The taxman tools up: An event history study of the introduction of the personal income tax ☆

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ABSTRACT

The introduction of income taxation was a landmark in the historical development of the fiscal state of the now developed world. This paper presents an event history study of the adoption of the income tax in 17 countries from western Europe, north America, Oceania and Japan between 1815 and 1939. We find evidence that spending pressures, reductions in tax collection costs and to a lesser extent social learning played a significant role for the adoption decision. We also find evidence that the extension of the franchise at first *reduced* the likelihood of adoption of the income tax, but eventually as universal suffrage was approached increased the likelihood.

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1. Introduction

In 2006 more than 30% of total tax revenue derived from the personal income tax in the United Kingdom; in the years after it was first introduced in 1842, the yield was less than half of that. During the intervening 164 years, the income tax, not only in the United Kingdom, but all over the (now) developed world moved from the margins to the center of the fiscal state. During the same period, the size of government increased dramatically in proportion to the size of the economy (Tanzi and Schuknecht, 2000). A variety of economic and political explanations have been advanced to explain this (see, e.g., Lindert, 2004a,b). One important idea, promoted, for example, by Becker and Mulligan (2003), is that efficient taxes are behind big government. If so, this begs a deeper question, namely what causes a society to innovate and adopt efficient taxes? The income tax is arguably one of the most important tax innovations of the past 200 years, only rivalled by the value added tax. Gaining a better understanding of how and why it came into being would therefore provide another important stepping stone towards understanding the sources of growth in government.

The purpose of this paper is to study the factors behind the differential timing of income taxation in western Europe, north America, Oceania and Japan. The decision to add the income tax to the arsenal of revenue raising instruments spanned almost a

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century for these countries. The first country to introduce a nation-wide personal income tax was the United Kingdom in 1842; the last was Switzerland in 1939. In between these extremes, other western European countries, the USA, Canada, New Zealand, Australia and Japan introduced taxation of personal incomes. We are interested in four potential reasons for adopting the income tax. The first set of reasons is related to political factors such as the extension of the franchise, the degree of political competition, the secret ballot and the importance of left-wing parties. The second set of reasons relates to the possibility of social learning or spatial diffusion, i.e., the idea that late adopters observe the results achieved by early adopters and base their adoption decision on this. The third set of reason relates to tax collection technology or costs, while the fourth set relates to wars and other pressures on the public purse.

There exists plenty of circumstantial evidence that these factors mattered for the decision to adopt the income tax. Peters (1991, p. 231), for example, argues that "with the extension of the franchise and the birth of labor movements and socialist parties came demands for greater redistribution through the tax system, and particularly for greater use of income and profit taxation to raise the needed revenues for increasingly active governments." At the same time, there is also ample anecdotal evidence that politicians aiming at introducing an income tax at home took notice of what happened abroad. For example, the Austrian income tax introduced in 1849 was explicitly modelled on the British income tax (Sieghart, 1898). In France the repeated, but unsuccessful, attempts to introduce an income tax throughout the later part of the 19th century took much of its inspiration from Prussia and Britain.[1] Likewise, when Britain introduced the income tax in 1842, many Dutch politicians were inspired. The minister responsible for the first income tax bill was, however, forced to resign, and it was not until 1893 that the income tax was finally adopted in the Netherlands (Smit, 2002). Many authors also believe that systematic reductions in tax collection costs matter greatly (e.g., Riezman and Slemrod, 1987). Moreover, economic history is littered with examples of early attempts to introduce income taxation that subsequently failed because of the lack of fiscal capacity to extract sufficient yields. Finally, the fact that many countries resorted to temporary taxation of incomes in times of war strongly suggests that fiscal pressures might have played a key role in spreading income taxation during the 19th and early 20th century.

To quantify the importance of these factors, we offer an event history study of the adoption of lasting income taxation in 17 countries from western Europe, north America, Oceania and Japan between 1815 and 1939. The idea is to model the (conditional) probability that a country which has not yet adopted the income tax adopts it in a given year as a function of the four factors outlined above. We find evidence that spending pressures, reductions in tax collection costs and to a lesser extent social learning played a significant role for the adoption decision. Surprisingly, we also find evidence that the extension of the franchise at first *reduced* the likelihood of the income tax, but eventually as universal suffrage was approached, increased the likelihood. The introduction of the secret ballot added significantly to the adoption probability. The rise of left-wing parties, on the other hand, did not play any role. Neither did GDP per capita, the size of a country nor its demographic structure.

The paper is related to a growing literature on the historical roots of the fiscal state. Lindert (1994), Boix (2003), Lindert (2004a, b), Aidt et al. (2006), Aidt and Jensen (in press) and others report quantitative evidence on the factors that drove tax and spending decisions during the 19th and early 20th century.[2] We complement these studies with an event history study of the historical origins of the income tax.[3] Our study is directly related to a small literature on tax innovations. Berry and Berry (1992) study the timing of new taxes, levied either on income or on gasoline, among US states during various sub-periods of the 20th century. They report evidence that states were less likely to adopt an income tax in election years and more likely to adopt it if the state legislature was controlled by a liberal party.[4] Evidence from outside US states is scarce. One exception is Ashworth et al. (2006) who study the adoption of environmental taxes among Flemish municipalities in the 1990s. They also find evidence that adoptions are less likely in election years and more likely in municipalities controlled by a left-wing party. In addition, they find evidence of social learning in that the likelihood of adoption in a particular municipality increases if its neighbors (both geographically and ideologically) have adopted in the past. We shall comment in more detail on these findings when we discuss our results in Section 5. A virtue of our setting relative to the previous studies is that it spans a period of time during which major political reforms took place. This allows us to investigate the role of institutional reform, such as the extension of the franchise or the secret ballot, in facilitating tax innovations. One problem with our setting, however, is that tax adoption decisions are not made against the backdrop of a common institutional framework, as in the case of states or municipalities. Another problem is that we observe relatively few tax innovations (17) spread over a long period of time (97 years). To deal with the former problem, we pay special attention to unobserved heterogeneity. To deal with the latter problem, we report results corrected for the bias that may arise when events are rare.

The rest of the paper is organized as follows. In Section 2, we provide a brief history of income taxation in the 17 countries in our sample. In Section 3, we formulate the hypotheses to be tested and discuss how to measure the four sets of potential determinants of the decision to introduce the income tax. In Section 4, we set out the empirical strategy. In Section 5, we report the main results

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[1] In 1893, for example, three income tax proposals were discussed. The first was simply an extension of the personal property tax (contribution personnelle et mobilière). The second was one based on the Prussian model of a lump-sum income tax (impôt global or impôt sur le revenu). The third was the stoppage-at-source (PAYE) income tax based on the English model, known as the impôt cédulaire or the impôt sur les revenue (Seligman, 1911, Chapter 2; Willis, 1895).

[2] There is also a related literature on the development of the fiscal state after the Second World War. This include among others Peltzman (1980), Riezman and Slemrod (1987), Husted and Kenny (1997), Becker and Mulligan (2003), Persson and Tabellini (2003) and Kenny and Winer (2006).

[3] This methodology is frequently used to study the factors that cause governments to adopt new policies. Some examples include Berry and Berry (1990), who study adoption of state lotteries in the USA, Canon and Baum (1981), who study adoption of tort law innovations among USA states, and Meissner (2005) who studies the diffusion of the gold standard between 1870-1913.

[4] Democrats are assumed "liberal" except in the Southern states where they are assumed "conservative".

Table 1
The timing of the income tax

Country	Permanent income tax from	Episodes of temporary income taxes	Local/state income taxes from	Revenue yield reaches 5% in
United Kingdom	1842	1798–1802, 1803–16	None	1844
Austrian Empire[f]	1849	1778, 1789–90	None[d]	1905
Italy	1864	None	<1861[a]	1877
Japan	1887	None	None	1925
New Zealand	1891	None	None	1915
Norway	1892	1809	1882	1892
Netherlands	1893	1797	None	1899
Sweden	1902	1809–12	1920	1903
Denmark	1903	1789, 1809, 1848–50, 1864, 1867–70	1861	1917[e]
France	1911	1793	None[d]	1918
United States	1913	1862–72, 1894–95	1706	1916[g]
Australia	1915	None	1884	1915
Canada	1917	None	1866	1919
Germany[c]	1920	1808	1851[b]	1924
Finland	1920	1865–81	1873	1920
Belgium	1922	1797	None[d]	1922
Switzerland	1939	1911–14, 1917–1928, 1933–37	1840	1942

Notes: a. Income taxes levied by some of the old states before unification in 1861. b. Prussia introduced the income tax in 1851, followed by Hessen in 1869. c. The German Empire (1871–1918) and the Weimar Republic (1919–33). d. We could find no indication in the literature that local and/or state income taxes were used before the introduction of the nation-wide income tax. e. The threshold for Denmark was most likely reached before 1917. f. Austro-Hungarian Empire after 1867. g. 1916 is the first year for which Mitchell (2003c) records separate revenues from income taxes.
Sources: See Appendix.

and consider various strategies to deal with unobserved heterogeneity and rare events. In Section 6, we conclude and put the results into a broader perspective. The Appendix discusses the construction of the data set and its sources.

2. Income taxation in historical perspective

At the end of the Napoleonic Wars in 1815, the fiscal states of western Europe, north America and Japan still relied heavily on indirect taxes, such as customs and excise duties, for revenues, supplemented with land and inheritance taxes. But things were starting to change with significant ramifications for the development of the fiscal state. Forced by the need to raise revenues to finance the war against France, an income tax was introduced in Britain in 1799.[5] It had most of the attributes of the modern income tax: citizens had to file a yearly tax return stating gross income from all sources which were then taxed at 10% with an allowance for deduction of certain expenses, children and payments to life insurance. The tax was, however, repealed in 1802, but reintroduced the following year when war broke out again. Other countries, including the Nordic countries, France, and some of the German states, also experimented with income taxation during the Revolutionary and Napoleonic Wars, but only temporarily. The first country in Europe to make the income tax, understood as a tax on earned income,[6] a lasting feature of the tax system was Britain in 1842. It was soon after followed by the Austrian Empire in 1849,[7] Italy in 1864, and Japan in 1887. Eventually, by 1939, when Switzerland introduced a federal income tax, all the countries in our sample (listed in Table 1) had a permanent income tax levied by the central or federal government. The precise years of adoption are reported in Table 1 along with information about temporary income taxes and income taxes levied by local government or by states within a federation. To gauge its importance, we also list the (approximate) year in which the revenue yield of the income tax reached 5% of total revenue. For most countries, the 5% threshold was reached shortly after the adoption, but there were exceptions. In Austria the yields stayed below 5% until 1905. Likewise, it took Japan 38 years to surpass the 5% threshold.

It is clear from Table 1 that most countries experimented with temporary income taxes at some point before income taxation became a permanent feature of the tax system. Most of these "experiments" were directly related to the financial urgency created by war. As mentioned above, the Revolutionary Wars and the Napoleonic Wars triggered income taxation not only in the United Kingdom and France, but also in the Austrian Empire, Denmark, Norway, the Netherlands and Belgium. Denmark resorted to income taxation again during the wars with Prussia in 1848–50 and 1864, as did the USA during the civil war and Switzerland during World War I. However, examples of temporary income taxation in peace time do exist. Finland, for example, levied income taxes during the period 1865–81, but gave it up because of disappointing revenue yields.[8] The same was true for the income tax introduced in 1809–10 in Sweden and in 1867–70 in Denmark (Philip, 1965, chapter 9). The attempt at introducing a federal income tax in the USA in 1894 was judged unconstitutional and had to be abolished for that reason. It is also interesting to note that the

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[5] See Daunton (2001, chapters 1 and 4).
[6] Various "proxy" taxes, such as wealth taxes, window taxes and property taxes, partly aimed at taxing something correlated with income, were widely used. These taxes are not part of our definition of income taxation.
[7] See Sieghart (1898).
[8] The Finnish income tax of 1865 was expected to raise one million mark, but the actual yield was only 2/3 of this (Lappalainen, 2003, p. 7).

Table 2
Overview of explanatory variables and mnemonics

Category	Variable definition and prediction
Political factors	1) *Suffrage* (U-shaped): The electorate (for parliamentary elections) in percentage of the enfranchised age and sex group, before women's suffrage, male population only. Coded 0 if no elections took place. 2) Secret ballot (+): Dummy variable equal to 1 in the years after the introduction of the secret ballot and 0 otherwise. 3) *Left-wing parties* (+): The share of seats held by left-wing parties in the lower chamber of parliament. 4) *Election year* (−): Dummy variable equal to 1 in election years and 0 otherwise. 5) *Years to next election* (+): The number of years until the next election. 6) *Political competition* (?): The polity IV index.
Social Learning & geographical diffusion	1) *Geographical closeness* (+) is defined as $$GC_{ij} = \sum_i \frac{1}{dist_{ij}} A_j(t)$$ where $dist_{ij}$ is the distance between the capitals of country i and j. $A_j(t) = 1$ if country j adopted the income tax in year $\tau \leq t$, and is 0 otherwise. 2) *Linguistic closeness* (+) is defined as $$LC_{ij} = \sum_i \left(1 - \sqrt{\frac{15 - common_{ij}}{15}}\right) A_j(t)$$ where #common$_{ij}$ is the number of common notes in the linguistic tree between the (dominant) language of country i and j in year t. $A_j(t)$ is defined as above. 3) *Learning from temporary adoptions* (−) is defined as *linguistic closeness*, except that $A_j(t) = 1$ if country *j* has a temporary income tax in year *t* and 0 otherwise.
Tax collection costs	1) *Tax technology index* (+) is the sum of ● *Census* (dummy variable coded 1 in year t if the country had a population census at some $\tau \leq t$ and 0 otherwise). ● *Local income tax* (dummy variable coded 1 for the years after a country started to levy income tax at the local and state level and 0 otherwise). ● *Education attainment* (dummy variable coded 1 for the years after which enrollment in primary education as a percentage of all 5 to 14 years olds reached 60% and 0 otherwise). ● *Urbanization* (dummy variable coded 1 for the years in which more than 10% of the population lived in towns with more than 20,000 inhabitants). 2) *Temporary income tax* (−): Dummy variable equal to 1 in years with temporary income taxation and 0 otherwise.
Spending pressures	1) *War* (+): A dummy variable equal to 1 if a country was at war in year *t* and equal to 0 otherwise. 2) *Deficit* (+): The difference between total (central) government spending and total (central) government tax revenues in percentage of total spending, lagged one year. 3) *GDP per capita* (+): GDP per capita at 1990 International Geary–Khamis dollars. 4) *Population* (+): The size of the total population in 1000s. 5) *Age structure* (+): The percentage of the population above 65 years of age. 6) *Urbanization rate* (+): The percentage of the population living in towns with more than 20,000 inhabitants. 7) *Agricultural share* (−): The number of individuals employed in agriculture, mining and fishing per 1000 employees.

Notes: The sources are listed in the Appendix. The predicted effect is indicated in brackets after the name of the variable.

British income tax of 1842 was envisaged as a temporary measure to close the gap in the public budget created by the repeal of the corn laws.

The federal countries in the sample, Australia, Canada, Germany, USA, and Switzerland, had income taxation at the state level long before it was added to the toolbox of the federal government (see, e.g., Seligman, 1911; Copland, 1924; Perry, 1955). In fact, one of the earliest examples of an income tax in the modern sense comes from Massachusetts in 1706 (Seligman, 1894). Likewise, some form of income taxation at the municipality level was common in the Nordic countries long before nation-wide income taxes were introduced (Philip, 1965, chapter 9).[9] It is therefore important to stress that we focus on the timing of the adoption of a *lasting* or *permanent* income tax levied by *central* (or federal) government.

3. The main hypotheses

It is clear from Table 1 that the income tax was gradually added to the fiscal toolbox in the years following the end of the Napoleonic Wars. We want to understand what explains this timing. Conceptually, we are interested in estimating the conditional probability that a country adopts the income tax given that it has not yet done so. We conjecture that this probability depends on four main determinants of the costs and benefits of adoption.[10] Below, we discuss each of these in turn. Table 2 lists the variables that we use to represent them empirically. The sources are discussed in the Appendix.

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[9] This has caused a certain amount of confusion in the literature about the dating of the income tax. We have checked the dates recorded in Table 1 against multiple sources. The Appendix discusses the sources used for each country and how we have resolved any discrepancies.
[10] Hettich and Winer (1988, 1999), Winer and Hettich (1991) and Ashworth et al. (2006) develop a framework for analyzing tax innovations within the context of a competitive democratic system which can be used to conceptualize this.

3.1. Political factors

Decisions on tax innovations are made within the boundaries of the prevailing political institutions. Among other things, these define if regular elections take place and if so, who can vote in them. The income tax is a powerful tool for redistribution and has the potential to make a significant contribution to the fiscal purse. A broader franchise lowers the income of the decisive voter relative to the average income earner. Insofar as the tax cost can be spread widely enough, the benefits of income taxation should be higher under universal than under restricted suffrage. We, therefore, expect that the extension of the voting franchise (to poorer citizens) increases the probability that the income tax is adopted.[11] However, the effect may be non-monotonic. In particular, an expansion of the electorate from say 10% to 30% of the adult (male) population may not increase the probability of income taxation by much or at all. The reason is simply that the new decisive voter may belong to the segment of the population who would end up paying the tax and who would not receive any significant benefits from the revenues thus raised. In contrast, as universal suffrage is approached, the social profile of the new decisive voter is likely to be such that he does benefit from income taxation. We can summarize this as follows:

Hypothesis 1. The extension of the franchise makes adoption of the income tax more likely but only after the suffrage has passed a threshold level.

Empirically, we measure the extension of the franchise by the variable *suffrage*. It records the number of citizens that can vote in elections to the lower chamber of parliament in percentage of the enfranchised age and sex group.[12]

In most countries, the secret ballot was uncommon until late in the 19th century. Before then voting was a public event and one that could be influenced by intimidation or bribery. For that reason poorer voters might be dissuaded from supporting political candidates in favor of income taxation (and redistribution) under a system of public voting. If so, the secret ballot would allow them to express their support to the income tax more freely. As a consequence, we expect:

Hypothesis 2. The secret ballot makes adoption of the income tax more likely.

We measure the introduction of the secret ballot with the dummy variable, *secret ballot,* as explained in Table 2.

Left-wing parties are likely to have played an important role in the propagation of income taxation, as they have been found to do in other contexts (Berry and Berry, 1992; Ashworth et al., 2006).[13] For left-wing parties, the benefits of new tax instruments are relatively high because they represent constituencies that favor more spending. The political cost of adoption might also be relatively low because many of their voters would not, at least initially, pay income tax. We therefore conjecture that:

Hypothesis 3. The income tax is more likely to be adopted where left-wing parties are important.

Empirically, we use the seat share in the lower chamber of parliament to capture the importance of left-wing parties (*left-wing parties*).

In societies with regular democratic elections, there is ample evidence that politicians time fiscal decisions within the election cycle to maximize the chance of reelection.[14] New taxes are unpopular with at least some segments of the voter population. As a consequence, politicians looking to minimize the political cost of an otherwise beneficial tax innovation are least likely to adopt it immediately before an election and most likely to do it immediately after. As pointed out by Berry and Berry (1992, p. 719) "such timing would give the public the maximum amount of time to forget the government's unpopular action before the next election". Of course, the costs and benefits of adopting the income tax continue to depend on the composition of the electorate, so the hypothesis is conditional on that:

Hypothesis 4. For a given franchise, the income tax is less likely to be adopted in election years and more likely to be adopted the longer there is to the next election.

We measure the effect of the election cycle by the dummy variable *election year* and the variable *years to next election* as explained in Table 2.

The degree of political competition is another important political factor that could influence the decision to adopt the income tax. Political competition allows political power to be contested by organized factions and parties. It can affect the adoption probability through a number of competing channels. Firstly, it may increase the probability of adoption because it forces political parties to seek new and more effective ways of raising revenues.[15] Secondly, by allowing power to be more freely contested,

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[11] Theoretical work by Meltzer and Richard (1981) suggests a positive link between franchise reform and redistribution. The survey by Tridimas and Winer (2005) discusses franchise reform within the framework of the probabilistic voting model and reaches a similar qualitative conclusion. The CGE simulations of Winer and Rutherford (1993), however, cast some doubt on how big a fiscal expansion franchise extension causes in practice.

[12] Except in Germany, Finland, Australia and Belgium women's suffrage was introduced after the adoption of the income tax (see, e.g., Aidt and Dallal, 2008). We do not make any attempt to model this aspect of enfranchisement and interpret *suffrage* as a measure of the importance of income and wealth restrictions on the right to vote.

[13] There is also substantial evidence that left-wing parties played an important role in building welfare states in western democracies after the Second World War (see, e.g., Hicks and Swank, 1992).

[14] See, for example, the survey by Paldam (1997).

[15] Fundamentally, this hypothesis derives from the belief that political competition is efficiency enhancing. For theoretical work supporting this idea, see, e.g., Wittman (1989).

enhanced political competition may cause government fragmentation. This can lead to grid-lock and be an obstacle for tax innovations. Thirdly, compared to an autocracy, a fully competitive political system may increase political uncertainty (and government turnover). This may shorten the time horizon of politicians and cause a myopic bias against new taxes. Theoretically, therefore, the effect of political competition is ambiguous. Empirically, we measure political competition by the polity IV index constructed by Marshall and Jaggers (2000).[16] The index is measured on a scale from −10 (little political competition) to 10 (lot of political competition). This index also controls for intrinsic differences between autocracies and democracies.

3.2. Social learning and geographical diffusion

A country with no experience with the income tax might look to neighboring countries, which have already adopted the tax, to learn about its costs and benefits (Berry and Berry, 1992). For example, successful adoption in one country may demonstrate the revenue potential to neighboring countries. Likewise, when an innovation in tax collection technology occurs, other countries should learn and revise their estimate of the collection cost downwards. Taken together, these information externalities suggest:

Hypothesis 5. The income tax is more likely to be adopted in a particular country if other (neighboring) countries have already adopted it.

Empirically, we use two alternative measures of social learning. Both build on the idea that a country that has not yet adopted the income tax is more likely to learn from adopting countries "close" to it. The two measures differ in their definition of "closeness" as detailed in Table 2. *Geographical closeness* measures closeness by the inverse distance between the capital in the country under consideration and that of the other countries in the sample that have adopted the income tax in the past.[17] *Linguistic closeness* is based on a calculation of the linguistic similarity between countries. Following Fearon (2003), we use the number of common branches in the linguistic tree for each pair of countries to measure how closely related their languages are.[18] Arguably, sharing a common language is a more plausible transmission channel for information about tax innovations than geographical proximity, and our preferred measure of social learning is *linguistic closeness*.[19]

A successful (permanent) adoption of the income tax in one country may send a strong (positive) signal to neighboring countries about the net benefits. However, countries may also learn from temporary, and therefore in some sense unsuccessful, adoptions in other countries. The information content in observing an unsuccessful, temporary adoption is, however, likely to be very different. One may, in fact, conjecture that temporary adoptions have a negative effect on the likelihood that neighboring countries adopt: the fact that the tax was given up again should tell outside observers that the benefit did not exceed the cost after all. To capture this, we have, using *linguistic closeness*, coded the variable *learning from temporary adoptions* as explained in Table 2.

3.3. Tax collection costs

Compared to trade and property taxes, the income tax is complex to administer and difficult to collect. While, for example, a tariff can be collected at ports by a small number of qualified civil servants, income taxes require the participation of a large number of individuals, who can fill in complex tax returns, and require a large bureaucracy to administer (Riezman and Slemrod, 1987; Kenny and Winer, 2006). We expect that:

Hypothesis 6. Improvements in the tax collection technology increase the probability that the income tax is adopted.

In practice, the cost of taxing income is reduced when taxpayers acquire the skills needed to handle tax returns and the tax administration develops the capacity to collect complex taxes. An increasing wage share of GNP, the development of formal markets, and the introduction of modern accounting systems are also important factors that, for example, by allowing stoppage at source contribute to falling collection costs. All this suggests that we can proxy tax collection technology by measures of education levels, by whether a regular census is taken or not and, insofar as urbanization is correlated with the wage to GNP ratio and with the development of formal markets, by the urbanization rate.[20] On top of this, experience with either local or state level income taxation should help build institutional capacities that lower the administrative and political cost of nation-wide income taxes. To enable us to track these variables back to 1815, we have constructed a *tax technology index* as described in Table 2. We expect that an increase in this index (representing a fall in relative tax collection cost) to increase the probability of adoption.

Temporary income taxes are obviously also an indication that the technology to tax income is present. However, the fact that these taxes did not persist suggests that the time was not yet ripe and that the estimate of the net benefits shifted against adoption

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[16] The polity IV index summarizes different indicators of political authority patterns. It records three key aspects of a country's political system: i) competitiveness and openness in the process of executive recruitment; ii) constraints on the chief executive and iii) competitiveness and regulation of political participation. A weighted sum of these components is used to construct two summary variables, measuring democracy on a scale from 0 to 10 and autocracy from -10 to 0. The polity IV index is the sum of these two sub-indexes.

[17] Berry and Berry (1992) and Ashworth et al. (2006) use neighboring states (or municipalities) to define geographical closeness. The geography of the countries in our sample, however, makes this an uncompelling choice.

[18] We use the dominant language group, except for Canada, Switzerland and Belgium where we base the calculation on a population weighted average. The linguistic tree contains up to 15 nested categories.

[19] In a previous version of the paper, we also used the extent of bilateral trade relative to GDP to define closeness. For most countries, we can only trace this variable back to 1870. For this reason, we decided against using this measure.

[20] See Riezman and Slemrod (1987), Kenny and Winer (2006) and Aidt and Jensen (in press) for a more detailed discussion of the merits of these proxies.

as soon as the particular reason for the (temporary) tax disappeared. We use the variable *temporary income tax* as a separate indicator of tax collection costs and expect it to have a negative effect on the adoption probability.

3.4. Spending pressures

The doctrine of a balanced budget was rigorously applied throughout the 19th century. It was effectively *the* framework for public finances in western Europe and elsewhere till after the Second World War (Webber and Wildavsky, 1986, chapters 6 and 8). In fact, with the possible exception of Italy and Germany, the norm of balance was so widely accepted that when governments began to spend more on social programs and arms, they had to find new taxes to finance these expenses to maintain balance. Mounting spending pressures, e.g., triggered by wars, by fiscal crises or by a desire to expand government spending, increase the need for new taxes. We can summarize what Berry and Berry (1992) call the fiscal health hypothesis as follows:

Hypothesis 7. The income tax is more likely to be adopted in times of fiscal spending pressures.

Empirically, we proxy fiscal pressures by a dummy variable that is equal to one if a country is at war and zero otherwise (*war*). We also use a measure of the budget deficit (*deficit*), which within the context of a balanced budget regime becomes a direct measure of spending pressures. Economic development and the associated changes in demographics also put pressures on the public purse while at the same time enlarging the potential tax base from which income taxes can be collected. We measure the forces of development, which according to Wagner's law should be associated with more government spending, by *GDP per capita*, the share of employment in agriculture (*agricultural share*), the *urbanization rate*, and the size of the population (*population*). As argued by Mulligan and Shleifer (2005), a larger population also means that there are more shoulders to bear the fixed cost associated with tax innovations. Consequently, more populous countries should be more inclined to adopt new taxes with large fixed costs. Finally, ageing of the population (measured as the percentage of the population above 65 years of age) is another likely contributor to spending pressures as demands for social security and pensions increase (Lindert, 1994).

4. Empirical specification

We code the dependent variable y_{it} as 1 if country i adopts the income tax in year t and 0 in the years before that. A country drops out of the sample when it adopts the income tax.[21] We do not know precisely when the spell without income taxation starts for each country. We deal with this problem of left censoring by assuming that countries that were independent at the time became at "risk" of adopting the income tax permanently at the end of the Napoleonic Wars (1815). The rationale for this is that many countries (e.g., the United Kingdom, the Nordic countries and France) partly financed the Napoleonic Wars by taxing incomes. This establishes beyond any doubt that the technology to do so existed at that point in time. For countries that enter the sample after 1815, e.g., because they were not independent states in 1815, we assume that they become at "risk" of adopting the income tax as soon as they enter.[22] All in all, this gives us a data set of up to 920 country-year observations.

The data are grouped duration data. It is, therefore, natural to use a duration model to estimate the relationship between the explanatory factors introduced above and the time conditional probability of adopting the income tax (the hazard rate). We follow Beck et al. (1998) and estimate the following discrete logistic model:[23]

$$P(y_{it} = 1 | x_{it}, y_{it-1} = 0) = \frac{1}{1 + e^{-(x_{it}\beta + H(t-t_i))}} \tag{1}$$

where x_{it} is a vector of explanatory factors (chosen from among those listed in Table 2) and β is the vector of parameters of interest. Since it is unlikely that the hazard rate is independent of the tax history of the countries, we include the function $H(t-t_i)$ to allow for duration dependence.[24] $H(t-t_i)$ is a smooth function of the number of years a country has been at "risk" of adopting the income tax. This specification allows us to model duration dependence in a flexible way and to test (and reject) the assumption of a constant baseline hazard rate. We estimate $H(.)$ using natural cubic splines and use the estimated spline coefficients along with the cumulation of years spend without income taxation to trace out the path of duration dependence in the estimations.[25]

5. The results

We divide the discussion of the results into two sub-sections. Firstly, we present the baseline results. Secondly, we present results that take into account unobserved heterogeneity and the possibility of rare events bias.

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[21] Since we focus on the arrival of lasting income taxation, there is, by definition, no issue of "reentry".

[22] This means that Belgium and the Netherlands enter the sample in 1830; that Switzerland enters in 1848 (when a federal stucture was established); that Italy enters in 1861; that Germany enters in 1871; that Australia enters in 1900; that New Zealand enters in 1856; and that Canada enters in 1867. We assume that Japan enters the risk set in 1853.

[23] Beck et al. (1998) show that this is the discrete hazard model corresponding to the well-known continuous time proportional hazard model (Cox, 1975).

[24] t_i represents the year in which country i enters the risk set (i.e., either 1815 or the year of entry to the sample).

[25] We have determined the number of knots by a sequence of F-tests and have settled on a specification with two knots.

Table 3
Logit estimates of the probability of adopting the income tax, 1815–1939

Model	1	2	3	4	5	6
Suffrage	−0.226***	−0.258***	−0.236***	−0.200***	−0.247***	−0.224***
	[−3.16]	[−3.29]	[−2.97]	[−2.67]	[−3.37]	[−3.12]
Suffrage^2	0.00178***	0.00203***	0.00199***	0.00153**	0.00196***	0.00176***
	[2.76]	[2.91]	[2.78]	[2.34]	[2.97]	[2.73]
Secret ballot	2.551**	2.054*	2.178*	2.354*	2.225**	2.540**
	[2.21]	[1.68]	[1.86]	[1.95]	[2.05]	[2.20]
Tax technology index	0.995*	1.115*	0.765		1.224**	0.970*
	[1.89]	[1.88]	[1.29]		[2.11]	[1.84]
Temporary income tax	−2.213**	−2.355***	−3.658***	−2.727***	−2.852***	−2.104**
	[−2.57]	[−2.60]	[−3.12]	[−2.83]	[−2.73]	[−2.43]
Linguistic closeness	3.014*	2.657	1.821	3.587*		3.578*
	[1.71]	[1.43]	[0.92]	[1.82]		[1.94]
Log(GDP per capita)	−1.258	−0.864	0.772	−1.069	0.316	−1.420
	[−0.90]	[−0.57]	[0.42]	[−0.75]	[0.30]	[−1.02]
War	0.994	1.113	1.188	0.845	1.263	0.861
	[1.21]	[1.33]	[1.31]	[0.98]	[1.63]	[1.03]
Log(Population)	0.152	0.0598	0.316	0.191	0.448	0.097
	[0.71]	[0.27]	[1.17]	[0.85]	[1.64]	[0.44]
Years to next election		−0.005				
		[−0.08]				
Election year		−0.153				
		[−0.24]				
Left-wing parties			0.017			
			[0.76]			
Political competition			−0.220*			
			[−1.94]			
Education attainment				0.128		
				[0.11]		
Urbanization				2.348*		
				[1.86]		
Local income tax				0.157		
				[0.19]		
Geographic closeness					79.790	
					[1.35]	
Learning from temporary adoptions						−1.468
						[−0.81]
Years without income tax	0.115	0.113	0.185	0.105	0.132	0.110
	[1.16]	[1.10]	[1.51]	[1.01]	[1.26]	[1.11]
Spline 1 (*1000)	0.150	0.150	0.203*	0.151	0.168	0.143
	[1.51]	[1.45]	[1.74]	[1.47]	[1.55]	[1.43]
Spline 2 (*1000)	−0.109*	−0.111*	−0.142*	−0.113*	−0.120*	−0.105*
	[−1.73]	[−1.70]	[−1.96]	[−1.74]	[−1.73]	[−1.65]
Constant	1.886	0.387	−14.71	0.966	−12.15	3.511
	[0.19]	[0.04]	[−1.05]	[0.09]	[−1.54]	[0.34]
Observations	920	861	850	920	920	920
Joint significance[a]	12.22***	13.05***	9.11**	9.13**	13.42***	11.90***
Turning point	63.5	63.6	59.3	65.4	63.0	63.6

Notes: *z* statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%. a. Wald test of joint significance of suffrage and suffrage^2. In model (2) and (3), we lose data from Finland before 1906 and 1917, respectively.

5.1. The baseline results

The main results are reported in Tables 3 and 4. A likelihood ratio test indicates strong duration dependence in the baseline hazard rate, and all the specifications shown allow the hazard rate to be time-dependent.[26] This simply reflects the fact that the likelihood of adopting the income tax increases the longer a country has been without it. The baseline specification, reported as model (1) in Table 3, includes the key variables: *suffrage, secret ballot, tax technology index, temporary income tax, linguistic closeness, war, GDP per capita,* and *population*. The other models are permutations of the baseline where we have added (or deleted) variables. This, typically, reduces the sample.

To allow for the possibility of a non-monotonic relationship, *suffrage* enters the model along with its square. The baseline specification, as well as all its permutations, shows strong evidence of a U-shaped relationship: The extension of the franchise, at first, reduced, but eventually increased the likelihood of income taxation.[27] Fig. 1 graphs the relationship between *suffrage* and the

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[26] The $\chi^2(3)$ statistic is 18.46.

[27] It is straightforward to include standard functional forms among the explanatory variables in a logit model (Wooldridge, 2002, p. 459). If a variable x_1 enters with a quadratic term, then the partial effect of x_1 on $P(y=1|x)$ is $\frac{\partial P(y=1|x)}{\partial x_1} = g(x\beta)(\beta_2 + 2\beta_3 x_1)$, where $g(x\beta) = G'(.) = \frac{exp(x\beta)}{[1+exp(x\beta)]^2} > 0$. If $\beta_2 < 0$ and $\beta_3 > 0$, the relationship is U-shaped. The turning point in the response probability is at $|\frac{\beta_2}{2\beta_3}|$. In short, the sign of the partial effect is determined by the parameters β_2 and β_3. The "interaction" effect, however, is $\frac{\partial^2 P(y=1|x)}{\partial x_1 \partial x_1}$ and not $\frac{\partial P(y=1|x)}{\partial (x_1^2)}$ as pointed out by Ai and Norton (2003).

Table 4
Logit estimates of the probability of adopting the income tax, additional control variables

Model	7	8	9	10
Suffrage	−0.201***	−0.247***	−0.156*	−0.176**
	[−3.17]	[−2.82]	[−1.79]	[−2.08]
Suffrage^2	0.00149***	0.00197**	0.00112	0.00126
	[2.64]	[2.53]	[1.44]	[1.59]
Secret ballot	2.202**	2.696*	3.038*	2.337*
	[2.12]	[1.76]	[1.90]	[1.78]
Tax technology index	0.613	0.715	0.426	0.893
	[1.17]	[0.87]	[0.67]	[1.44]
Temporary income tax	−2.995***	−2.660**	−2.609***	−2.036**
	[−3.05]	[−2.52]	[−2.70]	[−2.04]
Linguistic closeness	3.034	3.483	3.973**	4.355**
	[1.55]	[1.62]	[2.06]	[2.09]
Log(GDP per capita)	−0.464	−1.350	−4.704***	−2.982
	[−0.34]	[−0.86]	[−2.78]	[−1.58]
War	0.793	0.544	−0.94	0.319
	[0.92]	[0.52]	[−0.87]	[0.31]
Log(Population)	0.122	0.254	−0.351	0.245
	[0.54]	[0.79]	[−1.09]	[0.97]
Deficit	0.036***			
	[2.61]			
Age structure		0.186		
		[0.67]		
Urbanization rate			0.020***	
			[2.80]	
Agricultural share				−0.003
				[−0.57]
Constant	−3.204	1.843	25.68**	15.95
	[−0.31]	[0.15]	[2.09]	[1.04]
Years without income tax	0.139	0.119	0.237	0.084
	[1.278]	[1.00]	[1.62]	[0.80]
Spline 1 (*1000)	0.186*	0.157	0.221*	0.157
	[1.65]	[1.30]	[1.73]	[1.44]
Spline 2 (*1000)	−0.136*	−0.114	−0.149*	−0.122*
	[−1.89]	[−1.50]	[−1.92]	[−1.73]
Observations	756	650	883	654
Joint significance[a]	12.57***	9.44***	5.88*	8.92**
Turning point	67.5	62.7	69.6	69.8

Notes: *z* statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%. a. Wald test of joint significance of suffrage and suffrage^2. In model (8), we lose all information from Austria and Finland. In model (10), we lose all information for Austria and New Zealand.

probability of adoption for specific values of the other explanatory variables.[28] It is clear that a country that introduces universal suffrage may increase or decrease its probability of income taxation depending on its initial position. For example, universal suffrage in a country that already allows around 30% of its citizens to vote would increase the probability of adoption. In contrast, universal suffrage would *reduce* the likelihood of income taxation if the starting point was a very restricted franchise, say, 5%.[29] The estimated turning point, reported at the bottom of the tables, is around 63%. In a country below this point, a (marginal) extension of the franchise *reduces* the probability of income taxation, while in a country above the turning point further franchise extension makes income taxation more likely. While the positive effect above the turning point is in line with Hypothesis 1, the negative effect below is surprising.

It is possible, of course, that the (initial) negative effect of suffrage reforms is due to the effect of elections rather than the effect of the franchise as such. This would be consistent with the idea that tax innovations are less likely to be adopted in election years (Hypothesis 4). However, model (2), which adds *years to next election* and *election year* to the baseline specification, rules this out: neither of these additional variables are significant and the coefficients on *suffrage* and its square are only marginally affected. Not only does this fail to provide an explanation, it also suggests that the election cycle did not exercise a major influence on the adoption of the income tax. This stands in sharp contrast to the evidence reported by Berry and Berry (1992) for US states and by Ashworth et al. (2006) for Flemish municipalities. Both of these studies found strong evidence that new taxes are not adopted in election years. This may indicate that the election cycle played a less important role in the early days of democracy in Europe, north America, Oceania and Japan than it does today. In addition and also in contrast to Berry and Berry (1992) and Ashworth et al.

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[28] We use the average values for *GDP per capita, population* and *linguistic closeness.* We set *war, temporary income tax* and *years without income tax* equal to zero. *Tax technology index* is set at 4. We have experimented with other values and they give qualitatively the same results. We show the graph with and without *secret ballot.*
[29] This is also true, if a country moves from no voting (nondemocratic) to universal suffrage (democracy).
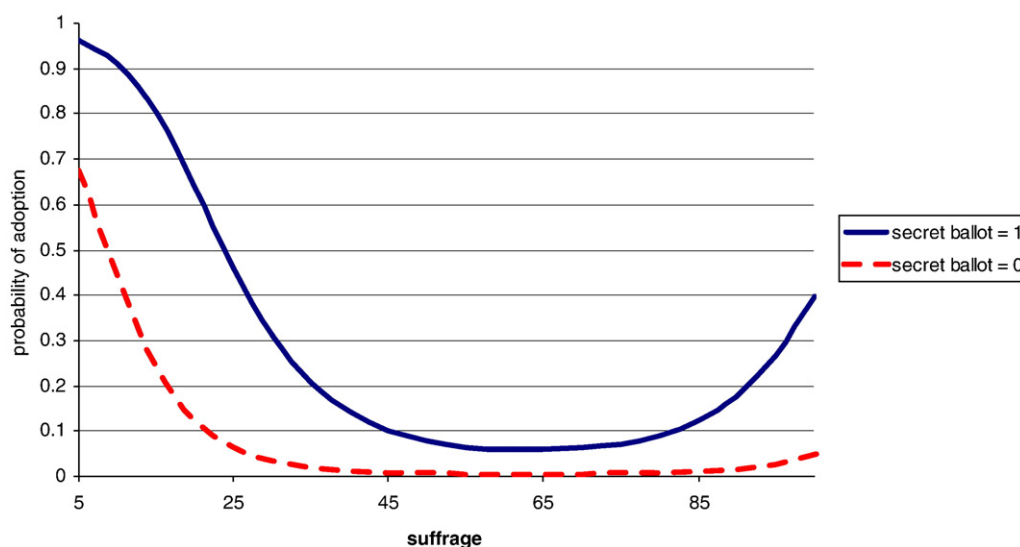
Fig. 1. The probability of adopting the income tax and the extension of the franchise.

(2006), we find virtually no evidence that left-wing parties were leading the drive towards income taxation (Hypothesis 3). Model (3) in Table 3 shows that although the point estimate on *left-wing parties* is positive, it is not statistically significant. One possible reason for the rejection of Hypothesis 3 is that the seat share held by left-wing parties simply was too small for them to exercise any real influence on fiscal reform until later in the 20th century.

The secret ballot, on the other hand, contributed significantly to the introduction of the income tax. Based on the point estimate of model (1), the odds of adopting the income tax is almost 1200% higher with the secret ballot than without.[30] This strongly supports Hypothesis 2. Finally, model (3) shows that political competition *reduces* the likelihood of adopting the income tax. This suggests that reforms, other than those related to the suffrage, towards more open and competitive political structures were not driving the spread of income taxation. Instead, the evidence is consistent with the notion that political competition may induce fragmentation and myopia.

We find some evidence that high tax collection costs reduce the probability of adoption (Hypothesis 6). In the baseline model, the *tax technology index* has the predicted positive sign and is significant at the 10% level. Based on this estimate, a one point increase in the *tax technology index* increases the odds of adoption by more than 70%. In model (4) in Table 3, we investigate the contribution of the sub-components of the *tax technology index* individually. The different sub-components all have a positive effect, but it is only *urbanization* that is significant.[31] This suggests that it was the process of urbanization rather than experience with state or municipality level income taxes that drove the technological innovations that eventually reduced the cost of rolling out income taxation at a national level. This is further supported by model (9) in Table 4 where we have included the *urbanization rate* directly in the estimations and find a highly significant positive effect. Since urbanization is positive correlated with the wage share of GNP, this also lends support to the hypothesis that income tax is more likely to be levied where wages make up a large share of GNP. *Temporary income tax*, on the other hand, has, as expected, a negative effect on the probability of a permanent adoption. Unsuccessful spells of income taxation clearly sends a negative signal that makes decision makers less likely to adopt the tax permanently.

We also find some evidence of social learning (Hypothesis 5). In the baseline model, *linguistic closeness* has the predicted positive sign and is significant at the 10% level. The effect is robust across the specifications that make use of the full sample, but it becomes insignificant in the specifications with a reduced sample. The alternative measure of social learning, *geographical closeness*, also has a positive point estimate (see model (5)), but it is never significant. This suggests that social learning was facilitated by language similarities rather than by geographical proximity.[32] Neither of these variables, however, takes into account that neighboring countries might also learn something from observing temporary adoptions. To allow for this possibility, we have in model (6) included *learning from temporary adoptions*. This variable is insignificant but with the expected negative sign.

The evidence on the role of spending pressures is broadly consistent with Hypothesis 7. While the dummy variable *war* is not statistically significant in any of the specifications reported in Tables 3 and 4, it does have the expected positive sign in all but one

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[30] The percentage increase in the odds that the income tax will be adopted following the introduction of secret ballot is (exp (2.55)-1)*100=1181.

[31] It is not possible to include *census* in the logit estimations on its own. We can, however, estimate the relation using Maximum Penalized likelihood (see Zorn, 2005). Doing so, we find a positive and marginally significant impact of *census* [not reported].

[32] The estimates of social learning do not take into account unobserved neighborhood effects. As pointed out by Blume and Durlauf (2006) the presence of such effects can lead to spurious relations. We cannot rule out that the social learning variables included in our estimations pick up other neighborhood effects than social learning. Nevertheless, within our context, we find it reasonable to interpret the estimates as evidence of social learning.

Table 5
Results from a 2SLS Linear Probability model, a random effects logit model and rare events logit models

Model	11	12	13	14	15
Dependent variable	Suffrage	Income tax	Income tax	Income tax	Income tax
Suffrage, lagged three periods	0.815***				
	[7.68]				
Suffrage^2, lagged three periods	0.001				
	[1.17]				
Revolution	2.276				
	[1.43]				
Suffrage		−0.00205	−0.226***	−0.208**	−0.174***
		[−1.18]	[−3.16]	[−2.46]	[−2.59]
Suffrage^2		0.0000156	0.00178***	0.00167**	0.00130**
		[0.83]	[2.76]	[2.011]	[2.03]
Secret ballot	3.154***	0.019	2.551**	2.330	1.846
	[3.44]	[1.49]	[2.21]	[1.60]	[1.60]
Tax technology index	1.471*	0.011	0.995*	0.923**	0.495
	[1.80]	[1.03]	[1.88]	[1.96]	[1.25]
Temporary income tax	−0.525	−0.0272	−2.213**	−1.936**	−2.673***
	[−0.83]	[−1.61]	[−2.57]	[−2.09]	[−2.690]
Linguistic closeness	−1.106	0.053	3.014*	2.690	2.711
	[−0.71]	[1.12]	[1.71]	[1.30]	[1.28]
Log(GDP per capita)	0.383	−0.019	−1.258	−1.338	−0.468
	[0.27]	[−0.63]	[−0.90]	[−0.63]	[−0.30]
War	2.803	0.038	0.994	0.983	0.789
	[1.16]	[1.20]	[1.21]	[0.87]	[0.82]
Log(Population)	−0.122	0.003	0.152	0.147	0.106
	[−0.36]	[0.41]	[0.71]	[0.66]	[0.46]
Deficit					0.033***
					[2.65]
Years without income tax	0.143	0.001	0.115	0.0861	0.112
	[1.62]	[0.72]	[1.16]	[0.97]	[1.24]
Spline 1 (*1000)	0.135	0.002	0.150	0.121	0.159
	[1.40]	[1.17]	[1.51]	[1.40]	[1.63]
Spline 2 (*1000)	−0.0841	−0.002	−0.109*	−0.091	−0.118*
	[−1.29]	[−1.39]	[−1.73]	[−1.63]	[−1.85]
Constant	−2.477	0.126	1.886	3.456	−1.959
	[−0.23]	[0.54]	[0.19]	[0.23]	[−0.17]
Observations	898	898	920	920	756
Joint significance[a]		4.63*	12.22***	11.52***	10.64***
Estimation technique	2SLS: 1st stage	2SLS: 2nd stage	random effects	rare events	rare events
Turning point		65.7	63.5	62.3	66.9
J-statistic		0.98			
F-statistic for first stage	1064***				

Notes: *z* statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%. a. Wald test of joint significance of suffrage and suffrage^2.

specification. It is clear, however, from Table 1 that episodes of temporary income taxation often coincided with war. It is therefore plausible to conjecture that the spending pressures created by war mainly caused premature emergency tax innovations, rather than lasting reforms. The most important piece of evidence in favor of Hypothesis 7, accordingly, comes from the fact that the direct measure of spending pressures, *deficit*, is highly significant. The point estimate from model (7) in Table 4 suggests that a one percentage point increase in the budget deficit increases the odds of adopting the income tax by about 4%.

Modernization theory receives no support. *GDP per capita* seems to have a negative impact on the adoption probability, albeit an effect that is insignificant. The share of employment in agriculture has the expected negative effect, but is insignificant (model (10) in Table 4). *Age structure* is also insignificant (model (8) in Table 4). In addition to rejecting modernization theory, this result also suggests that the "grey power" effect that aging populations were one of the key drivers behind the rise of social spending in the West (Lindert, 1994) was *not* making it more likely that income taxation was adopted to finance this expansion. Finally, *population* has a positive but insignificant impact on the adoption probability. This, at best, lends weak support to the argument that policy innovations with substantial fixed costs are most likely to be adopted in large polities.

5.2. Unobserved heterogeneity and rare events

One reservation concerning the evidence on the role of suffrage reforms is that it may be contaminated by omitted variables bias. This would, for example, be the case if fiscal and political reforms were driven by common unobserved preference shifts.[33] We use three instrumental variables for *suffrage* and its square to address this issue. The first instrument is a dummy variable coded 1 if a revolution or major revolt took place in one of the 17 countries in the sample or elsewhere in

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[33] This would bias the logit estimate upwards.

Europe in a particular year (*revolution*). This variable is motivated by the theoretical model of Acemoglu and Robinson (2000) and is a crude attempt to quantify the (perceived) threat of revolution.[34] As an instrument it makes mostly sense for the European countries in the sample, as institutional developments in north America and Oceania were driven by very different factors from those in Europe (Acemoglu and Robinson, 2001). Second, there is strong path dependency in the evolution of franchise institutions. This suggests that we can use lagged values of *suffrage* and its square as instruments.[35] To implement this strategy, we estimate a linear probability model with 2SLS.[36] The results are reported in Table 5.

We might begin by noting that the J-test does not reject the validity of the instruments. If we believe on a priori grounds that *revolution* is a valid instrument, then we can interpret this test result as a validation of the lagged value of *suffrage* and its square. The three instruments are highly significant in the first stage regression reported in model (11), but this is largely driven by the lagged value of *suffrage*. More importantly, we see from model (12) that the impact of suffrage reforms on the probability of adoption is qualitatively the same as before. The two coefficients are jointly significant at the 10% level and the turning point of 66% is comparable to that obtained from the logit models. The individual coefficients are, however, imprecisely estimated.

Another limitation of the results reported in Tables 3 and 4 is that the baseline hazard rate does not include a country-specific component. Model (13) in Table 5, in contrast, assumes that the baseline hazard rate is affected by idiosyncratic country-specific shocks. A comparison between the estimates from this random effects logit model and those from the baseline model reveals very little difference. The conclusions drawn from the baseline model are therefore robust to allowing for heterogeneity in the baseline hazard rate. Further, the hypothesis of homogeneity cannot be rejected.

Finally, the maximum likelihood estimate of the parameters of a logit model are biased in small samples (less than 200 observations). Moreover, the bias is amplified when events are rare.[37] Despite having more than 900 observations, we therefore need to take the possibility of a systematic downwards bias seriously. King and Zeng (2001) have developed an estimator that corrects for this bias. It also improves the efficiency of the estimates. We have re-estimated all the models using this estimator and report the results for two representative specifications in models (14) and (15) in Table 5. We continue to find that suffrage reforms had the reported non-monotonic effect on the probability of income taxation and that improvements in tax collection technology mattered. However, the evidence of social learning is weaker than before and the positive effect of *secret ballot* becomes insignificant. On the other hand, the evidence in favor of Hypothesis 7 continues to be strong as *deficit* has a positive and significant coefficient in model (15).

6. Discussion and conclusion

The introduction of income taxation was one of the major events in fiscal history that contributed to the growth in government observed during the past 150 years. We have estimated the conditional probability that a country adopts the income tax for a sample of 17 countries from western Europe, north America, Oceania and Japan. We find evidence that reductions in tax collection costs, spending pressures and to a lesser extent social learning played a significant role for the adoption decision. Voting institutions were also important, but in surprising ways. We find evidence that the extension of the franchise at first *reduces* the likelihood of income taxation. But once the franchise surpasses a threshold (estimated to be around 63% of the adult population) the effect reverses and further extension of the franchise makes it more likely that income tax will be levied. The puzzling negative effect is unlikely to be caused by confusion between election year effects and franchise effects, by reverse causality or by rare events bias. We also find that reforms that allowed for more political competition reduced the likelihood of income taxation and that the introduction of the secret ballot made the income tax much more likely. In contrast, broader economic and demographic factors, such as aging, population pressures, economic growth and sectorial shifts, did not matter much.

What can account for these effects? One interpretation is that suffrage reforms that allow more individuals to vote, yet keeping the privilege concentrated among a relatively narrow segment of the population, effectively discouraged any move to taxation of incomes because the new voters were the principle target for theses taxes. They would initially bear the lion's share of the cost without benefiting much from redistribution or more public spending. This interpretation is consistent with the fact that the franchise effect becomes positive once the suffrage is sufficiently broad: eventually the new voters do benefit from income taxation. In western Europe at least, this was complemented by another effect. The elites that extended the franchise accepted that the poor could vote, but at the same time they introduced new or enhanced old checks and balances that prevented or delayed large scale Robin Hood type redistribution. For example, it was common practice to have two legislative chambers and new legislation needed the approval of both chambers. By maintaining control over the upper chamber, while widening the franchise for the lower one, the elites effectively put constitutional constraints on the extent of redistribution. This may have delayed the income tax for two reasons. Firstly, it was less attractive as a tool of redistribution. Secondly, its value as a revenue raiser was reduced by the fact that spending programs favored by the newly enfranchised voters could be blocked. This may also explain why more competition for executive power made it more difficult to introduce new taxes.

The broader literature on the drivers of the fiscal state also contains hints as to why suffrage and other institutional reforms towards democracy did not unambiguously add to the taxman's toolbox. Mulligan et al. (2002, 2004) report that the effect of democracy on the

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[34] For alternative theories of franchise extension, see Congleton (2004).

[35] We use lags of three years. Under the assumption that the lagged value of *suffrage* is uncorrelated with the unobserved component of the income tax equation, this procedure produces consistent estimates in panels with a long time dimension when the error terms are uncorrelated over time.

[36] Wooldridge (2002) recommends 2SLS even in cases when the dependent variable is binary.

[37] In our sample, tax adoptions constitute less than 2% of the total number of cases.

scale and design of social security programs and on a number of other public policy outcomes is very limited and possibly negative in a large panel of 90 countries from 1960 to 1990. They interpret this as evidence in favor of institutional neutrality: it is economic and demographic changes that are driving fiscal choices, and the ways they affect these choices are invariant to voting institutions. A similar message comes from Ross (2006) who reports that democracy makes no difference for key social outcomes such as infant and child mortality rates. Our results do not support the hypothesis of institutional neutrality and the direct effect of broader economic and social factors do not seem to matter nearly as much in our context as they do later on in the 20th century. Nevertheless, our results on the role of suffrage reforms strongly suggest that the franchise reforms of the 19th and early 20th century had a much more complex impact on the fiscal state than suggested by theoretical reasoning in the tradition of Meltzer and Richard (1981). This interpretation is consistent with other available evidence for the period. Aidt et al. (2006) report that the franchise extension in western Europe did not lead to a large and immediate expansion of government spending, but shifted the portfolio of spending. This observation along with the evidence on the interaction between suffrage reform and tax collection technology reported in Aidt and Jensen (in press) supports the view that the value of income taxation as a revenue raiser might have been limited at the time of the first wave of franchise reforms. It was not until the appropriate tax collection technology had emerged *and* a sufficiently broad suffrage was established that democracy became a major driver of fiscal expansion and even then, it is possible that the broad differences between democracies and nondemocracies remain limited.

Appendix A

Construction of the data set

For the following variables, we have complete series for all 17 countries from 1815 (or the time of entry into the data set) to the time when the income tax was adopted: *suffrage*, *left-wing parties*, *secret ballot, tax technology index* (and its constituents), *temporary income tax*, *geographical* and *linguistic closeness*, *population*, *learning from temporary adoptions* and *war*. Data on *GDP per capita* are missing for Japan for 1815–1869. For *suffrage* and *left-wing parties* data are only recorded in election years and we assume that the variables stayed constant between elections. Both variables are coded zero for periods without democracy and elections of any sort. The largest possible data set contains 920 observations. Adding additional variables reduces the sample size. The polity IV project has not coded Finland before 1917, but otherwise data on *political competition* is complete. It was not possible to code *election year* and *years to next election* for Finland before 1908. Data on *urbanization rate*, *deficit*, *agricultural share* and *age structure* cannot be tracked back to 1815 (or time of independence) for most of the countries. In addition to this, information on *urbanization rate*, *agricultural share* and *age structure* is missing for some years for the time span they do cover. In these cases, we have interpolated the missing observations linearly. Linear interpolation seems a reasonable solution, although more sophisticated methods are available (Little, 1992).

Data sources

The data on the extension of the franchise are from Flora et al. (1983), Mackie and Rose (1991), Mitchell (2003b,c), Cook and Paxton (1998), www.elections.org.nz and www.elections.ca. The data on the share of seats held by left-wing parties is constructed from Caramani (2000), Mackie and Rose (1991), and Flora et al. (1983). The source of the polity IV index is Marshall and Jaggers (2000). The data on *agricultural share*, *urbanization rate*, *educational attainment*, and *age structure* come from Banks (2003), Flora et al. (1983), Gibson (1973), Mitchell (2003a,b,c), Vanhanen (2003), and Maddison (2003). Tax and public spending data are from Flora et al. (1983) and Mitchell (2003a,b,c). The data on real GDP at international prices and population size are from Maddison (2003). Distance data used to construct *geographical closeness* are from Lopez-Cordova and Meissner (2005). Data on the existence of a population census come from Flora et al. (1983) and Mitchell (2003a,b,c). The data on the structure of linguistic trees used to calculate *linguistic closeness* come from Fearon (2003). The sources used to date the adoption of the income tax are listed below for each country.

1. Denmark (Sample period: 1815–1903). A tax on earned income was introduced permanently in 1903 after the so-called "system change" in 1901 where the peasants' party finally took hold of government. This date is confirmed by Webber and Wildavsky (1986), Peters (1991, p. 230), Encyclopaedia Britannica (1911, Vol. XIV p.357), Philip (1965, chapter 9) and the National Danish Encyclopaedia (1998, Vol. 9). The first temporary income tax was levied in 1789. Other temporary income taxes were levied in 1809, 1848–50, 1864, and in 1867–70. In 1803, a sort of income tax at the municipal level (on wealth) was introduced. However, the first proper tax on earned income at the municipal level was the income tax levied in Copenhagen from 1861 (Philip, 1965, chapter 9).

2. Sweden (Sample period: 1815–1902). We date the introduction of the income tax to 1902 when a progressive income tax with self-declaration was adopted. This dating is supported by Philip (1965, chapter 9), Nationalencyclopedin (1995), Messere (1998, p. 328). Webber and Wildavsky (1986, p. 344), however, put the date as 1897 and this is repeated by Peters (1991, p. 320), but this seems to be a mistake that can be traced back to Seligman (1911). During the Napoleonic Wars an income tax was introduced in 1809–10 but given up in 1812 because of low yields. Although local taxes on property were widely used from 1843 onwards, it was not until 1920 that the municipalities levied a proper income tax (Svensk Uppslagsbok, 1953, Vol. 14).

3. Norway (Sample period: 1815–1892). At the end of the Napoleonic Wars, the Dano-Norwegian Oldenburg king was forced to cede Norway to the King of Sweden. Norway took this opportunity to declare independence, adopted a constitution based on American and French models but was soon after forced into a union with Sweden. Under this arrangement, Norway kept its

liberal constitution and independent institutions, except for the foreign service. Philip (1965, p. 123) dates the introduction of the income tax in Norway to 1892; a date which is confirmed by Store Norske Leksikon (1999) and Encyclopaedia Britannica (1911, Vol. XIV, p. 358). Webber and Wildavsky (1986) and following them Peters (1991, Table 7.1) report that the income tax was introduced in 1905, but this date corresponds to the introduction of progressive income taxation. From 1882 an income tax was levied by the local authorities (kommune) and the modern income tax can be traced back to the Napoleonic Wars when a temporary tax on income was imposed (Store Norske Leksikon, 1999).

4. Italy (Sample period: 1861–1864). The income tax (imposte e reddito) in Italy was introduced three years after unification, i.e., in 1864, and followed the British model of schedules (Seligman, 1911, p. 340; Webber and Wildavsky 1986; Peters, 1991, Table 7.1; Enciclopedia Italiana, 1937, Vol. XVIII). The tax code was amended in 1866, 1867, 1870, 1873, 1874, 1877, 1894 and 1907. The income tax, introduced in 1864, unified all taxes on mobile wealth from the old states, where mobile wealth meant that "the tax was imposed upon all incomes except those subject to the real estate tax and excepting also the income from government securities" (Enciclopedia Italiana, 1937).

5. Germany (German Empire (1871–1918) and Weimar Republic (1919–33)) (Sample period: 1871–1920). The first federal income tax was introduced in 1920. Before then only the states could levy income taxes. During the Napoleonic Wars some of the states, including Prussia in 1808, introduced a temporary income tax. State income taxes were introduced on a permanent basis in Prussia in 1851, in Hessen in 1869, in Saxony in 1874, and in Baden in 1884 (Philip, 1965, p. 122; Seligman, 1911, p. 233; Webber and Wildavsky, 1986; Encyclopaedia Britannica, 1911).

6. Austrian Empire (Sample period: 1815–1849). The Austrian Empire (Kaisertum Österreich) officially lasted from 1804 to 1867, followed by the Austro-Hungarian Empire. It was a monarchy with no elections. The personal income tax was introduced permanently in 1849 (originally envisaged as a temporary measure) after the revolution in 1848. Goschen (1872, p. 45) reports that the yields from the (imperial) income tax was an inappreciable item in the years following its adoption. Temporary attempts at an income tax were noted in 1743 and again in the war taxes of 1778, 1789 and 1790 (Seligman, 1932, vol. VII; Webber and Wildavsky, 1986, p. 344; Peters, 1991, Table 7.1; Encyclopaedia Britannica, 1911, Vol. XIV, p. 357). It was not possible to establish for sure if there were any local income taxation in Austria before 1849, but the detailed discussion in Sieghart (1898) suggests that this was not the case. We code the local income tax dummy as 0 from 1815 to 1849.

7. The Netherlands (Sample period: 1830–1993). At the Congress of Vienna, Holland and Austrian Belgium were united to the Kingdom of Holland. However, Belgium declared its independence in 1830, and we treat the two as independent states from 1830 onwards. The income tax became a permanent feature of the tax system in 1893 when a tax on income from businesses and professions (belasting op bedrijf en beroep) was introduced (Seligman, 1932, Vol. VII). The year before a tax on wealth had been introduced and the income tax is sometimes thus dated (e.g., Peters, 1991, Table 7.1). The origins of the income tax can be traced back to 1797 when something like an income tax was temporarily introduced (Webber and Wildavsky, 1986, p. 337). Stuart (1898) indicates that "several years before [the national income tax was levied] a great many communes levied already income-taxes" (p. 325). However, no precise date is given and it appears that the tax in question was a kind of poll tax in which the tax per head depended on wealth rather than on income as such (Fritschy, 1997). We have coded the local income tax dummy zero for the years before 1893.

8. Belgium (Sample period: 1830–1922). Belgium became independent in 1830 (see notes for the Netherlands). The income tax was first introduced in 1922 (Peters, 1991, Table 7.1). The discussion in Goschen (1872, p. 44) suggests that there was no local (province, canton or commune level) income taxes in 1870. There are no mentioning of any income taxes, national or local, in Encyclopaedia Britannica (1911) or other sources. We, therefore, assume that no such taxes existed before 1922. The origins of the income tax can be traced back to 1797 when something like an income tax was temporarily introduced (Webber and Wildavsky, 1986, p. 337).

9. Switzerland (Sample Period: 1848–1939). At the end of the Napoleonic Wars in 1815, the independence of the 22 Swiss Cantons was guaranteed. However, it was not until 1848 that a federation/central government was established. Although income taxation at the Canton level has a long history in Switzerland, it was not until 1939 that a permanent federal income tax was introduced (Dell et al., 2005). A tax reform in 1941 gave the tax its modern shape and the federal income tax is sometimes thus dated. Temporary income taxes on earned income were introduced in 1911–14 and 1917–28. From 1933–1937 an income tax on total income was levied (Schweizer Lexikon, 1946, Vol. II; Der Grosse Brockhaus, 1954; Dell et al., 2005). The first Canton to adopt income taxation was Baselstadt in 1840 (Seligman, 1932; Webber and Wildavsky, 1986, p. 344; Encyclopaedia Britannica, 1911, Vol. XIV, p. 358).

10. France (Sample period: 1815–1911). Throughout the 19th century repeated attempts were made to introduce the income tax. They all failed and it was not until 1911 that an income tax law was finally approved by the Senate (Seligman, 1911, chapter 2; Philip, 1965, chapter 7; Webber and Wildavsky, 1986, p. 344). Peters (1991, Table 7.1) dates the income tax to 1909 but this was the year in which the tax bill was approved by the lower house and referred to the Senate. It appears, however, that it was not until 1914 that the legislation came into force and some sources date the French income tax to 1914 (e.g., Flora et al., 1983). We date the income tax to 1911 when the relevant legislation was approved by the Senate, rather than to 1914/16 when revenues started to come in. A general income tax (the so-called compulsory loan) was introduced temporarily in 1793 as a sporadic war measure. Although various proxy taxes, such as doors and windows taxes, were widespread throughout the 19th century, there appears not to have been any local income taxes before 1911. For a comprehensive discussion of the early attempts of income taxation in France, see Willis (1895).

11. The United Kingdom (Sample period: 1815–1842). The income tax, based on the schedule system, became a permanent feature of the tax system in 1842 (e.g., Daunton, 2001; Sabine, 1966). Income taxes had previously been used temporary during the Napoleonic Wars (1798–1802; 1803–1816). Incomes were not taxed at the local level before 1842 (or after).

12. The United States (Sample period: 1815–1913). The income tax became a permanent feature of the federal tax system in 1913 after the 6th amendment of the constitution (Seligman, 1914, 1932). Income taxes had temporarily been used during the Civil War (1862–72) but were eventually abolished. The income tax of 1894 was also temporary as it was deemed unconstitutional and had to be given up in 1895. Massachusetts had income taxation as early as 1706, while Virginia and North Carolina introduced state income taxes in 1849 and Alabama had an income tax between 1843–84 (Seligman, 1894). Wisconsin introduced income tax in 1911.

13. Japan (Sample period: 1853–1887). Japan enters the data set in 1853, the year in which it opened up to trade with the West. The income tax was introduced in 1887 some years after Restoration in 1868 (Droppers, 1892; Webber and Wildavsky, 1986, p. 344; Peters, 1991, Table 7.1). This was not preceded by episodes of temporary income taxes, nor by income taxation at the local level (Droppers, 1892).

14. Australia (Sample period: 1900–1915). The federal income tax was introduced in 1915 (Copland, 1924). The date of 1895 given by Webber and Wildavsky (1986, p. 344) and Peters (1991, Table 7.1) refers to income taxation in the colonies before the formation of the federation. Seligman (1932) notes income taxation in South Australia in 1884, in Tasmania in 1894 and Victoria in 1905. There were no temporary federal income taxes before 1915.

15. New Zealand (Sample period: 1856–1891). New Zealand gained self-government in 1852, but it was not until 1856 that a full parliamentary system was established. The income tax was introduced in 1891 and collected for the first time in 1893 (Seligman, 1932; Peters, 1991, Table 7.1). There were no temporary or local income taxes before that point in time. The income tax replaced a tax on property and emerged after a fiscal crisis.

16. Canada (Sample period: 1867–1917). Canada became a federation with self-government under the British Crown in 1867 and gained full independence in 1931. The federal income tax was introduced in 1917. It was very much driven by the need to finance Canada's participation in World War I (Perry, 1955). Seligman (1932) and Peters (1991, Table 7.1) date the income tax to 1892 but it is unclear why. Perry (1955, p. 75–83) documents that Nova Scotia had income taxation at the municipality level as early as 1831, Ontario had income taxation from 1866 and British Columbia had it from 1876. There were no temporary income taxes at the federal level.

17. Finland (Sample period: 1815–1920). Finland was an autonomous Grand Duchy of the Russian Empire from the end of the Finnish War between Sweden and Russia in 1809 until 1917 when full independence was achieved. The old four-chamber Diet was re-activated in the 1860s and made new legislation concerning internal affairs. The Diet was replaced by the Parliament of Finland in 1906. The regular (central government) tax on income was introduced in 1920, but a temporary attempt to introduce the tax was made in 1865–81 (Lappalainen, 2003). The tax was given up in 1881 because of high collection costs and low yields. Local income taxes were levied from 1873.

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