρ, α, β, γ,and θ are parameters to be estimated; η_i are country fixed effects parameters also

to be estimated;[56] and ϵ_{it} is the error term. Note that the presence of the country fixed effects and some function of time mean that we are identifying our estimate of the impact of of war mobilization on the top tax rate from within-country variation over time allowing for common shocks.

Table 4 reports the ordinary least square regression estimates for this analysis. The results in the first two columns use a common linear trend for the $f(T_{it})$ function with and without control variables and the estimates in the last two columns use decade dummy variables for the $f(T_{it})$ function. Across all four specifications, the estimated coefficient for the variable *War Mobilization* is positive and statistically and substantively significant. For example, in the specification with a linear trend and control variables, the estimated coefficient is 4.188 with a standard error of 0.774. This estimate implies a long-run effect of 67.5. In the specification with decade dummy variables, the implied long-run effect is 42.0. With both country fixed effects and decade dummy variables, this estimate identifies off of differences in within-country variation over time in mass warfare participation and progressive taxation. This is fairly strong evidence consistent with the main argument of the paper. Across both sets of specifications in Table 4, the results for the control variables are negative. There is little evidence of a significant partial correlation between *GDP per capita*, *Left Seat Share*, and *Male Universal Suffrage* and top tax rates.

One potentially informative way to explore the robustness of these results is to consider more flexible ways to model common trends or shocks. We substituted separate year dummy variables for the decade dummy variables. Our estimates were robust to this alternative specification, though it reduced the magnitude of the coefficient estimate (e.g. in the specification with controls and year dummy variables, the estimate for *War Mobilization* is 2.536 (p-value equal to 0.012)).

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 upward to five percent, the threshold of the percent of the population that needs to be mobilized for

[56] We omit one country due to the constant.

the war to count as a mass mobilization war. The second, *War Mobilization 3,* codes only the two twentieth century world wars as mass mobilization conflicts. This variable is similar to our main measure but in addition to obviously excluding a few wars, it also codes each year of the conflict as a mass mobilization war year as opposed to only those years for which mobilization was above the two percent threshold. 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 4 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 coefficient 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 coefficient estimate for the most restrictive definition of what constitutes a mass war, *War Mobilization 2,* is equal to 4.4 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 3.88 which is somewhat larger than the estimate reported in Table 4 for *War Mobilization.* Finally the coefficient estimate for *War Mobilization 4*, the least restrictive definition of what counts for a mass mobilized war is 2.0. 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. This pattern is also evident in other specifications including substituting separate year dummy variables for the decade dummy variables.

5 Conclusion

This paper argues that participation in mass warfare increases demands for increased tax progressivity as a means of ensuring equal sacrifice between those who fight in wars and those with high incomes. We suggest that this effect persists for some period of time for at least a couple of reasons. First, because wars are often financed in part by borrowing, paying

for them involves a long-run tax commitment as does any veterans benefits that are provided. Second, the sacrifice of the generation that fought in the war and its implications for what are reasonable and fair sacrifices to be expected from the relatively affluent in society influences debates about the tax-and-transfer system more generally.

The paper presents 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. This increase remains evident once controls for other potential determinants of top tax rates such as levels of development, the extent of the franchise, and the representation of parties of the left are introduced. Further, we find a substantial positive war mobilization effect based on differences-in-differences estimates that compare changes in top rates from 1900 to 1930 in participant and non-participant countries. The paper also presents evidence of an effect of mass warfare on top income tax rates over a much longer period from 1850 to 1970. We find much less evidence in our results in favor of the interpretation that either universal suffrage or strong representation of the left were sufficient conditions for tax progressivity to dramatically increase.

Our argument and empirical results have important implications for a number of political economy debates about the determinants of redistribution and progressive taxation. One strain of this literature notes the rise of progressive income taxation and asks what accounts for it. The most common answer to this question is to suggest that the rise of progressive taxation has depended on the development of electoral democracy as well as 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 rise in progressive income taxation. Another strain of this literature notes the rise of progressive taxation and asks why not more, that is why don't the poor soak the rich in electoral democracies. The answers that have been offered to this question are many and varied but an important class of answers focuses on beliefs about fairness, equality, and deservingness. Our argument and evidence about the influence of war contributes to this class of answers by suggesting that what level of taxation is considered to be fair and what sacrifices are required of the relatively wealthy depends in

part on what sort of sacrifices society demands from the rest of its citizens.

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. 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.

Data Appendix on Top Income Tax Rates

United States - Source: Senate Committee on Finance (2001) tax rate for years 1913-1970. Kennan (1910) for 1862-1872. In both cases the rates presented are statutory top marginal tax rates, and these include any surtax.

United Kingdom - For 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.

Netherlands -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, or the top 0.1% group when the former is unavailable (1962, 1964, 1966). 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.

Japan - Moriguchi and Saez (2007 Table A0) report statutory top marginal tax rates for Japan for all years 1886-2005. Prior to this period there was no income tax in Japan.

Canada - Saez and Veall (2007 p.301) report top share tax rates 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).

Sweden - Roine and Waldenström (2006) report effective 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. Sweden had no income tax prior to 1903.

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 participation on tax progressivity.

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.

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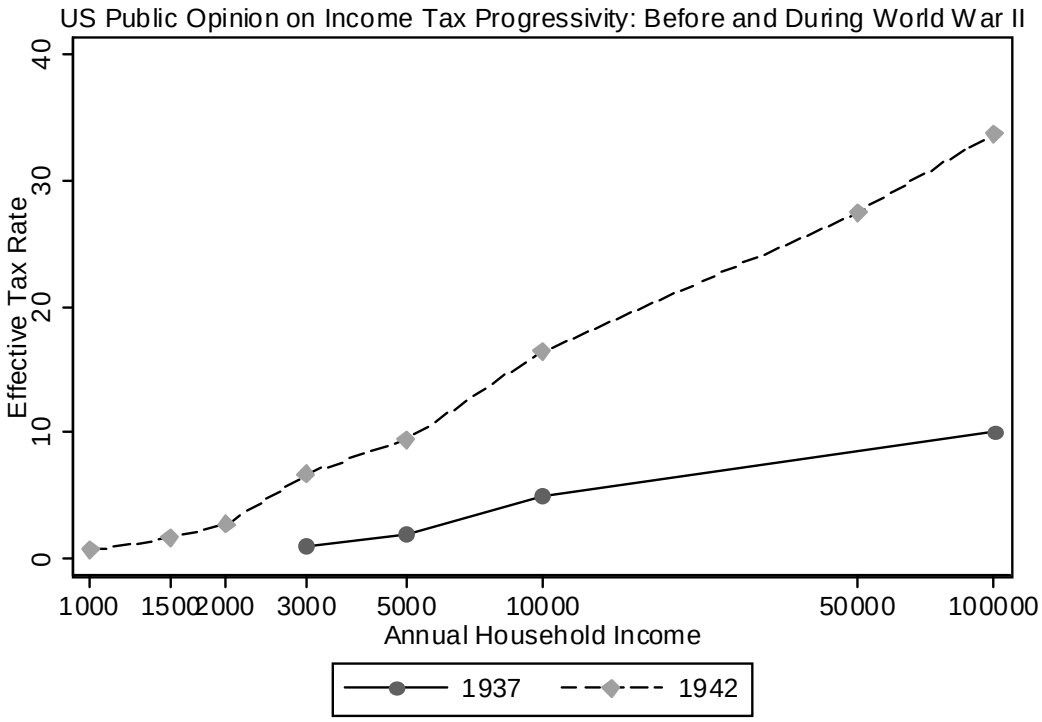

Figure 1: This figure plots the implied effective tax rate suggested by median responses to a Gallup survey question asking U.S. citizens in 1937 and 1942 how much they think a person with a given income should pay in taxes. Income is plotted on a logged scale.

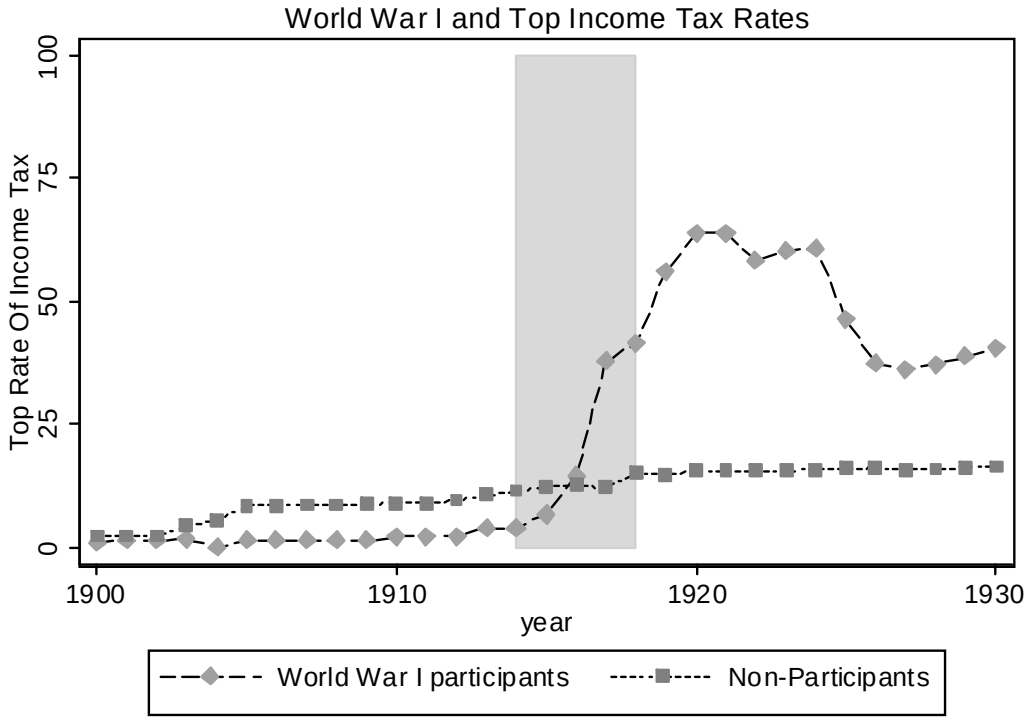

Figure 2: Compares average top income tax rate in four high mobilization countries (US, UK, France, Canada) and four low mobilization countries (Sweden, Netherlands, Japan, and Spain). High mobilization is defined as participation and moiblization of more than 2.0% of population. See data appendix and text for full description of rate definitions and sources.

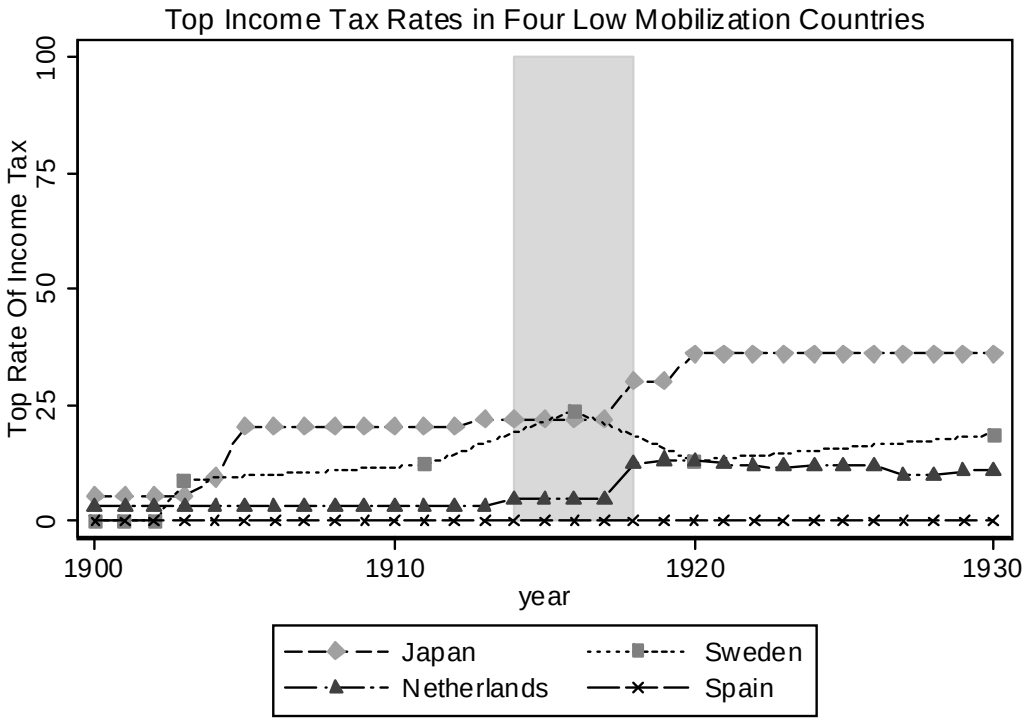

Figure 3: Low mobilization is defined as non-participation in World War I or participation with less than 2.0% of population mobilized. Sources: Japan (Moriguchi and Saez, 2007) Netherlands (Salverda and Atkinson, 2007) Sweden (Roine and Waldenstrom, 2007) Spain (Alvaredo and Saez (2007). See text and data appendix for full description.

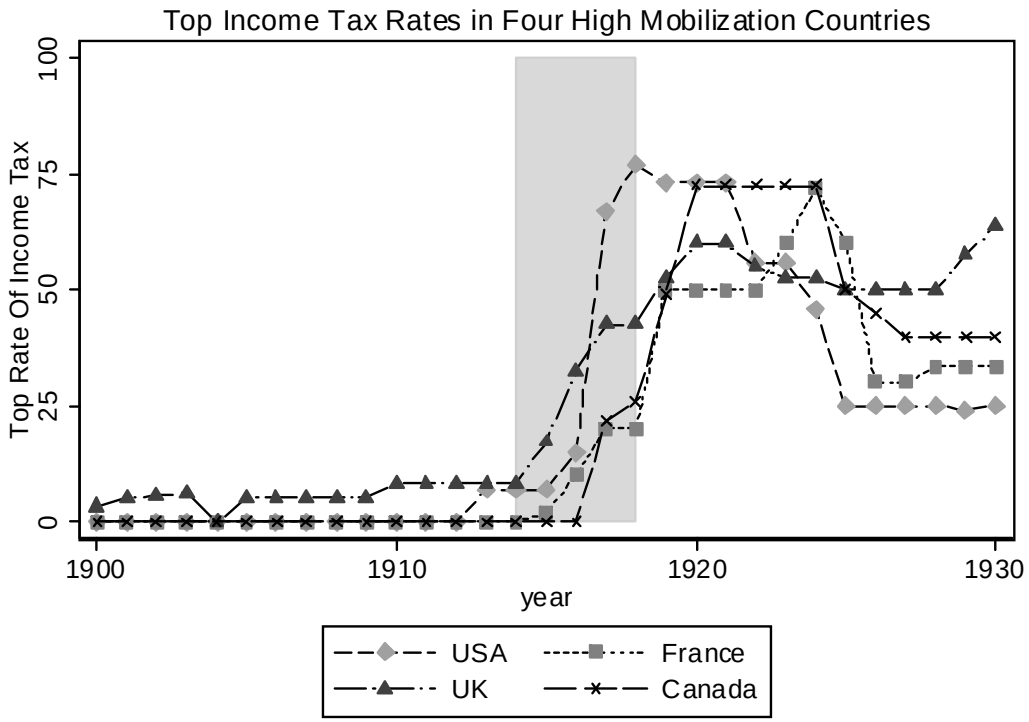

Figure 4: High mobilization defined as participation in World War I with more than 2.0% of population mobilized. Sources: USA (Senate Committee on Finance, 2001) UK (Atkinson and Leigh 2007) France (Piketty, 2001), Canada (Saez and Veall 2007). See text and data appendix for full description.

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

Table 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.

WWI Mobilization	32.811	36.378	31.068	34.006
	(4.461)	(4.115)	(3.503)	(3.408)
	0.000	0.000	0.000	0.000
GDP per capita		-10.317		-5.943
		(2.427)		(2.418)
		0.000		0.015
Left Seat Share		-0.123		-0.087
		(0.099)		(0.117)
		0.214		0.460
Male Universal Suffrage		7.856		6.998
		(2.356)		(2.514)
		0.001		0.006
Linear Trend	Yes	Yes	No	No
Year Fixed Effects	No	No	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	248	228	248	228

Table 2: 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 two specifications condition on a common linear trend and the last two 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.

	France		Japan		UK		US	
Top Rate$_{t-1}$	0.923	0.925	0.827	0.730	0.963	0.952	0.912	0.922
	(0.036)	(0.037)	(0.052)	(0.067)	(0.015)	(0.022)	(0.034)	(0.048)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
War Mobilization	6.364	4.036	2.740	5.823	4.831	5.198	4.938	5.780
	(1.614)	(1.780)	(2.392)	(2.830)	(0.923)	(1.020)	(2.786)	(2.864)
	0.000	0.025	0.255	0.042	0.000	0.000	0.079	0.046
GDP per capita		0.253		-0.304		-0.373		-0.774
		(0.482)		(0.445)		(0.532)		(0.496)
		0.601		0.496		0.485		0.122
Left Seat Share		0.036		0.114		0.030		
		(0.058)		(0.068)		(0.037)		
		0.530		0.099		0.414		
% Electorate		0.345				0.010		0.004
		(0.119)				(0.038)		(0.078)
		0.074				0.799		0.959
Year	0.051	0.017	0.151	0.233	0.039	0.046	0.076	0.136
	(0.028)	(0.043)	(0.046)	(0.065)	(0.017)	(0.058)	(0.036)	(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 3: 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.

Top Rate$_{t-1}$	0.937	0.938	0.918	0.916
	(0.010)	(0.011)	(0.014)	(0.015)
	0.000	0.000	0.000	0.000
War Mobilization	4.158	4.188	3.475	3.528
	(0.767)	(0.774)	(0.831)	(0.849)
	0.000	0.000	0.000	0.000
GDP per capita		-0.114		-0.037
		(0.126)		(0.163)
		0.366		0.820
Left Seat Share		0.020		0.008
		(0.015)		(0.015)
		0.175		0.605
Male Universal Suffrage		-0.584		-0.883
		(0.585)		(0.602)
		0.318		0.143
Linear Trend	Yes	Yes	No	No
Decade Fixed Effects	No	No	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
S.E.R.	4.647	4.673	4.589	4.618
Observations	881	871	881	871

Table 4: 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 two specifications condition on a common linear trend and the last two specifications include indicator variables for each decade. 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.