

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

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September 2008

¹We would like to thank Tony Atkinson, Neal Beck, Tom Cusack, Jim Fearon, Yotam Margalit, Thomas Piketty, Adam Przeworski, Nicholas Sambanis, Daniel Waldenström, David Mayhew as well as seminar participants at Princeton, Rochester, Washington University in St. Louis, and Yale for comments on a previous draft and Brian Fried, Allison Sovey, and Suon Choi for excellent research assistance.

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 political scientists, 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 changed attitudes about taxation, and in particular about the fair burden that should be borne by high income groups. We then show empirically that over the last century mass mobilization for war has been associated with a notable increase in tax progressivity. In the absence of war neither the establishment of universal suffrage, nor the arrival of political control by parties of the Left is systematically associated with large increases in tax progressivity. In making these arguments we devote particular attention to a "difference-in-differences" comparison of participants and non-participants in World War I.

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

1 Introduction

For well over a century, debates about redistribution have focused, among other issues, on the question of progressive taxation. Should individuals pay a tax proportional to their income, or should the rate of taxation actually increase with income, and by how much? Normative discussions have focussed on the trade-off between the benefits of progressive taxation in terms of equal sacrifice and reducing income disparities (to the extent this is seen as desirable) while also considering the associated costs involving altered labor supply and investment incentives. But precisely because choices about progressive taxation can have major distributional implications, it also makes sense to ask what conditions in practice lead actual governments to adopt tax policies in which the rich pay a higher percentage of their income in taxes when compared with other groups. One common, and very plausible, response to this question is to suggest that the rise of progressive taxation has depended on the development of electoral democracy characterized by universal suffrage, as well as on the presence of political parties that mobilize lower income groups.² In this paper we propose a different explanation emphasizing how participation in mass warfare changed attitudes with regard to progressive taxation. As a result of wartime participation it became seen as fair to tax top incomes at unprecedentedly high rates. To support our argument and to test the alternatives we use evidence on top rates of income tax across countries, relying in particular on a comparison of participants and non-participants in World War I. This is supplemented by evidence on the slope of income tax schedules, as well as statements by observers and participants at the time. Our empirical results show that mass mobilization for war has been very closely correlated with the adoption of more progressive income tax policies. In

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

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

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 legislature made a difference for tax progressivity. We also argue that our evidence does not fit with a simple argument that governments during wartime needed money, and that they found it optimal to raise a disproportionate share of war revenues by taxing the rich. Our findings have two significant implications. They suggest for one that the rise of progressive taxation may not have occurred without war. They suggest second that democracy on its own may be insufficient to generate redistribution without changes in attitudes about the fairness of different tax burdens.

Why would war generate a shift in attitudes regarding progressive taxation? If individuals give at least some concern to establishing a fair sharing of the burden for financing public goods, then the environment of modern mass warfare can create new demands for the taxation of top incomes. It is a characteristic of modern mass warfare that very large numbers of individuals make a sacrifice of time, foregone income, and potentially their lives for a collective cause. In many cases individuals make this sacrifice voluntarily, but the institution of conscription also raises the possibility that individuals can be compelled to sacrifice themselves for a collective objective even if the private return they receive from doing so is sufficiently low that they would choose otherwise. At the same time, outside the context of a command economy, sustaining a war effort also requires the continuing mobilization of capital for normal economic production, and capital will only be supplied if its holders receive a sufficient private return from doing so. As emphasized by John Hicks (1942) this creates the potential for protests to emerge that some individuals are compelled to sacrifice themselves at the front as others who remain home, or who have capital that is invested at home, earn profits from the war effort. The Labour Party manifesto of 1918 provides one example of such a protest, and it suggests how this might translate into demands for increased tax progressivity.

We present three types of empirical evidence to examine the effect of war on progressive taxation and to investigate the possibility that war led to progressive taxation because of a shift in attitudes, and not simply because this was an optimal policy for revenue maximizing

governments.

First, we present evidence on the historical context for the development of income taxation. This shows that while by 1914 the income tax was established in many countries and many observers saw it as the wave of the future, at this stage in time top marginal rates of income tax universally remained extremely low (often in the single digits), and even those who supported expanding the share of revenues drawn from income taxation seemed content with the existing rate structure. The year 1914 proved to be a watershed in countries that were war participants. It proved to be a break point in terms of policies as top tax rates in countries participating in the war rose dramatically to levels that seemed beyond the realm of imagination in 1914. It also proved to be a turning point in other terms, as debates about the appropriate levels of taxation on top incomes became inextricably linked with debates about burden sharing during wartime. Interestingly, we observe that taxes became more progressive and the terms of the debate changed even in war participants where parties from the right of the political spectrum held power. France provides one illustration of this phenomenon. When we look at countries like the Netherlands and Sweden that did not participate in the war we observe trends also seen in war participants, including debates about expansion of the suffrage and the development of parties of the left. Interestingly, however, there was no sharp break in these countries either in top income tax rates or, equally importantly, in the political debate about income taxation. The work of Sven Steinmo (2003, 1993) has been important in identifying the divergence between the Swedish, British, and American tax systems at this time. The empirical evidence we present in this paper suggests that this divergence was actually a more general phenomenon between war participants and non-participants.

In addition to the qualitative evidence, we also make use of time-series data on top marginal rates of income tax to examine systematically whether war mobilization made a difference for progressive taxation. The bulk of the tax rate data, which covers eight countries, has been collected by authors involved in the project on top incomes over the twentieth

century.³ Top marginal tax rates are only a proxy for progressivity, but they are available at annual frequencies. It is also inherently interesting to identify the factors that may prompt a society to tax its richest members heavily. We devote particular attention to a difference in differences comparison involving World War I. Since four of the eight countries were significant participants in World War I and four were not, we can conduct an analysis where the counterfactual for countries that 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.⁴ Using this approach we conclude that there was a very significant effect of war participation on top tax rates while there is much less evidence that either universal suffrage or strong representation of the left were sufficient conditions for tax progressivity to dramatically increase. We do not interpret this as meaning that partisanship did not matter. Our country qualitative evidence certainly suggests that those on the left pushed more heavily for high top tax rates than did those on the right. What it does suggest though is that if left and right had different levels of enthusiasm for progressivity, governments of both types felt compelled to tilt policies in this direction. Finally, we also obtain very similar results when conducting tests on individual country series as well as tests on a longer time period 1850-1970.

As a third step in our empirical inquiry, we consider the direct evidence that is available on the extent to which taxation became more progressive in countries that participated in World War I and whether similar developments occurred in non-participants. This evidence serves to verify whether our tests using the top marginal tax rate are simply showing a general tax increase in war participants, as opposed to an increase in progressivity. The evidence strongly supports the latter interpretation. It also sheds insights on the argument that increases in top income tax rates were simply a logical choice made by cash strapped governments. If governments were seeking to use the income tax to raise the maximum

³A full detailing of rates and sources is presented in the appendix.

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

amount of revenue at the minimum cost in terms of collection, then we might well have expected them to concentrate on the wealthy. This was in fact the pattern of income tax collection in the early decades of the twentieth century (though not in later decades). But within the limited group of individuals subject to the income tax there would then be no logical reason to tax lower incomes more lightly. In fact, the pattern we observe for all World War I participants (but not for the non-participants) is that marginal rates of taxation rose very steeply even within the group of individuals subject to the income tax. If governments were concerned about the deadweight costs of taxation, we would also not have expected them to have opted for such a steeply progressive tax schedule, because it is suggested that elasticities of earnings with respect to taxation are the highest for those groups at the top of the income distribution. The contemporary literature on optimal taxation in fact suggests that a government seeking to maximize revenue should adopt something close to a flat tax, or even a regressive tax schedule. If governments were also concerned about minimizing political costs of taxation, and such political costs were increasing in the number of citizens subject to income tax, this might create an incentive to tax the rich heavily, but this effect should apply to any country either at peace or at war. In the end, it is difficult to explain the emergence of steeply progressive tax schedules by referring to optimizing choices of governments seeking to maximize revenue. The very steep pattern of these schedules is, however, perfectly consistent with the suggestion that the wartime context created new demands for progressive taxation that would equalize sacrifices for the war. We would expect such demands to call for higher rates of taxation at successively higher levels of the income distribution.

Our argument and empirical results cast new light on current debates about democracy, inequality, and redistribution. They suggest first that precisely because the rise of progressive taxation was a product of war, it was not an inevitable development.⁵ This claim about inevitability has relevance for political scientists like Mayhew (2005) who have made a similar claim with respect to US welfare state development. It also contributes directly to work on

⁵This point has recently been made by Elliot Brownlee (2004) with regard to the early development of progressive taxation in the United States, but it has not been made in a comparative context that also considers countries that did not participate in World War I.

inequality by authors like Piketty (2003) who has suggested that much of the deconcentration of income observed in advanced industrial countries during the twentieth century was an "accidental" product of war.⁶ According to Piketty the reduction in income inequality can be explained by a story where events like wartime destruction and economic depression helped to destroy great fortunes, and following these events the presence of high top rates of income tax and inheritance taxation prevented fortunes from becoming reconstituted. But his analysis leaves open the question - what force made it politically possible to sustain high top tax rates in the first place?⁷ Our contribution is to suggest how the particular wartime conditions of the twentieth century created political pressures for the adoption of high top rates of taxation.

A second contribution of our study, which follows immediately from the above point, is that electoral democracy may be insufficient to produce a reduction in income inequality in the absence of some event, like a war, that serves to heighten demands for taxation of the rich. If true then this would call for revisiting the assumption in theoretical models like those of Acemoglu and Robinson (2000) or Boix (2003) where the expansion of the suffrage represents a commitment to redistribute.⁸ The same conclusion would apply to the assumption in Ticchi and Vindigni (2008) that wars generate incentives to expand the suffrage, precisely because suffrage expansions represent a commitment to future redistribution toward those who have fought for their country. In contrast, our evidence suggests that democracy does not by itself ensure redistribution without changes in beliefs about the fairness of alternative approaches to taxation. We should make clear that our study is specifically focussed on the question of progressive taxation, and we have not conducted empirical tests regarding overall

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

⁷Two 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.

⁸There is a potentially important difference between the type of redistribution considered in these papers, which involves a proportional tax and a set transfer, and the question of tax progressivity. Under general assumptions, the design of an income tax system in which different individuals pay different rates becomes a multidimensional problem in which conventional median voter results do not hold. See Carbonell-Nicolau (2008) for a review of this literature as well as an attempt to propose a model where income tax progressivity can be observed as an equilibrium outcome even with nonlinear tax schedules.

welfare state development or other policies with redistributive consequences.

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

Finally, we should make clear that our study is specifically focussed on the question of progressive taxation, and we have not conducted empirical tests regarding overall welfare state development or other policies with redistributive consequences. Our results can nonetheless have implications for these other debates. They may lend credence to the claims by authors like Esping-Anderson (1990), Amenta and Skocpol (1988), Skocpol (1992), and Mayhew (2005) that wars have been underemphasized as a causal influence on welfare state development.⁹

2 Mass Mobilization and Demand for Progressive Taxation

There is a long-standing argument that when societies increase the extent to which they rely on the broad mass of citizenry for military service, then they also tend to extend greater political rights to these same citizens. Perhaps the earliest example of this claim comes from

⁹Amenta and Skocpol (1988) and Mayhew (2005) refer to the study of the US welfare state whereas in the introduction to the 1990 version of his book Esping-Anderson makes a more general claim. It is less clear that this claim applies to the work of historians, given the contributions of scholars like Marwick (1965, 1974). The importance of warfare in the secular growth of government expenditure has been suggested by Peacock and Wiseman (1961).

Aristotle who made such a statement when referring to oligarchies in Greece.¹⁰ Similar claims have been made for China during the Warring States period as well as by Weber (1923) with regard to the expansion of citizenship rights in Western Europe.¹¹ It seems logical to expect that expansion of rights to hold political office or to vote would also translate into lower levels of economic inequality.¹² If so, then there would be a link between the breadth of military participation and economic inequality. The argument we develop in this section follows the above line of thought by emphasizing the effect of war on progressive taxation. However, by emphasizing the effect of war on attitudes we also attempt to suggest why the extension of political rights alone might be less likely to lead to greater progressivity. We focus in particular on suggesting that military conscription may be an efficient means of fighting a mass war but that the decision to opt for conscription will in turn generate demands for greater progressivity of taxation in order to ensure equality of sacrifice between those with wealth and those without.

2.1 Conscription, Fairness, and Tax Progressivity

Take the case of a government that needs to finance a war in an economy composed of individuals who can supply labor and some of whom also own capital representing accumulated wealth. Typically, we think of the material and salary costs of a war being financed by a mix of increased consumption and income taxes and deferred taxation (borrowing). But the existence of military conscription also gives governments the opportunity of levying a tax in kind on labor. Henry Sidgwick (1883) suggested explicitly how conscription could serve as a means of funding an army while economizing on the deadweight costs of the taxation that

¹⁰"When, however, states began to increase in size, and infantry forces acquired a greater degree of strength, more persons were admitted to the enjoyment of political rights" p.188 in *The Politics*, edited by Ernest Barker, 1946.

¹¹See Hui (2005) for this observation regarding China during the warring states period and Finer (1975) for an extended discussion of the "format" of military force and social stratification over the course of Western European History. Andreski (1954) proposed a general theory of the link between military organization and social stratification.

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

would need to be levied to pay the salaries of a volunteer army.¹³ It allows individuals to be recruited at a below market wage, and since it represents a tax in kind it does not distort labor supply decisions. For Sidgwick conscription also had important costs in that it did not involve a selection of those individuals "most likely to be efficient soldiers and those to whom military functions are least distasteful."(p.545). But these costs would be outweighed by the benefits in the case of a large scale war for which the taxes necessary to fund a professional army would be so large as to impose unsupportable deadweight costs. This idea has been pursued in several recent formal analyses of the economics of conscription of which Ross (1994) provides an example. In sum, conscription is a tax, and it is one that may be a logical choice for any decision maker concerned about the deadweight costs of taxation.

The work of Margaret Levi (1997a, 1997b) has been important in investigating the historical evolution of conscription and the gradual disappearance of policies that provided exemptions for certain individuals or opportunities for the wealthy to buy themselves out of military service. This is significant because if we follow the logic of the economic model of conscription laid out above, it might actually be an optimal policy to give certain types of individuals an exemption from service. As Levi notes, this was precisely the type of argument made by many nineteenth century proponents of the practice. For Levi, the need to ensure compliance and demands for equal sacrifice, particularly in an environment of expanded suffrage, led to conscription being made universal.

While it seems understandable that individuals subject to conscription may demand that the policy be made universal for reasons of fairness, we can also explore the possibility that those who are conscripted will make further demands. If it is possible to levy a tax in kind on labor, then why should it not also be desirable to levy a tax in kind on capital? This follows closely along the lines of the problem identified by John Hicks (1942) in his work on economic incentive in wartime. The device of conscription allows individuals to be paid a

¹³1883 p.545 "But a nation may unfortunately require an army so large that its ranks could not be kept full by voluntary enlistment except at a rate of remuneration much above that which would be paid in other industries for labour that requires no more outlay in training and no scarcer qualifications: and in this case the burden of taxation requisite to provide for such an army may easily be less endurable than the burden of compulsory service.

wage lower than that which would normally be required to give them an incentive to supply effort. But in other parts of the economy, economic incentives need to be preserved. The risk, as noted by Hicks, was that "the sense of unfairness is particularly aroused when the high incomes are earned, not by those who are in the centre of the war effort, but by those who are on the edge of it."(1942 p.5) Hicks suggested that this sense of unfairness was a primary reason that demands emerged for the taxation of war profits during World War I and World War II. We follow this argument while also suggesting that similar fairness concerns will lead to demands for steeper progressivity of income taxation. This is precisely what is suggested in the Labour Party manifesto of 1918.

The argument that we have laid out above refers to demands for tax progressivity that will emerge during wartime. Why would we not expect that after a war tax schedules will return back to their prior peacetime level? There are several reasons why the effect we describe is more likely to be long-lived. First, since wars are often financed by borrowing, the political debate over how to pay for them is often prolonged for a considerable time afterwards. This was certainly the case in countries like France and Great Britain after World War I, and we will show below that in these countries even after the war, debates about financing continued to be influenced by claims that progressive taxation was necessary to ensure equality of sacrifice between those who fought and those who earned profits out of the war. Second, if fairness involves subsidies for war veterans, then this can also have direct implications for financing debates long after a war is over. Third and more speculatively, war time sacrifices may have a permanent effect on perceptions of the generation that fought in the war about fair tax burdens for the wealthy, independent of what the revenue is spent on. All public goods must be eventually paid for, and the perceived fair distribution of these burdens may be permanently influenced for the generation that fought in the war by the distribution of sacrifices when national preservation was in question. Finally, it may also be possible that the persistence of the war effect on progressive taxation has less to do with the endurance of beliefs forged during wartime than with a more conventional account that once high top tax rates became the status quo policy, it was hard to organize a coalition to

change them, particularly in an environment where politicians had a new source of revenue. Even if this final mechanism provided the only reason why top tax rates remained high, our identification of the war effect is still a critical part of the story. It identifies a reason why policy might move away from a low progressivity status quo in the first place.

2.2 Alternative arguments

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

We could ask further whether the effect of war on progressive taxation to which we refer simply reflects the logical interests of the median voter. Why is it necessary to refer to attitudes about fairly sharing the burden of a war if a median voter who is not rich should want to maximize the share of revenue drawn from high income groups, taking into account

¹⁴See Gruber and Saez (2000)

¹⁵For example, among late nineteenth century thinkers Henry Sidgwick demonstrated awareness of this issue in the following quote "...it is conceivable that a greater equality in the distribution of produce would lead ultimately to a reduction in the total amount to be redistributed..." (1883 p.520). In this section of his *Principals of Political Economy* Sidgwick continues by suggesting that heavy taxation of the rich might be particularly likely to produce this effect because of the effect of taxation in savings incentives.

incentive effects, so as to minimize the economic burden for themselves? We will suggest below that evidence on the structure of tax progressivity allows us to test this alternative against our own argument. The logic of this alternative suggests that the median voter should want to tax the rich heavily, but it suggests no reason why, for example, an individual at the 99th percentile of the income distribution should be taxed at a different rate than someone at the 99.9th percentile of the distribution. This could only be the case if it was anticipated that the deadweight costs of taxation would actually be lower for individuals higher up the income distribution, an idea that runs contrary to most observations. In contrast, if individuals are concerned about a fair sharing of burdens, then it is consistent with the principle of equal marginal sacrifice to choose to tax someone at the 99.9th percentile significantly more heavily than an individual at the 99th percentile.¹⁶

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

As a final note, while our argument implies that mass warfare should have a long-term effect on the demand for progressive taxation, probably lasting decades, there is no reason to expect that this effect should necessarily be permanent. As time goes on and war debts are repaid (or defaulted upon), and as a generation of veterans passes away, there should be less and less of a possibility of justifying high top tax rates for this reason. It would be intriguing to ask whether the disappearance of a consensus in favor of a steeply progressive income tax

¹⁶See Atkinson (1973) for a review of the principle of equal marginal sacrifice in income taxation.

schedule in countries like the US and UK is related to this phenomenon, but without firmer evidence we offer this only as speculation.

3 Using World War I to Identify the Effect of Mobilization

Our principal goal in this paper is to empirically test the hypothesis that the experience of modern mass warfare produced new demands for progressive taxation. In the absence of this war effect, extensions of the suffrage and the rise of the political left may have produced less of an increase in redistribution through the tax system than would commonly be expected. For part of these tests we will adopt a long run view, that helps establish the general applicability of our results. In this section, however, we will first consider developments with regard to progressive taxation around the time of the First World War. In addition to being of obvious historical interest, World War I allows us to observe what took place both in those countries that mobilized heavily for the war and in those that did not. It is more difficult to make this same sort of "difference-in-differences" comparison for World War II, given that almost all European countries were participants in the conflict. 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 begin by presenting the historical background on the development of the income tax and on debates about tax progressivity. This is followed by a discussion of changes in income tax policy in our eight sample countries 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. This analysis also includes a discussion of additional evidence showing that the war increased tax progressivity according to other measures besides top tax rates. The section concludes with a discussion of the plausibility of our account emphasizing the impact of mass mobilization on concerns for fairness and equal sacrifice compared to alternative arguments for the war effect.

3.1 Pre-World War I Development of Progressive Taxation

Great Britain in 1799 was the first country to adopt something resembling a modern income tax, a measure adopted to raise war finance against the major threat posed by Napoleon's armies. As a consequence, discussions of income taxation often begin with this event. The British income tax was not progressive to the extent that all households liable paid a single rate regardless of their level of income, a rate 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 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

¹⁷Seligman (1911 p.235).

¹⁸Seligman (1911 p.279).

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 or less simultaneously established graduated inheritance taxes. These developments were certainly significant, but what is most striking is that even after the adoption of graduated income taxes, during the pre-World War I era top earners paid only a small portion of their income in the form of tax. On the eve of World War I, among countries that had an income tax, the top rate stood at 7% in the United States, 8.33% in the UK, 12% in Sweden, and 3.2% in the Netherlands. The extensive early study by Kennan (1910) presents information on income tax rates for different groups in a very broad set of countries circa 1910. It confirms the initial impression that even when they had an income tax with a graduated rate schedule, it was very rare for countries at this time to adopt top rates of more than 10%. In sum, for an observer of international events in early 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 substantial financial demands on the countries that were major participants in the conflict. Governments needed to respond to this demand by some combination

¹⁹*The Economist* March 10, 1883.

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, and debates about the top marginal rate of income tax took on a new political salience. Either during or soon after the end of the war, participant countries adopted steeply graduated rate schedules with top rates that *The Economist* had previously seen as "preposterous". In Great Britain a series of war budgets saw the top rate of income tax increased from 8.33% in 1914 to 60% by 1920. Observers at the time also suggested that in a country like the United Kingdom the changes in the tax system had an important effect on the distribution of both income and wealth.²⁰ In the United States the top marginal rate of income tax rose from 7% at the outset of the war to 77% by the end. A very similar pattern of events took place in Canada which first established a federal income tax in 1917 with a top rate of 21.9% and which subsequently raised this rate to 72.5% by 1920.²¹ 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%. By 1919 the top rate had risen to 50%.²² 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

²⁰For one early discussion of the effect of the increase in taxation on the distribution of incomes and wealth see Bowley (1930).

²¹See Perry (1955 p.162)

²²Piketty (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.

the United Kingdom the super tax was initially paid by something on the order of 0.1% of households, and the number of households paying the top rate of super tax was considerably smaller.²³ In other countries, such as France and Canada, the fraction of households liable at the top rate of income tax was on the order of 1000 households and 500 households respectively.²⁴ 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 alternative measures of tax progressivity to increase our confidence in the effect of the war on progressivity more generally.

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.²⁵ In addition, in both of these countries parties of the political left first gained a significant share of parliamentary seats at this time and both countries experienced episodes of working

²³See Atkinson (2007 p.95).

²⁴See Piketty (2001 p.556) and Saez and Veall (2007).

²⁵In 1911 in Sweden and 1918 in the Netherlands.

class unrest similar to those in participant countries.²⁶ Yet, despite these shared political conditions, outcomes with regard to top tax rates were very different in Sweden and the Netherlands when compared with France and the UK. For the Netherlands, Van Zanden (1997) notes the lack of movement toward progressive taxation as the right and center-right governments in the interwar period, despite some World War I period increases in direct taxation, returned quickly to a system based primarily on indirect taxation and relatively low top income tax rates. Of course, this raises the possibility that progressive income taxes failed to develop early in the Netherlands because the left was not yet in government. But among the war participant countries that adopted progressive tax systems, parties of the right played leading or major supporting roles in Canada, France, and the UK. Interestingly, Dutch adoption of a highly progressive tax system did not occur until 1941 with German occupation when taxes were designed to harmonize policies with those in place in Germany.²⁷

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

The connection of these policy changes to demands for progressive taxation in order to ensure equal sacrifice in the war effort is most evident in the pattern of political debate over public finance in each participant country. This pattern was typically characterized by new demands for the taxation of "war wealth" and "war profits" often most vocally

²⁶See, for example, Andre (1975) on labor unrest in Sweden in the 1917-1918 period, particularly in the wake of the Russian Revolution.

²⁷See Goedhart (1966).

from labor organizations and left parties. What distinguished these demands from previous ones of a similar flavor was their connection to the war and the logic of equal sacrifice and their resonance with the public and governments across the political spectrum. There developed a perception in many countries that certain individuals were reaping large profits as a result of the increased demand for certain goods. In a context where many individuals were conscripted into service at the front, it became a common rallying cry that those who profited from the war should have their wealth conscripted in the same manner that others had been obliged to make more direct sacrifices. It is important to note that we are by no means implying that this perception was always completely accurate. In the case of Great Britain it is known that the upper classes volunteered heavily for the war, and based on figures cited by Marwick (1965), the fatality rate among Oxford undergraduates by the end of the war may have actually exceeded that for the general population.²⁸ 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.²⁹ In English language countries frequent calls appeared for "the conscription of wealth", a phrase that seems to have in particular been used by groups that had originally been most reluctant in their support for the war. Elsewhere the language differed but the policy demands were similar. Grotard (1996) emphasizes how discussions of the war profits tax in France were linked in the popular press to the sacrifices of soldiers. She notes that during the parliamentary debate over the war profits tax, it was specifically stated that given that many individuals were sacrificing themselves at the front "it was necessary to reestablish equal sacrifice for all" (Grotard 1996, p. 264). Similarly, Isaia and Spindler describe how in the 1917 debates over a new income tax bill in France, it became increasingly difficult for those on the right to come up with a convincing counter-argument when deputies on the left said that high top income tax rates

²⁸Marwick (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.

²⁹The *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."

were a necessary counterpart given that so many were sacrificing themselves at the front. After the conclusion of the war such calls continued as the issue shifted to being one of how to repay war debts. The issue of how to finance benefits for war veterans also rose to prominence, and in the case of the United States, Alstott and Novick (2006) have shown that debates about veterans benefits were explicitly linked with debates over tax progressivity, and in particular whether the US government should maintain the very high top tax rates established during the war.

All of the countries that mobilized heavily for World War I ended up adopting "excess profits" or "war profits" taxes of one form or another, in parallel with 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.³⁰ In the United States an excess profits tax was levied that by 1918 reached a rate of 80 percent.³¹ 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.³² 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

³⁰Hicks et al (1942 p.72).

³¹Hicks et al. (1942 p.121).

³²See Kuczynski (1923) for evidence on German war taxation. It should be recognized though that Germany was in a different situation from France or Great Britain in that it lacked a centralized bureaucracy for tax collection at this time, one factor that may help explain why Germany moved much further than other war participants towards having a command economy during World War I. See Feldman (1966) on this point. Bogart (1919) provides evidence on Austrian taxes during the war.

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 1, which will be supported by statistical tests in the next section, is biased by the omission of Germany from the sample. Germany did not have a federal income tax prior to 1919 though its constituent states did have income tax systems with generally low rates prior to the war. After 1919, however, Germany closely resembled other war participants as it created a federal income tax with a high top marginal rate of 60%. In introducing this new rate Minister of Finance Mathias Erzberger of the Weimar government made an explicit attempt to justify it based on the same solidarity among citizens as had been required during the war.³³ It should also be emphasized that the Weimar government's actions 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.

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

³³*New York Times*, December 5, 1919 "Erzberger Offers Great Tax Budget"

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 income tax rate for a country in a given year. This variable is set equal to zero for years in which a country did not yet have an income tax.³⁴ 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.³⁵ 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.³⁶ The variable *Left Seat Share* is equal to the percent of seats in the national legislature held by a Left party in a given year.³⁷ 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.³⁸ For the US, *% Electorate* is equal to the percent of adults 21 years of age or older that are

³⁴See Appendix for sources and further description of this variable.

³⁵For Canada, France, and the UK, the entry year is 1914 and for the US, it is 1917.

³⁶The 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).

³⁷As 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/PVDA, Socialist Party, Communist Party, Revolutionary Socialist Party, and the Pacifist Socialist Party. Swedish left parties include Social Democrats, Left Socialists, Communists, Högland Communists, Socialists, and Kilborn Communists. Left parties in the UK include Independent Labour Party, Labour Party, National Labour, Communist Party, and Social Democratic and Labour Party. For Canada, the source for this data is Mackie and Rose (1991). The Canadian Labour Party is coded a left party but the Canadian Liberal Party is not. For Japan, the source for this data before 1945 is Scalapino (1968) and after 1945 is Mackie and Rose (1991). The Japanese Socialist Party is coded as a left party. For Spain, the source for this data is Caramani (2000). Spanish left parties include the Socialists and the Communists. Following Bartolini's classification, the Democratic party is not coded as a left party and therefore the US is always coded a zero.

³⁸The source of this data is Flora et al (1983).

eligible by law to vote.³⁹ For Canada, % *Electorate* is equal to the percent of the total population that is registered to vote.⁴⁰

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

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

where t indexes year; *Top Rate* is the top tax rate measure; *WWI* is the key measure of war mobilization, *WWI Mobilization*; \mathbf{X}_t is a vector of control variables and is excluded in the initial regression for each country; $\alpha, \beta,$ 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.⁴¹ 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 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 3. 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.

³⁹The source for this data is Rusk (2001, p. 50).

⁴⁰The source for this data is Elections Canada, A History of the Vote in Canada, Appendix Voter Turnout Since Confederation, <http://www.elections.ca>.

⁴¹The results reported assume a single-period lag in the calculation of the Newey-West standard errors though they are robust to longer lag structures.

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. 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.⁴² 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 Difference in Differences 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 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.⁴³

The *Top Rate* is modeled as:

⁴²Our results regarding the absence of an effect of partisanship on top tax rates parallel those of Atkinson and Leigh (2007).

⁴³We 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).

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

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;⁴⁴ $\alpha, \beta, \gamma,$ and θ are parameters to be estimated; η_i are country fixed effects parameters also to be estimated;⁴⁵ and ε_{it} is the error term. We again report Newey-West standard errors to account for serial autocorrelation.⁴⁶ 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 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 32.81 with a standard error of 4.46 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

⁴⁴The initial year is excluded due to the constant.

⁴⁵Again, we omit one country due to the constant.

⁴⁶The reported standard errors assume a single-period lag. The main results reported are robust to allowing for additional lags in the calculation of the Newey-West standard errors and for alternatively using robust standard errors clustered on country.

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 1 through 3 before the beginning of the war suggest that this assumption is at least plausible and is bolstered by the relatively good performance of the control variables.

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.⁴⁷ 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 limited to its impact on the very highest earners that pay the top rate. We think the result would be important even if this were true, but in our view, the finding indicates a larger impact of the war on progressivity.⁴⁸ To explore this claim further, we highlight three pieces of evidence.

First, and most simply, a complete assessment of British tax changes during World War I shows a marked increase in tax progressivity at almost all levels of income. Samuel (1919) conducted a painstaking analysis designed to estimate the tax burden including all types of national taxation and at all different levels of income before and after the war.⁴⁹ Figure 4 reports his main results. The overall picture is striking with taxes on earned income for 1913-1914 being essentially flat over most of the income distribution though moderately

⁴⁷The 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."

⁴⁸We choose to focus our main econometric analysis on top rates because it is for these that we have the most complete data across countries and time.

⁴⁹Taxes included in analysis are income and super tax, death duties, inhabited house duty, and numerous indirect taxes such as those on purchases of tea, sugar, tobacco, and alcohol.

progressive for those with the highest incomes compared to significantly increasing rates across the entire distribution in 1918-19. For example, a household earning 200 pounds sterling in annual income would have paid 4.8 percent of this income in taxes 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. It is worth noting that Samuel chose not to include war or excess profit duties because their exact incidence on different income groups is difficult to estimate and because it was not viewed as a long-run source of revenue after the war. As we discuss above, however, there can be no doubt that politically the tax was viewed as an additional tax on the wealthy and as such reflects additional evidence of the war generating policies intended to increase progressivity. Overall, Samuel's evidence rules out the possibility for the British case that even if income taxes on the rich increased, other forms of taxation, the incidence of which fell primarily on the poor, may have increased even more.⁵⁰

Second we replicated our statistical analysis for an alternative measure of tax progressivity, *Income Tax Share*, equal to the percentage of central government revenues raised by the income tax.⁵¹ Use of this measure depends on the assumption that income taxes are more progressive than alternative sources of revenue such as customs, excise, and general sales taxes. It should be remembered that 10% or less of the population was subject to income taxation at this time. In the specification with country and year fixed effects and control variables for *GDP per capita*, *Left Seat Share*, and *Male Universal Suffrage*, the estimated coefficient for *WWI Mobilization* is equal to 6.87 with a standard error of 2.20 (p-value is equal to 0.002). This estimate is statistically and substantively significant as mass mobilization for

⁵⁰Shirras (1943) conducts a similar analysis of overall changes in effective tax rates before and after the UK's entry into World War II (1937-38 versus 1941-42) and finds a significant increase in progressivity.

⁵¹The main source for this variable is Flora et al (1983). The source for Canada is Perry (1955, pp. 626-7). The source for the United States is the Historical Statistics of the United States. The source for Japan is Shiomi (1957, pp. 136-7).

the war is associated with an increase of about 7 percentage points (a bit over one standard deviation of the variable *Income Tax Share*) in the percent of central government revenues raised by the income tax. Again, to the extent that war profits taxes fell more heavily on the wealthy and certainly in light of the fact that it does not take into account increased inheritance taxes, this figure underestimates the effect of the war on progressivity. The result is consistent with the claim that mass warfare has a general impact on tax progressivity that is not limited to the highest income tax rates.

Third, we examined changes in progressivity within the top ten percent of income earners. Table 3 reports the changes in participant and non-participant countries in average marginal income tax rates for individuals at the 90th, 99th, and 99.9th percentiles and in top rates before and after World War I.⁵² The table shows that the war is associated with increased taxes in participant countries compared to non-participants at all of these high income levels but that these differences increased as incomes increased. For example, effective taxes at the 90th percentile increase by 3.8 percentage points more in participant than non-participant countries compared to a difference of 20.6 percentage points at the 99.9th percentile (51.8 percentage points for top rates). The tax rates reported here make it clear that the increases in income tax rates adopted as a result of World War I involved the very rich being asked to pay a much larger fraction of their incomes than were individuals who merely had incomes within the top decile. As we have already noted, very high top marginal tax rates adopted during World War I were generally paid by a small number of individuals, numbering in the hundreds. But when we look at a larger grouping, such as the top 0.1% of earners which in the countries considered here often comprised 30,000 to 50,000 individuals, the increase in taxes was also dramatic. Again, when considering the absolute magnitude of the figures in Table 3 it should also be recalled that these increases in progressivity do not include the steep increases in the rates and the progressivity of inheritance taxation and heavy reliance on levies on war profits and excess profits. In sum, we have every indication from the above information that the interpretation we have given to our analyses of top tax rates is accurate—mobilization

⁵²See Data Appendix for sources and further information on the calculation of these rates.

for World War I was associated with a dramatic increase in tax progressivity.

3.5 Further evidence on the demand for progressive taxation

Our evidence that mobilization for the First World War increased the progressivity of taxes in participant countries is consistent with our argument emphasizing how mass mobilization for war can change attitudes about the fair tax burden for high income groups. In this section, we consider how evidence on the timing of policymaking in participant countries and the political debates surrounding war finance lends additional support to the fairness argument. Among our participant countries, Canada and the UK, are particularly enlightening because the extent and nature of mobilization for the war effort varied significantly within each. Each country relied on a volunteer army for a significant portion of the war before introducing conscription. While our argument suggests that mass mobilization under a volunteer army is likely to push attitudes about taxation toward greater progressivity, the logic of the argument implies that conscription, in so far as it implies greater sacrifices on the part of the mass of citizens, will generate further pressures toward progressive taxation in order to equalize sacrifices.

In Canada, the war arrived with a Conservative government led by Robert Borden. Canada was initially quite successful in recruiting volunteers with many of them being recent immigrants from the United Kingdom. To finance the war, the government relied at first on tariffs, increased consumption taxes, and debt. As the war progressed, Canada did adopt a war profits tax in 1916, which in 1917 was revised to have a progressive scale.⁵³ Interestingly, it did not initially enact an income tax and as late as April 1917, the Minister of Finance Thomas White noted the use of the income tax in Great Britain and the United States in his annual budget remarks, but citing a number of considerations such as administrative expense and fairness in a time of rising prices, he concluded that in Canada "it would appear to me that income tax should not be resorted to."⁵⁴ White, however, yielded to increasing pressure to tax the wealthy more heavily and introduced income tax legislation

⁵³Hicks et al. (1942, p. 171).

⁵⁴April 24, 1917 speech in House of Commons printed in *The Globe*, April 25, 1917, p.4.

at the end of July 1917. Two characteristics of this policy change are significant. First, it followed the government's announcement in May that the government intended to introduce conscription.⁵⁵ Second, it was adopted in a political environment demanding greater sacrifices on the part of the wealthy in response to war sacrifices generally and those related to conscription specifically. For example, Canadian Trade and Labor Congress leaders met with Borden in December 1916 seeking a commitment from him to not implement conscription and to equalize war burdens. Borden refused to tie his hands on conscription but even then acknowledged that "the government accepted and acted on the principle that the accumulated wealth of the country should bear its due proportion of contributions and sacrifices in the war."⁵⁶ Once the government enacted conscription, organized labor pushed even harder for various versions of the "conscription of wealth."⁵⁷ Though the more radical proposals did not find mainstream acceptance, arguments for greater sacrifices on the part of wealthy certainly did. For example, the Liberal Platform for the election in the fall of 1917, argued, even after the government had introduced the income tax and war profits tax, that "A fundamental objection to the government's policy of conscription is that it conscripts human life only, and that it does not attempt to conscript wealth..."⁵⁸ The government's Unionist Platform, however, clearly also recognized the importance of the principle as it promised that "In order to meet the ever-increasing expenditure for war purposes and also to ensure that all share in common service and sacrifice, wealth will be conscripted by adequate taxation of war profits and increased taxation of income."⁵⁹ In short, in Canada, with greater mobilization from conscription, across the political spectrum support for progressive taxation on fairness grounds increased.

In the United Kingdom, the government at the start of the war was led by Herbert Asquith and the Liberal Party though by May 1915, Asquith was forced to form a new

⁵⁵The Military Service Act was passed on July 6, 1917. Note that conscription was not implemented until a bitter election was fought in December 1917 primarily over the issue of conscription. Borden, running in coalition with many Liberal MPs under the Unionist Party label but against the Liberal Party's leader Wilfred Laurier, won a landslide victory.

⁵⁶Borden Papers, cited in Robin (1966), p. 63.

⁵⁷See Robin (1966).

⁵⁸Liberal Party Platform in Carrigan (1968), p. 72.

⁵⁹Unionist Platform in Carrigan (1968), p. 77.

coalition government with the Conservatives and further set backs in the war in 1916 led to yet another coalition government in December 1916 with Lloyd George as the new Prime Minister. Like Canada but on a much larger scale, the United Kingdom began the war with a very large and successful voluntary recruitment campaign. The effect of the war on the progressivity of taxation was nonetheless more immediate than in Canada. Prior to the outbreak of hostilities, the government's 1914 budget proposal slightly reduced the income tax rate and proposed a combination of increased customs and excise taxes and reduced spending to balance the accounts.⁶⁰ It is clear that at least for 1914, the UK was not going to have a more progressive tax system absent the war. With the war, however, the first and second war budgets in 1914 and 1915 increased income tax rates significantly making the tax system overall more progressive.⁶¹

In January 1916, the government introduced the Military Service Bill adopting conscription which passed quickly into law and was expanded several times throughout the remainder of the war. Importantly, once conscription was adopted it became central to political debates about how the war was to be financed and certainly appeared to lead to policy changes that made taxation even more progressive. Calls for progressive taxation to equalize sacrifices in the war, particularly those associated with conscription, came primarily in two forms. The first was simply more progressive income taxation, the "conscription of income," while the second was a capital levy or literally the "conscription of wealth." These demands came in part from the expected places such as the Trades Union Congress, which held "that, as the manhood of the nation has been conscripted to resist foreign aggression . . . this Congress demands that such a proportion of the accumulated wealth of the country shall be immediately conscripted. . ." ⁶² but they were also reflected in publications such as *The Economist*, which, as indicated above, previously opposed high levels of income taxation. To be clear, *The*

⁶⁰"The Income-Tax Muddle," *The Times*, June 24, 1914, p. 9, col. G.

⁶¹The first war budget introduced by Lloyd George, then the Chancellor of the Exchequer, doubled both the income tax and supertax. While other increases such as taxes on beer and tea were also made, increases in the income tax and super tax were expected to yield well over twice as much revenue as the other increases making the tax system overall more progressive. The second war budget passed in the fall of 1915 increased the income tax by another 40 percent and lowered the exemption level to some extent.

⁶²Trade Union Congress resolution, September 1916, cited in Daunton (1996), p. 890.

Economist opposed a capital levy but supported “direct taxation heavy enough to amount to rationing of citizens’ incomes” and explicitly endorsed an article in the *Economic Journal* by Harvard Economist O.M.W. Sprague entitled “The Conscription of Income,”⁶³ in which he argued that “Conscription of men should logically and equitably be accompanied by something in the nature of conscription of current income above that which is absolutely necessary.”⁶⁴

In the UK policy responded to demands for greater progressivity in income taxation. The third war budget, introduced in April of 1916 just after the conscription bill was passed, significantly increased the income tax with revenues from higher income taxes expected to generate over twice as much additional revenue as increases in indirect taxes.⁶⁵ Further, the capital levy debate intensified following the introduction of conscription though the levy was never adopted. Daunton (1996) presents evidence that while the government including the Treasury and Inland Revenue civil service was in broad agreement with the need to use taxation to equalize sacrifices for the war and even initially receptive to the idea of a capital levy, it was eventually deemed impractical at least in part due to administrative considerations. Daunton also shows that these considerations continued to be salient in post-war budget debates and helped lead to the continued adoption of progressive inheritance and income taxes after the war. As in Canada, the introduction of conscription in the UK generated more war-time sacrifices and increased support for progressive taxation with fairness concerns salient in justifying the new policies.

3.6 Summary

We have examined the impact of the First World War on top income tax rates in order to evaluate the main argument of this paper that the experience of modern mass warfare produced new demands for progressive taxation. We find considerable evidence that participants in the war raised their top income tax rates substantially, and that this increase far

⁶³ *The Economist*, March 31, 1917, p. 579.

⁶⁴ Sprague (1917, p. 5). Note also that Sprague played an important role in the U.S. debate about funding the war lobbying publicly for high income and profits taxes.

⁶⁵ *The Economist*, April 8, 1916, p. 663.

exceeded growth in top rates in non-participant countries. We also find that within cases, greater mobilization and in particular the use of conscription was associated with greater demands for progressive taxation to equalize sacrifices among citizens. Further, there is some evidence that the effect of the war on the progressivity of taxation was persistent. Although countries did lower rates as the 1920s progressed, rates did not return to their pre-war levels and generally remained above the rates in countries that did not mobilize significantly for the war.⁶⁶ The evidence during this period for more conventional accounts is mixed. There are 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

In this section, we analyze the impact of mass warfare on progressive taxation for the period 1850 to 1970. The main objective of this analysis is to evaluate whether our findings for the First World War generalize to a much longer time period. The pattern of participation and non-participation in World War I may be helpful in cleanly identifying the effect of mass warfare on demands for progressive taxation, but ultimately we are also of course interested in knowing whether mass warfare more generally might have had such an effect. In what follows we focus on reporting the results of our analyses pooling the eight countries in our sample together.⁶⁷

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

⁶⁶Japan is a partial exception to this general pattern.

⁶⁷We also conducted time series analyses for each country individually that allow for heterogeneity in the impact of war mobilization on tax progressivity across cases. The results are consistent with the main claim of the paper that mass warfare raises the demand for progressive income taxation. It is particularly interesting that we observe the 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. In contrast, these estimates suggest little support for the impact of expansion of the suffrage and left political power.

the military and equal to 0 otherwise.⁶⁸ 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.⁶⁹ Note that we think that there are good reasons to expect that the effect of mass civil wars may be different than 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.

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 *Male Universal Suffrage* as defined above.

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;

⁶⁸Our 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).

⁶⁹More precisely, our war mobilization variable is coded one for Canada in 1941-1945 (mobilization data is missing for Canada before 1920 and these years are not included in the analysis for this measure); for France in 1871, 1914-1920, 1940-1943; for Japan in 1941-1945; for the Netherlands in 1951-1952; for the UK in 1915-1918, 1940-1945; and for the US in 1918, 1942-1945, 1951-1953.

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; $\rho, \alpha, \beta, \gamma,$ and θ are parameters to be estimated; η_i are country fixed effects parameters also to be estimated;⁷⁰ 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 war mobilization on the top tax rate from within-country variation over time allowing for common shocks. Further, because some countries experience more than one case of mass warfare in this analysis, our modeling strategy has changed in at least two important ways from the World War I analysis. First, rather than coding mass mobilization in terms of before and after, the variable *War Mobilization* is simply equal to one for mass 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 4 reports the ordinary least square regression estimates for this analysis with panel-corrected standard errors. 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 4.19 with a standard error of 1.11. This estimate implies a long-run effect of 67.5. In the specification with decade dummy variables, the implied long-run effect is 41.9. 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

⁷⁰We omit one country due to the constant.

and progressive taxation. This is 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.⁷¹

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 2.525 (p-value equal to 0.025)).

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 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

⁷¹One interesting possibility that we explored is that the impact of war mobilization is greater in countries for which the left is well represented or for which suffrage rights are more extensive. We explored these hypotheses by adding interaction terms between the war mobilization measures and the suffrage and partisanship variables. While the estimate for the interaction term for mobilization and partisanship was in the hypothesized positive direction, it was not statistically significant. The estimate for the interaction term between mobilization and male universal suffrage was not in the anticipated direction nor was it statistically significant. Given the course of political debates over progressive taxation, the hypothesis that wars have a bigger effect when the left is relative strong, nonetheless, merits further investigation.

the magnitude of the estimates reflects the logic of the main argument of the paper. Focusing attention on the results with decade dummy variables and control variables included, the implied long-run effect for the most restrictive definition of what constitutes a mass war, *War Mobilization 2*, is equal to 54.3 and is the largest of the estimates for the alternative measures. The estimate for *War Mobilization 3*, which is the alternative measure closest to our preferred definition, is 45.8 which is somewhat larger than the estimate reported in Table 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 24.4. One interpretation of this pattern of estimates is that the more extensive is mobilization for a war, the greater is the impact on progressive income taxation. This pattern is also evident in other specifications including substituting separate year dummy variables for the decade dummy variables.

5 Conclusion

We have argued that participation in mass warfare increases demands for progressive taxation as a means of ensuring equal sacrifice between labor, which could be conscripted, and capital which could not. There is substantial evidence consistent with this hypothesis. Focusing attention on the First World War, we find a significant upward shift in top tax rates in those countries that participated and mobilized for the war. 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. Importantly, we show that this effect is not limited to top tax rates but reflects changes in other measures of progressivity as well. Perhaps, most interestingly, war participation had a progressively bigger effect within the top decile of incomes. The paper also reports evidence that the timing and political rhetoric of war financing debates were consistent with the claim that these policy changes were a response to increased demands for progressivity to equalize war-time sacrifices. Finally, the paper presents evidence of an ef-

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

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. The implication is that in the absence of mass warfare there may have been nothing inevitable about the development of highly progressive tax systems.

Data Appendix on Top Income Tax Rates

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

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

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

distribution.

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

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

Sweden - Roine and Waldenström (2006) report top share tax rates for the years 1903-2004 including both the state (national) income tax and the communal (local) income tax. We use their series for the highest marginal tax rate. We also use their series for the marginal tax rates facing individuals at the 90th, 99th, and 99.9th percentiles of the income distribution. Sweden had no income tax prior to 1903. We used rates in place in 1911 for pre-World War I and 1920 for post-World War I.

France - For purposes of measuring the top marginal tax rate in France Piketty (2001 ch.4) provides full schedules showing marginal income tax rates for France for the years 1915 to 1998. He also reports a series for the top marginal tax rate that takes into account surcharges (*majorations*), including those levied only on certain types of households, such as those without children (p.325, 566). His goal is to consider the marginal tax rate faced by the household in the most unfavorable position. Our goal is slightly different in that we seek exclusively to measure the marginal tax rate faced by the richest households. In addition, we

also face some uncertainty whether any surcharges of the sort reported by Piketty for France have been taken into account in the other country series that we use. In order to maximize the likelihood of inter-country comparability, we constructed a top rate series for France based exclusively on the top marginal rates (*barèmes d'imposition*) reported in Piketty (2001 Tables 4-1 to 4-5). The main difference between the two series is that focusing exclusively on the *barèmes d'imposition* results in a lower tax rate for the period immediately after World War I and for the Second War War. As a result, our choice here would if anything bias our results against finding a significant effect of war participation on tax progressivity. In order to obtain an estimate of the marginal tax rate faced by individuals at the 90th, 99th, and 99.9th percentiles prior to and following World War I we used the tax schedules reported by Piketty, his figures for the total number of tax units (p.566 Table A1), as well as his figures for the number of tax units by income threshold (p.566 Table A-2 column 1). For the pre-WWI rate we have used the earliest available rate (1915) and the rate in 1920 for the post-war rate, the year in which a very sizeable increase in income taxation was implemented as part of a package to finance war debts.

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

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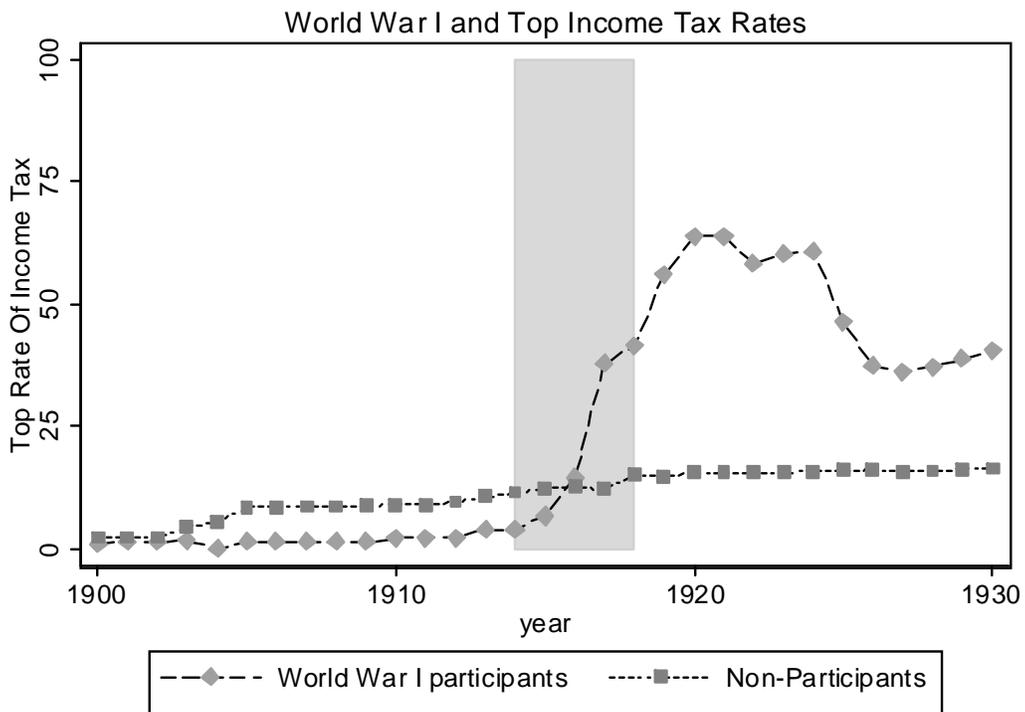


Figure 1: Compares average top marginal income tax rate in four high mobilization countries (US, UK, France, Canada) and four low mobilization countries (Sweden, Netherlands, Japan, and Spain). High mobilization is defined as participation and mobilization of more than 2.0% of population. See data appendix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

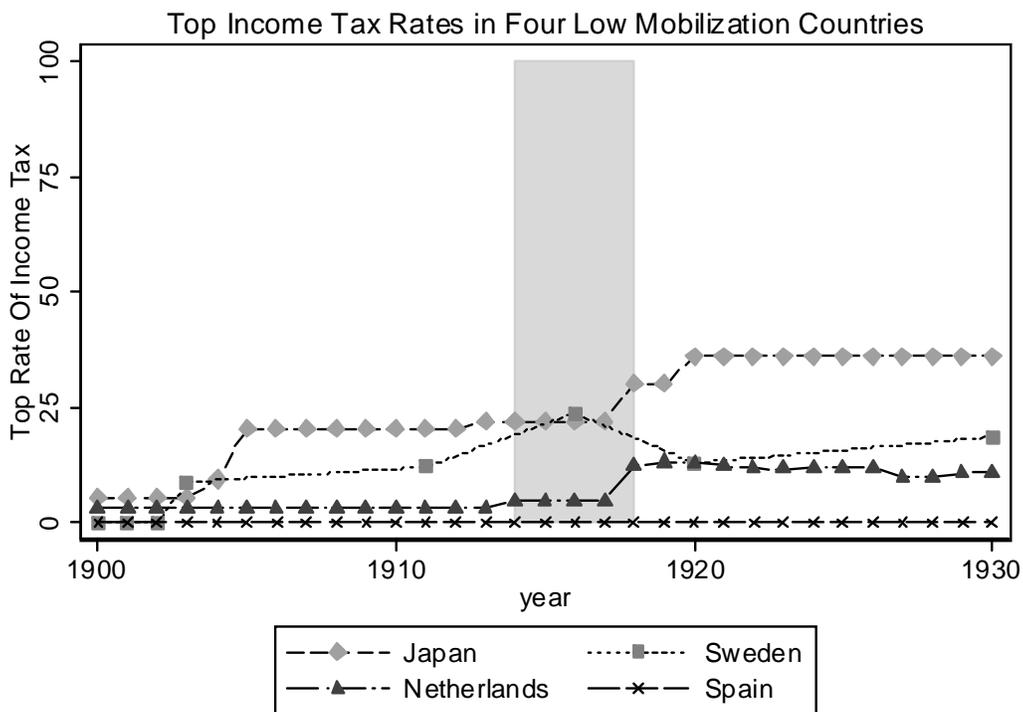


Figure 2: Low mobilization is defined as non-participation in World War I or participation with less than 2.0% of population mobilized. Sources: Japan (Moriguchi and Saez, 2007) Netherlands (Salverda and Atkinson, 2007) Sweden (Roine and Waldenstrom, 2007) Spain (Alvaredo and Saez (2007)). See text and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

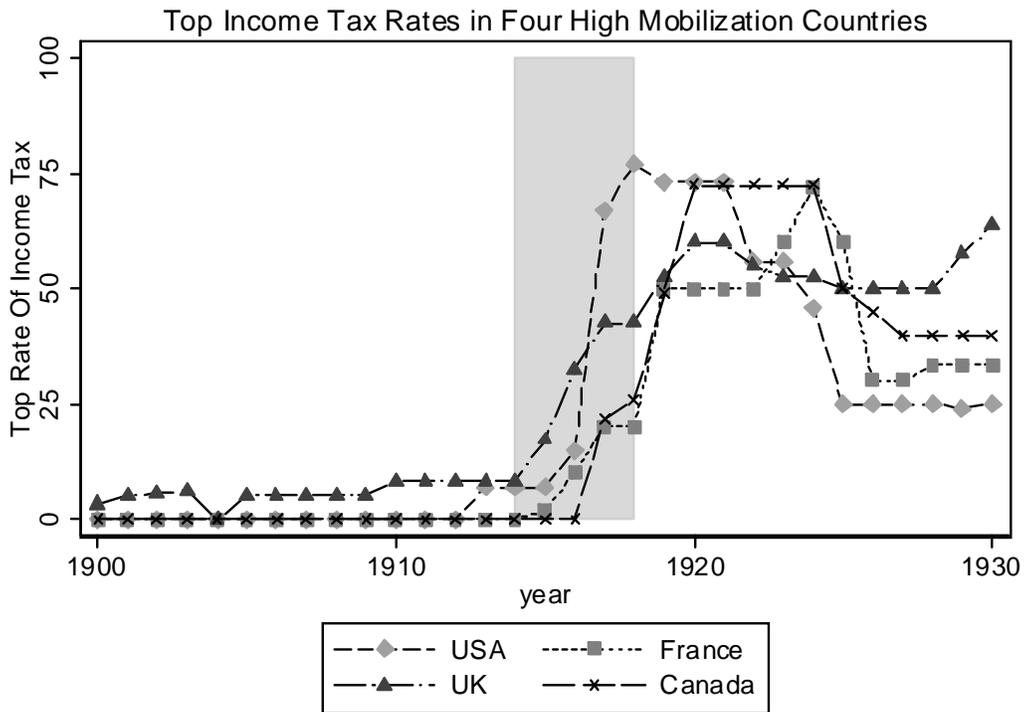


Figure 3: High mobilization defined as participation in World War I with more than 2.0% of population mobilized. Sources: USA (Senate Committee on Finance, 2001) UK (Atkinson and Leigh 2007) France (Piketty, 2001), Canada (Saez and Veall 2007; Perry 1955). See text and data appendix for full description.

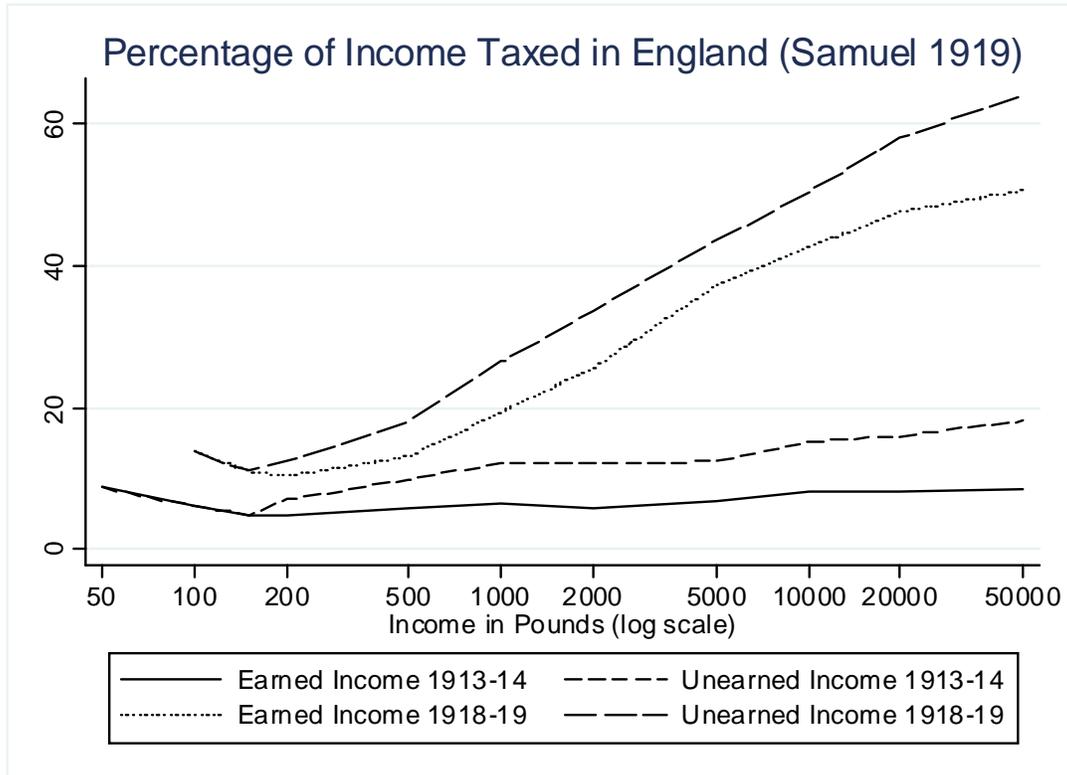


Figure 4: Reports Samuel's (1919) estimates of total taxes paid as a percentage of income before and after World War I. Includes income taxation, inheritance taxation, and all forms of indirect taxation. These calculations do not include the incidence of excess (war) profits duties.

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

<i>WWI Mobilization</i>	32.811 (4.461) 0.000	36.378 (4.115) 0.000	31.068 (3.503) 0.000	34.006 (3.408) 0.000
<i>GDP per capita</i>		-10.317 (2.427) 0.000		-5.943 (2.418) 0.015
<i>Left Seat Share</i>		-0.123 (0.099) 0.214		-0.087 (0.117) 0.460
<i>Male Universal Suffrage</i>		7.856 (2.356) 0.001		6.998 (2.514) 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.

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

Table 3: World War I and Progressive Income Taxation, Changes in Average Marginal Tax Rates. The table reports pre- and post-war average marginal income tax rates for the 90th, 99th, and 99.9th percentiles in participant and non-participant countries. See Data Appendix for sources.

<i>Top Rate</i> _{<i>t</i>-1}	0.937 (0.013)	0.938 (0.015)	0.918 (0.018)	0.916 (0.018)
	0.000	0.000	0.000	0.000
<i>War Mobilization</i>	4.158 (1.113)	4.187 (1.110)	3.475 (1.091)	3.521 (1.100)
	0.000	0.000	0.001	0.001
<i>GDP per capita</i>		-0.118 (0.177)		-0.036 (0.209)
		0.506		0.863
<i>Left Seat Share</i>		0.021 (0.016)		0.008 (0.017)
		0.180		0.647
<i>Male Universal Suffrage</i>		-0.620 (0.678)		-0.892 (0.706)
		0.360		0.207
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 panel-corrected standard errors in parentheses, and p-values. A constant term is included in each regression but not reported in the table.