From Open to Secret Ballot: Vote Buying and Modernization*

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Abstract

The introduction of the secret ballot was an important step towards full-fledged democracy in Western Europe and the Americas. This paper argues that modernization–income growth, urbanization and rising education standards–was important for this development. Our evidence–based on event history analysis of three different historical samples–shows that the forces of modernization were systematically related to ballot reforms. Moreover, we propose and provide evidence, from two historical samples, that the mechanism through which this happened was the market for votes.

Key words: Secret ballot, modernization, democratization.
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1 Introduction

One of the most striking facts in comparative political economy is the positive correlation between income and democracy. Since the first statistical evidence was unearthed in the late 1950s by Seymour M. Lipset in his influential paper "Social Requisites of Democracy: Economic Development and Political Legitimacy" (Lipset, 1959), a lively debate amongst political scientists, sociologists, and economists regarding the correct interpretation of this correlation has raged.

Lipset (1959, p. 86) himself interprets, in what has subsequently become known as modernization theory, the correlation as a unidirectional causal relationship: "economic development involving industrialization, urbanization, higher educational standards and a steady increase in the overall wealth of the society is a basic condition sustaining democracy". As societies develop economically under autocratic rule, their social structures become more complex as a consequence of industrialization, specialization in production, and urbanization. New social groups emerge, including a middle class, which are empowered by the spread of communication technologies and higher education standards. This creates demand for democratic governance from a growing numbers of citizens who eventually succeed in their demand. This interpretation has been questioned by many subsequent scholars.

In one corner, we find among many others Moore (1966), Przeworski and Limongi (1997), and Acemoglu et al. (2005, 2008). Przeworski and Limongi (1997, p. 167) declare that "there are no grounds to believe that economic development breeds democracies" and instead attribute the correlation to the fact that democracy is more likely to survive in rich than in poor countries. Acemoglu et al. (2008, p. 810) plainly conclude that "there is no relationship between changes in income per capita and changes in democracy"[1] and instead suggest that the correlation can be explained by the fact that countries at critical junctures in the far past were pushed on to divergent development paths, some of which

[1]Benhabib et al. (2011) challenge the econometric evidence presented by Acemoglu et al. (2008). They expand the sample and employ a different estimation technique which takes into account that the democracy index used in the study is censored. Both these adjustments indicate that there may be a link between income growth and democratization. Boix (2009) also studies a longer sample period and finds evidence of a link between within country difference in income and democratization.

led to economic prosperity and democracy and some of which did not.[2]

In the other corner, we, besides Lipset (1959), find among others Barro (1999, p. 160), who argues that "increases in various measures of the standard of living forecast a gradual rise in democracy" and Gundlach and Paldam (2009, p. 34), who conclude that "the long-run causality appears to be running exclusively from income to democracy, with critical junctures playing no role in the long run." Yet other scholars endorse parts of modernization theory, but tend to stress a different set of mechanisms than those envisaged by Lipset (1959). Rueschemeyer et al. (1993, pp. 74-75), for example, suggest that "capitalist development is related to democracy because it shifts the balance of class power, because it weakens the power of the landlord class and strengthens subordinate classes."

This paper proposes a new perspective on the modernization debate. We hope in that way to defuse some of the tension between those who reject and those who endorse the view that economic development is a root cause of democratization and to explore the boundaries of modernization theory in a more nuanced way. Our starting point is that democracy is a package of institutions. This observation is neither new nor novel and most writers on democracy make a distinction between different aspects of democracy.[3] Yet, the modernization debate is largely about whether or not economic development explains why countries adopt the entire package of democratic institutions. It is therefore either assumed that democratization is an all or nothing choice or that all the sub-components of the package are equally likely to be causally driven by modernization. The alternative view we propose is that modernization understood as increases in income levels, urbanization and higher educational standards may be causally linked to specific sub-components of the overall package of democratic institutions without necessarily governing in a causal sense the evolution of the overall package or all of its parts. In other words, our general approach is to zoom in on particular institutions, such as suffrage, ballot, and election rules, or on the political party structure or the absence or presence of a free press, and ask,

[2] Acemoglu et al. (2001) show that critical junctures played a key role for institutional and economic development in those parts of the world that were colonized by the Western European powers.

[3] Dahl (1971), for example, defines democracy by three attributes, "public contestation", "right to participate," and "civil liberties". In a similar vein, Acemoglu and Robinson (2006, p. 48) note that "democracy is associated with a set of institutions such as free and fair elections, the accountability of politicians to the electorate, and free entry into politics".

in each case, if it is possible to identify, theoretically, micro-founded causal mechanisms that suggest a link, and then study the relevance of that link empirically.[4] In some cases, the answer will be no, but in others it may be yes, thus allowing modernization theory to play a role for some aspect of democracy, albeit one which is more limited than the one envisaged by Lipset.

In this paper, we apply this general approach to the secret ballot.[5] Specifically, we ask if the secret ballot can be viewed as a consequence of economic development. We focus on the secret ballot for three related reasons. First, the secret ballot is regarded as one of the cornerstones of free and fair elections (Rokkan, 1961; Elklit, 2000).[6] Baland and Robinson (2007, p. 140) note that "the introduction of political institutions that stop corruption and vote buying, such as the Australian ballot, appear to be as significant a step in the process of political development as the construction of electoral democracy itself." In short, the introduction of the secret ballot is arguably an important step towards (full-fledged) democracy, and gaining a better understanding of how and why it came about is important in and of itself.[7]

Second, democratizations during the post-war period typically came with the entire package of *de facto* institutions including the secret ballot and universal suffrage – the Eastern European countries are prime examples of this as are Spain, Portugal, and Greece. Historically, however, the process of democratization was, as demonstrated for example in Rueschemeyer et al. (1992, 1993), Collier (1999), Andrews and Jackman (2005), and

[4] Ziblatt (2006) also argues that it is necessary to unbundle the concept of democracy to fully account for the correlation between economic development and democracy.

[5] Other aspects of the package of democratic institutions have already received substantial attention. See, for example, Boix (1999), Blais et al. (2004), and Andrews and Jackman (2005) for studies of the factors behind the adoption of proportional representation and Przeworski (2009), Aidt and Jensen (2011) for studies of the causes of suffrage reform and Braun and Kvanicka (2011) for a study of women's suffrage.

[6] Alvarez et al. (1996) and Boix (2003) define democracies as regimes in which governmental offices are filled as a consequence of contested elections, where the term contested implies that the voters can exercise a free and independent choice.

[7] The secret ballot has not received much attention in the political economy literature on democratization but there are some exceptions. Przeworski (2010) uses a world sample from 1919 till the present day to study, among other things, the relation between social unrest and the transition from open to secret voting. He also shows that the secret ballot reduces the probability that incumbents win elections. Heckelman (1995) studies the consequences of the secret ballot for voter turnout in elections in US states, while Anderson and Tollison (1990) show that the open ballot contributed to holding back expansion of the public sector. Aidt and Jensen (2009) show that the presence of secret voting increases the probability of income tax adoption in a sample of now developed countries.

Congleton (2011), a more gradual process where restrictions on participation, on contestation, and on civil liberties were relaxed step by step to eventually reach what we recognize today as full-fledged democracy. A typical sequence of reforms involved, firstly, an extension of the franchise to larger groups of men; secondly, the introduction of the secret ballot; thirdly, the adoption of some system of proportional representation and allowing women the right to vote.[8] The gradual pattern in itself does not prove that modernization played a causal role during the first wave of democratization. However, it does suggest the possibility that modernization could have played a role, but that it was different for each of these steps towards full-fledged democracy, and it motivates studies of individual aspects of democracy as opposed to the entire package.

Third, there is a straightforward causal mechanism that links modernization to the secret ballot. The mechanism operates through the vote market. Effective vote markets require open voting such that the buyer of the vote can verify that the seller kept his part of the bargain. Secret voting makes it much harder to operate vote markets. An effective vote market, however, also requires a certain degree of social control and resort to effective economic sanctions if promises are not kept (Baland and Robinson, 2008). Modernization tends to erode social control and the scope for economic sanction and in that way increases the transaction cost of maintaining a vote market. Urbanization and industrialization open up new outside options for common voters who previously might have been tied into localized employment relationships. Improved education standards broaden the perspective of common voters and tend to undermine old norms of social deference. Income growth in general tends to strengthen the hand of common voters through a simple income effect that makes them less inclined to view the vote as a commodity that can be sold at a price. All of these forces combine to undermine the value of the vote market for the old elites who, as suggested by Anderson and Tollison (1990), employed vote buying to protect themselves against the distributive threat posed by the common voter. These old defenders of the open vote would then become less stout defenders and ballot reform

[8] There are of course exceptions. The USA endorsed a broad male suffrage in the founding Constitution and not all countries went through all steps. The United Kingdom still uses the first-past-the-post system and Switzerland did not introduce women's suffrage until 1971.

becomes more likely.

We now provide a preview of the study. We begin the analysis by presenting a formal model that demonstrates how and why modernization and suffrage extensions can cause societies to subsequently adopt the secret ballot. To support these predictions empirically, we marshal two types of evidence. The first type of evidence is based on event history studies of the adoption of the secret ballot. Here, we ask whether modernization–income growth, urbanization, and increasing education standards–can predict the timing of these adoptions in three different historical samples: Western Europe plus (English speaking) off-shoots (1820-1913), Latin America (1820-1958), and US states (1840-1950). In all cases, we find strong evidence, which is robust to instrumental variables estimations, suggesting that modernization can predict the timing of the secret ballot very well. In contrast, the same variables cannot predict the timing of reforms that extended the suffrage to broader segments of the male population.[9] This illustrates the importance of studying different sub-components of democracy. With respect to suffrage reforms as triggers of ballot reforms, we find very little evidence. The second type of evidence delves deeper into the underlying causal mechanism. Heckelman (1995) observes that turnout should fall as consequence of the secret ballot and presents evidence that this indeed happened in the US states between 1870 and 1950. The reason is that the vote as a tradable commodity lost (much of) its value and voters had one less reason to show up and cast their (largely inconsequential) vote. The drop in turnout after the secret ballot is introduced can therefore be taken as an indicator of the importance of the vote market under the old system of open voting. We can then ask whether the fall is smaller in places where modernization has progressed more, as one would expect if the mechanism through which modernization encourages ballot reform is the vote market. We investigate this in two contexts. The first is, building on Heckelman (1995), the US states from 1870 to 1950. The second is the parliamentary constituencies in the United Kingdom before and after the Ballot Act of 1872. In both

[9] This has been demonstrated in recent contributions to the literature on the causes of suffrage reforms. Przeworsky (2009) studies a large cross-national sample of countries after World War I and finds that the threat of revolution, to a greater extent than income growth, drove the process of democratization. Aidt and Jensen (2011) study a historical sample of European countries and likewise find that income growth, urbanization, and education standards play little or no role for the suffrage reforms that took place between 1820 and 1938 while the threat of revolution played a leading role.

cases, we find evidence consistent with the proposed causal mechanism.

The rest of the paper is organized as follows. Section 2 presents the theoretical framework. Section 3 presents the results of the event history studies. Section 4 examines the effects on turnout of the secret ballot. Section 5 concludes.

2 Theoretical framework

We consider a society that is democratic in the sense that the government is elected in elections in which not only the old elite but also broader social classes can vote. It, however, falls short of a full-fledged democracy in that initially voting is open and the franchise is not universal. The model has two key ingredients. The first is a vote market that only operates under open voting. The second ingredient is what Congleton (2007, 2011) refers to as a constitutional exchange mechanism that determines the scope for ballot reform.

2.1 The vote market

Two political parties compete for the right to form government in an election in which all enfranchised citizens can cast a vote and the party that gains the support of the majority wins the right to set policy. The two parties represent separate core constituencies. Party E (for elite) represents the old elite (voters of type E), while party R (for radical) represents the enfranchised working or middle class voters (voters of type R). The number of type E voters is N_E, and $N_R = N - N_E$ is the number of working or middle class voters and N is the total number of voters. The old elite is outnumbered, $N_R > N_E$. As in Acemoglu and Robinson (2006), we focus on the distributive conflict between the old elite and the majority of the electorate.[10] The parties cannot commit to policy platforms. If elected, a party therefore implements the policy that is optimal for its constituency.

In practice, the platform of party E embraces regressive commodity and trade taxes and provision of basic public goods, while that of party R embraces progressive taxation of income and property and public provision of private goods (such as education, health, and social security), which mostly benefit the working and middle classes. We do not model

[10] We could introduce ideology, but doing so does not yield additional insights.

these choices explicitly. We simply refer to them as policy R and policy E, respectively. With this in mind, we can write the welfare gain for a voter of type R or E of having "their" party in power as

$$\Delta_R \equiv u_R(R) - u_R(E) > 0 \tag{1}$$

$$\Delta_E \equiv u_E(E) - u_E(R) > 0, \tag{2}$$

where $u_i(j)$ is the utility of a voter of type $i \in \{E, R\}$ of policy $j \in \{E, R\}$. The economic policy with party R in power is better for voters of type R than the policy associated with party E and vice versa.

There are two possible ballot regimes: open or secret ballot. Under secret ballot, voters vote their preferences; under open ballot, votes can be bought and sold in a vote market.[11] The outcome of the election is trivial under secret ballot: voters of type R are the majority and they elect party R. The old elite would like to avoid this as they suffer under policy platform R. The working and middle class voters, on the other hand, welcome it.

Under open ballot, a vote market can flourish because vote decisions can be observed and monitored. The vote is a commodity that can be sold and bought.[12] We assume that only party E got the resources needed to buy votes. This is in line with the historical narrative for many countries, but the assumption can be relaxed, at little consequence for the core results.[13]

Voters of type E always vote for party E. A voter of type R votes for party R whenever

$$\Delta_R - p > 0, \tag{3}$$

where p is the price offered to him in exchange for his vote. A voter of type R may be willing to shift his allegiance to party E if offered at least the reservation price $p_v = \Delta_R$.

[11] Stokes (2005) proposes a model of how party machines even in the presence of the secret ballot can buy votes. The mechanism is to use social networks to control voters. So, vote markets can exist even with secret voting, but they are clearly less effective.

[12] As pointed out by Baland and Robinson (2007) vote buying can either be direct in the sense that a monetary transfer takes place between the buyer and the seller or indirect in the sense that individuals contract away their votes when they enter into particular employment relations. We focus on direct vote buying in the model, but the general argument also applies to indirect vote buying.

[13] In particular, competition between the two parties in the vote market could be introduced as in Baland and Robinson (2008). They assume that one party cares more about being in power than the other and that competition takes place in prices à la Bertrand. The implication is that only one party buys votes in equilibrium.

Party E has to compensate each voter of type R that it "buys" for the economic loss that he incurs by having policy E instead of policy R.

The total cost of buying a majority depends on how many voters need to be bought and on the transaction cost of doing so. Let $N_R^B = \frac{N}{2} - N_E$ be the minimum number of purchased votes required to get a majority. Since some voters may renege on the vote contract, we assume that N_R^A additional voters of type R (beyond N_R^B) must be bought to secure a majority. We can then define the transaction cost of vote buying as $\tau = \frac{N_R^A + N_R^B}{N_R^B} \geq 1$.[14] We interpret τ as a measure of how easy it is to monitor and enforce the vote contract. The higher τ is the harder it is to ensure that each voter keeps his part of the deal and the more voters must be bought to secure a majority. In sum, the total cost of buying a majority is $C_v = \tau N_R^B \Delta_R$. Vote buying is expensive, but it keeps party E in power and the old elite can in that way avoid the distributive consequences of "real" democracy. Since the secret ballot eliminates the vote market, the value of preserving a system of open voting for party E is

$$\pi_E = N_E \Delta_E - \tau N_R^B \Delta_R + M, \tag{4}$$

where $M \geq 0$ is the ego rent from being in power. The party faces a clear trade-off: open voting keeps it in power and the distributive policies of party R are blocked, but it is costly to run the vote market because a subset of working and middle class voters must be compensated for their loss of having a sub-optimal policy. The utility of party R under secret ballot relative to open voting is

$$\pi_R = \left(N_R - \tau N_R^B\right) \Delta_R + M. \tag{5}$$

For party R, the trade-off is between gaining power by ending electoral corruption on the one hand and the "vote income" forgone by the party's supporters on the other. While $\pi_R > 0$ because it is not possible to buy more votes than there are voters, π_E can be negative. In that case, the old elite's opposition to the secret ballot vanishes altogether. This represents an interesting special case in which the ballot regime is reformed with the

[14] Since a vote can only be bought once in each election, τ cannot be greater than $\frac{N_R}{N_R^B}$.

consent of all parties. However, the general case must be considered one in which the two parties disagree about the optimal ballot regime ($\pi_E > 0$). We now turn to how this conflict is resolved through constitutional exchange.

2.2 Constitutional exchange

Before the election, the two political parties can decide on the ballot rules. In line with the historical facts, we assume that the *status quo* is that voting is open. The question, then, becomes whether or not to introduce the secret ballot.

We model the reform process as a contest between the two parties. They invest effort, denoted by x_j for $j \in \{E, R\}$, in protecting or challenging the ballot regime. The contest technology is described by a Tullock contest function:

$$q = \frac{x_R}{x_E + x_R}, \tag{6}$$

where q is the likelihood of introducing the secret ballot. The parties decide on effort simultaneously and aim at maximizing expected utility, anticipating that the vote market will operate only under open voting. If the old elite does not defend open voting, $x_E = 0$, then, as noted above, the secret ballot is introduced for sure, as all parties agree that this is the optimal system. If, on the other hand, both parties exert effort to protect and challenge, respectively, the system of open voting, a reform will happen with a certain probability depending on how much effort is exerted by each party.

We can write the expected utility of the two parties as

$$V_E = w_E(E) - q\pi_E - x_E \tag{7}$$

$$V_R = w_R(E) + q\pi_R - x_R \tag{8}$$

where π_j for $j \in \{E, R\}$ is given above in equations (4) and (5) and $w_j(E)$ is the utility of party j with party E is office. Solving this contest for an interior equilibrium where both parties put in effort, the equilibrium probability that the secret ballot is introduced is[15]

$$q^* = \frac{\pi_R}{\pi_E + \pi_R}. \tag{9}$$

[15] See Appendix A for details.

The probability of a ballot reform is increasing in the welfare gain to party R and decreasing in the welfare loss to party E. In other words, factors that make the vote market valuable to the old elite work against secret ballot, and factors that make the secret ballot valuable to the radicals work in favor of a reform. These gains and losses, in turn, depend systematically on underlying structural factors, and movements in these factors will then directly affect the probability of a ballot reform. We are particularly interested in two factors: the extension of the franchise and modernization, but, as we discuss in Appendix A, the model also links income and landholding inequality to the secret vote.

2.3 Results

An increase in the number of working and middle class voters, N_R, has a direct effect on the cost of buying a majority in the vote market: more voters have to be compensated for voting against their economic interests. This increase in N_R^B reduces the value of preserving open voting for the elite (π_E falls). For party R the value of secret ballot (π_R) is affected by two opposing forces. On the one hand, the expansion of the party's support base tends to increase π_R while, on the other, the fact that more of its supporters lose their "vote income" under the secret ballot tends to reduce π_R. The net effect is an increase in the value of secret ballot. The reason is that all voters of type R gain from the policy shift induced by the new ballot system, while only a subset loses their "vote income". The overall outcome of this is unambiguous: a broader suffrage makes secret ballot more likely. We shall refer to this as the size of the electorate hypothesis.

We model modernization as an increase in the transaction cost of buying votes, i.e., as an increase in τ. For the old elite, the value of open voting is undermined by the rise in the cost of buying a majority ($\frac{\partial \pi_E}{\partial \tau} = -N_R^B \Delta_R < 0$). At the same time, for the radicals, secret ballot is worth less (but still worth something) because the foregone "vote income" is larger when τ is larger ($\frac{\partial \pi_R}{\partial \tau} = -N_R^B \Delta_R < 0$). Assuming that both parties exert effort to preserve or reform the ballot system, the net effect of this on the likelihood of secret ballot is

$$\frac{\partial q^*}{\partial \tau} = \frac{(\pi_R - \pi_E) N_R^B \Delta_R}{(\pi_R + \pi_E)^2}. \tag{10}$$

The probability of secret ballot increases if and only if $\pi_R - \pi_E > 0 \Leftrightarrow N_E\Delta_E < N_R\Delta_R$. In other words, as long as ballot reform remains contentious, a (small) increase in τ raises the likelihood of secret ballot if and only if secret ballot is Pareto superior (in the Hicks-Kaldor sense) to open voting.[16] When τ becomes sufficiently large, however, party E stops defending open voting altogether. Accordingly, modernization, eventually, leads to secret ballot because at some point it becomes so expensive to run the vote market that ballot reform is supported by all parties. We refer to this as the modernization hypothesis.

Before we move on to the empirical investigation, it is appropriate to ask why the transaction cost of vote buying is systematically related to "modernization". It happens through a number of complementary channels. First, a vote market operates most effectively in environments with a high degree of economic dependency and social control. The process of industrialization and urbanization opens up new economic possibilities for working and middle class voters and make them more mobile both in terms of occupation choices and in terms of place of residence. As pointed out by Hicken (2007), urbanization destroys traditional patron-client networks, which are difficult to re-create. The transition from a static agricultural economy to a dynamic industrial economy with broader markets and economic specialization, therefore, makes it harder for the old elite to enforce and monitor vote contracts, and the transaction cost of vote buying shoots up. Of course, political parties may respond to this challenge and reorganize to take advantage of the new opportunities that, for example, urbanization offers. This happened in many US cities at the turn of the 19th century, where a culture of machine politics emerged and supported a system of direct vote buying. But the general tendency would be to increase the transaction cost of running a vote market. Moreover, as stressed by Rueschemeyer et al. (1993, p. 75), economic development "weakens the power of the landlord class and strengthens subordinate classes. The working and the middle classes [...] gain an unprecedented capacity for self-organization due to such developments as urbanization, factory

[16] This raises the question as to why a Political Coase Theorem does not apply: if secret voting Pareto dominates open voting, then the radicals could, in principle, compensate the old elite for their loss and yet be better off. The reason is, as also stressed in Acemoglu (2003), lack of commitment. Once in power (under a system of secret voting) party R will go back on any promises it may have made regarding compensation to the old elites.

production, and new forms of communication and transportation." This also serves to undermine the vote market. Second, modernization entails higher education standards and a rise in literacy in the general population. As pointed out by Lipset (1959, p. 79), "education presumably broadens men's outlooks, enables them to understand the need for norms of tolerance, restrains them from adhering to extremist and monistic doctrines, and increases their capacity to make rational electoral choices." The broader outlook and access to more information as well as the general level of independence of mind that comes with education are likely to make it harder to enforce vote contracts. All of this is broadly related to economic growth and increases in the average income per capita. One can, in fact, envisage an income effect by which an increasing number of well-off voters are less inclined to view vote selling as an important source of income.

3 Event history studies of the secret ballot

The aim of an event history study is to explain the differential timing of discrete events, in our case the introduction of the secret ballot. We model the (conditional) probability that a country or a state which has not yet adopted the secret ballot adopts it in a given year as a function of quantitative measures of modernization (income levels, urbanization, education standards, etc.), the size of the electorate, and other potential determinants of ballot reform.

We explore three different historical samples–Western Europe plus off-shoots, Latin America, and the US states–that cover the relevant period during the 19th and 20th centuries when the secret ballot replaced open voting. We are interested in the year in which the secret ballot, according to our sources, was *de facto* rather than *de jure* adopted in a country or a state. By *de facto* we mean that the ballot rules were such that electoral corruption, vote buying, and intimidation were reduced to a minimum. This requirement would, typically, be satisfied by the so-called Australian ballot. This requires that an official ballot is printed at public expense and distributed only at the polling stations. The ballot lists the names of the nominated candidates of all parties and it is marked in secret at the polling station. But non-Australian secret ballots may also qualify, and we consider

such ballots *de facto* secret if our sources indicate that electoral corruption, vote buying, and intimidation were *de facto* at a minimum after the change in voting procedures.[17]

The dependent variable y_{it} is coded as 1 if country (or state) i introduced the secret ballot in year t and as 0 in the years before and after that. A country (or state) drops out of the sample in the year after its adoption.[18] We use a duration model to estimate the time conditional probability of adoption of the secret ballot (the hazard rate). We follow Beck et al. (1998) and estimate the following discrete logistic model:

$$P\left(y_{it}=1|\, x_{it}, y_{it-1}=0\right)=\frac{1}{1+e^{-(x_{it}\gamma+H(.))}}. \tag{11}$$

The variable y_{it-1} is an indicator variable is equal to zero in each year before introduction of the secret ballot and equal to one thereafter. We allow for duration dependence in the hazard rate through the function $H\left(.\right)$.[19]

The vector x_{it} represents three main groups of explanatory variables.[20] The first group contains indicators of modernization, such as the log of GDP *per capita*, the urbanization rate, and measures of education attainment standards. The second group contains variables related to the size of the electorate. This includes direct measures of the number of voters and variables that capture literacy, gender, and other restrictions on the size of the electorate, as appropriate. The third group contains variables that capture alternative causes of ballot reform. Many scholars emphasize the importance of landholding and income inequality in relation to democratization in general. We expect that landholding inequality makes the secret ballot less likely. The impact of income inequality is less clear. This is because a reduction in income inequality reduces the demand for redistribution.

[17] Appendix B provides information on the coding for each of the countries and states in our samples, and lists the sources we consulted in the process.

[18] We do not know precisely when a country (or a state) became at "risk" of introducing the secret ballot. For the Western Europe plus off-shoots sample, we assume that countries enter the "risk set" either in 1820 or at the time of independence. This means that Belgium and the Netherlands enter the sample in 1830; that Switzerland enters in 1848; that Germany enters in 1871; that New Zealand enters in 1856; and that Canada enters in 1867. For the US states, we assume that they became at risk in 1840. For the Latin American sample, we assume that countries enter the "risk set" in 1820.

[19] The argument of the function is $t-t_i^p$ where t_i^p represents either the year in which country i enters the "risk set" (i.e., either 1820 or the year of independence). We estimate $H\left(.\right)$ using natural cubic splines and use the estimated spline coefficients along with the number of years a country has been at "risk" of adopting (or since entry to the sample) to model duration dependence. We have used a specification with two knots for the splines.

[20] See Appendix A for definitions and sources of all the variables.

This at the same time dampens the old elite's opposition to and the common voters' support for the secret ballot.[21] Other scholars, e.g., Wejnert (2005) or Gleditsch and Ward (2006), emphasize the international diffusion of democracy. Governments in one country may learn from political reforms–in our case ballot reforms–in other countries, and more so from countries (or states) which are either linguistically or physically nearer. Finally, we take scale effects into account by controlling for the log of the population size.[22]

3.1 Western Europe plus off-shoots

The Western Europe plus off-shoots sample covers, for the period from 1820 to 1938, the 11 Western European countries listed at the top of column one of Table 1 plus the USA, Canada and New Zealand. We see from the table that the first country in the sample to introduce the secret ballot was the Netherlands in 1849; the last ones were France and Germany in 1913. The dating of the *de facto* secret ballot in some of the countries–for example, France–required some judgement and Appendix B contains a detailed discussion of this. Before the secret ballot, electoral corruption was widespread. Both in the United Kingdom and in Germany vote buying was concentrated in the country side where social control and employment relations made it relatively easy for the landed elites to run effective vote markets (see, e.g., Ziblatt, 2009 or Seymour,1915, pp. 433-35). In France, the practice that voters could write the name of their preferred candidate on their own ballot paper at home or receive a ballot in a distribution in the streets allowed active vote markets to operate until 1913 (e.g., Seymour and Frary, 1918 or Mackie, 2000). Similar markets operated in the other European countries in the sample. In the USA, vote markets were particularly vibrant in the big migration cities where party machines exploited that colored voting papers, indicating party choice, could be handed out at the polling stations.

< Table 1 to appear here >

[21] Appendix A discusses how this works within the context of our model.

[22] Below we report the main results. Appendix C contains information on robustness checks.

In Table 2, we report the results of the event history study.[23] Two variables captures the process of modernization: *urbanization rate* and *GDP per capita*.[24] We see that the coefficients on *GDP per capita* and *urbanization rate* are positive and statistically significant when they enter the model one at a time. However, when they enter together, the individual effects are estimated less precisely,[25] but they remain jointly significant and *GDP per capita* remains individually significant in all but one specification. The joint significance of the modernization variables is robust to the use of a rare events or a random effects estimator.[26] How big are these effects? To answer this question, suppose, for example, that *GDP per capita* increases by \$100 keeping all other variables at their average values. As a consequence of this, the predicted probability of adoption increase from 0.3 to 0.4 percent. Further, an increase in *GDP per capita* from its average value (\$1856) to its maximum (\$3648) increases the probability by 26 percentage points. All in all, these results support the modernization hypothesis. Economic development predicts the introduction of the secret ballot, and *GDP per capita* is a stronger predictor than *urbanization rate*.

For the Western Europe plus off-shoots sample, we use information on number of eligible voters as a proportion of the adult population, *electorate/adult population*, to test the size of the electorate hypothesis. Table 1 (columns four and five) records information on *electorate/adult population* in the first democratic election and in the last election before the secret ballot in each country. The secret ballot was preceded by expansion of the franchise in most countries. This suggestive evidence of the size of the electorate hypothesis is, however, not confirmed by the estimation results reported in Table 2. They show that

[23] A formal test for duration dependency in the hazard rate cannot reject that the baseline hazard is constant over time. Our strong prior is that the hazard is increasing with time, so to allow for the possibility that this result is simply due to the fact that we estimate the duration function $H(.)$ poorly, we report specifications with duration dependence in the tables. Excluding duration dependence has little effect on the results.

[24] Data limitations prevent us from studying the effect of increasing education standards in this sample.

[25] The correlation coefficient between the two variables is 0.75.

[26] The secret ballot was a rare event and this may bias the estimates. King and Zeng (2001) have proposed a logit estimator that deals with this. We have re-estimated all the specifications with this estimator, but only report the one specification in column four. In the two specifications where the two modernization variables are entered individually, they remain statistically significant [not reported]. Overall, we therefore conclude that rare events bias is not a major issue.

the point estimate on *electorate/adult population* is positive in most specifications[27] but only statistically significant in one. We have experimented with alternative definitions of the size of the electorate but the results are very similar. Overall, then, it was not the pre-secret ballot expansion of the suffrage that triggered the secret ballot.

We use two variables to capture inequality. The first variable, *gini coefficient*, is an estimate of the degree of income inequality (Bourguignon and Morrisson, 2002). The other variable is a measure of landholding equality, *share of family owned farms* (Vanhanen, 2003).[28] This variable is only available from 1858. Accordingly, by including it in the model, we lose more than half the observations and three countries. We see that both income and landholding inequality are (statistically) unrelated to the timing of the secret ballot. This runs counter to other recent evidence on the effect of inequality on democratization.[29] The control variable *population* always has a negative coefficient, but is usually not significant, suggesting that scale effects were unimportant. The variable *learning* is introduced to capture diffusion effects. It is a "distance" weighted index of reforms in neighboring countries, where we use the information on linguistic similarities provided by Fearon (2003) to measure distance. Despite the fact that the adoptions of the secret ballot cluster in the 1870s, we find no evidence that social learning was important.

< Table 2 to appear here >

The results reported in Table 2 are estimated from a combination of cross national and within country variation in modernization, the size of the electorate, inequality, etc. It is therefore possible that the correlations between the timing of the secret ballot and the explanatory variables are driven by the same unobserved factors and that they are coincident rather than causal. To convince the reader that this is most likely not the

[27] The negative estimate reported in column 6 is based on a sample where we have lost three countries and all years before 1858.

[28] Boix (2003) and Ansell and Samuels (2010) also make use of this measure to capture (in)equality in the ownership of land.

[29] See, e.g., Ziblatt (2008), Boix (2003), and Ansell and Samuels (2010). The data on income inequality are very incomplete making it difficult to estimate the effect with precision. We, note however, that the point estimate is positive. This is in line with the intriguing finding by Ansell and Samuels (2010). They report that an increase in income inequality makes democratization more likely (where democracy means that more than half adult male population can vote).

case, Table 3 shows some estimations in which we instrument for *GDP per capita* and for *electorate/adult population*. As in Acemoglu et al. (2008), we use a weighted index of GDP in the other countries in the sample as an instrument for *GDP per capita* in a particular country.[30] The logic is the international business cycle. The validity of the instrument can, however, be challenged if social learning effects are strong. As we saw above, this does not seem to be the case, but by keeping *learning* in the model, we can rule out that movements in GDP in other countries affect the probability of a secret ballot reform in a particular country, not through its effect on GDP in that country, but through a social learning channel. While this instrument, in principle, is valid for the entire sample of countries, our second instrument only makes sense for the Western European countries and for this reason, the IV estimations are restricted to this sub-sample. Aidt and Jensen (2011) demonstrate that revolutionary events (as defined by Tilly, 1993) in other countries affect suffrage reforms in a country through a process of social diffusion. Revolutionary pressures are unlikely to be a direct cause of ballot reforms and so, we can use a measure of distance weighted revolutionary events, *revolutionary threat*, in other countries as an instrument for suffrage reform and thus the size of the electorate in a country. In addition to this, we exploit the high degree of path dependency in suffrage rules and make use of lags of *electorate/adult population* as an additional instrument.

Table 3 reports the results of the instrumental variables (IV) estimation. The IV estimates are based on a linear probability model and for the smaller sample that excludes the off-shoots. For comparison, we therefore report the results from a Logit and linear probability estimation on this smaller sample in columns one and two. The IV estimates in column three confirm not only the positive link between modernization and the secret ballot but also the rejection of the size of the electorate hypothesis. The first stage regressions are reported in the last two columns. The instruments are highly significant and the J-test for over-identification is passed.

< Table 3 to appear here >

[30] Acemoglu et al. (2008) use bilateral trade to construct the weights. We do not have this information for our sample, so as a second best we use physical distance to proxy for trade integration.

3.2 US States

Table 4 provides information on when the secret ballot was adopted for gubernatorial and senatorial elections across US states (listed in column one). The first state to adopt the secret ballot was Kentucky in 1882 and the last was South Carolina in 1950. Again, the data refer to when voting *de facto* became secret. In some states, e.g., Kentucky, Maryland, Minnesota, Tennessee, Texas, Missouri, and Wisconsin, the secret ballot was not initially applied uniformly throughout the entire state. We follow Heckelman (1995) and code these split states as being *de facto* on the secret ballot in the years recorded in the column two of the table.

Before the secret ballot, electoral corruption were widespread. Fredman (1968, p. 22) describes how vote buying worked in practice: "the simplest form of bribery occurred when ballot peddlers or district captains paid a voter as he emerged from the polling place. To check that he actually used the ballot it was colored or otherwise recognizable and the compliant voter was followed up to the booth." Other forms of electoral corruption, such as indirect bribery through official fees, party assessments, "knifing", and repeating, were also common currency. McCook (1892) estimates that sixteen percent of voters of Connecticut were up for sale at prices ranging from two to twenty dollars. The most corrupt and most disorderly 19th century state elections are said to have occurred in big cities such as New York and San Francisco. The reason was the high concentration of poor voters and recent immigrants unused to the franchise (Fredman, 1968, p. 25). Congleton (2011, p. 560) notes that the introduction of the secret ballot changed all this and "allowed votes to be cast without fear of rebuke by landlords or employers".

< Table 4 to appear here >

For the US state sample, we got three quantitative indictors of modernization: *income per worker*, *average years of schooling*, and *urbanization rate* for the entire sample period from 1840 to 1950. Table 5 shows the results of the event history study. The three variables are positively and significantly correlated with the timing of the secret ballot when they are entered on their own. When they are entered together, they are jointly significant, but

only *income per worker* and *average years of schooling* are individually significant. This is robust to alternative estimation techniques, as shown in columns four to six. To gauge the size of the modernization effect, suppose that *income per worker* increases by $1,000. Using model (4) and keeping all other variables at their average values, this increases the predicted probability of a ballot reform from 0.20 to 0.24 percent. An increase from the average value of *income per worker* ($8,371) to the maximum ($47,727) raises the probability of introduction by 1.8 percentage points. This effect is somewhat smaller than in the Western Europe plus off-shoots sample, but still substantial.

Unlike the countries in Western Europe (and Latin America), the male suffrage was broad already in the 1840s with 60-90 percent of adult (white) males enfranchised. Nevertheless, the states applied various tricks to *de facto* restrict the suffrage. These included requiring payment in full of poll taxes and literacy tests (see columns four and five of Table 4). These steps served to keep poor and illiterate males off the election roll, often aimed at disenfranchising African Americans. Women's suffrage rights also varied (see column three of Table 4) and some of the frontier states granted women the right to vote long before it became mandatory in 1920 (Lott and Kenny, 1999). We use these restrictions to capture over-time and across state variation in the size of the electorate. From Table 5, it is clear, however, that these restrictions had very little effect on the timing of the secret ballot. As in the Western Europe plus off-shoots sample, we must conclude that there is little evidence supporting the size of the electorate hypothesis.

We use the variable *share of land held by the 20% largest farms* to capture landholding inequality (Galor et al., 2009). It is only available from 1880, so we lose over half the observations when we include it in the specification shown in column six of Table 5. Yet, landholding inequality is highly significant and exerts a negative impact on the likelihood that the secret vote is adopted. This is in line with the findings of Ziblatt (2008) and Ansell and Samuels (2010) but contrasts with the finding for the Western Europe plus off-shoots sample reported above. We find little evidence that scale effects or social learning[31] mattered for secret ballot adoption.

[31] We use physical distance to construct the variable learning, see Appendix B.

< Table 5 to appear here

To address the issue of causality alluded to above, we present some estimations in which we instrument for *income per worker*, *average years of schooling*, and *urbanization rate*. To do so, we use a weighted index of income (or GDP) in the other states and regional dummies for the eight economic areas of the USA. As in the Western Europe plus off-shoots sample, the logic behind the first instrument is the common business cycle. The dummies for the economic areas capture that states that are located in the same region share similar geographical conditions, such as, e.g., access to the sea, which are likely to affect economic development (GDP, urbanization and human capital accumulation) but not, conditional on *learning*, the timing of the ballot.

Table 6 reports the results of the instrumental variables (IV) estimates. For comparison, we, again, report the results from a Logit and linear probability model. The IV estimates in column three confirm the positive link between modernization and the secret ballot. In particular, the positive effect of *average years of schooling* is robust to instrumentation and the three modernization variables are jointly significant. This suggests that the correlation between modernization and the timing of the secret ballot does, in fact, represent a causal mechanism. The first stage regressions are reported in the last two columns. The instruments are highly significant and the J-test for over-identification is passed.

< Table 6 to appear here >

3.3 Latin America

Compared to Western Europe or the USA, Latin America has a turbulent political history. For example, since independence, Peru has changed or modified its constitution 13 times; Chile has modified its constitution 11 times, while Brazil and Colombia have made 8 and 12 changes, respectively. As in Western Europe, Canada, New Zealand, and the USA, in the elections that did take place during the 19th and early 20th centuries, "voting was often a public, oral act, with registration rolls controlled by local government officials"

(Hartlyn and Valenzuela, 1994). Gradually, however, secrecy was introduced, but later and more reluctantly than in Europe and the USA.

Table 7 reports when the secret ballot was adopted in the countries in Latin American sample (listed in column one). The volatile political history of the countries in the sample makes it difficult to determine whether voting became *de facto* as well as *de jure* secret at the dates recorded. Moreover, electoral corruption returned or persisted in many countries after the secret ballot was *de jure* introduced. For example, in Colombia–the first Latin American country to introduce the secret ballot in 1853–"coercion and other forms of fraud" persisted (Hartlyn and Valenzuela, 1994, p. 129). Likewise, Argentina introduced the secret ballot in 1912, but "openly fraudulent elections" took place in the 1930s (Hartlyn and Valenzuela, 1994, p. 130) and there is evidence of vote buying as recent as in 2002 (Stokes, 2005). Even so, Drake (2009, p. 44) concludes that Latin Americans, over time, "increasingly tallied the ballots honestly and respected the results", and, in some countries, the secret ballot was effective at weeding out electoral corruption. Baland and Robinson (2008), for example, demonstrate how the introduction of the secret ballot in Chile in 1958 broke pervasive patron-client relationships. All in all, the dates constitute our best estimate of when the secret ballot was *de facto* introduced, but there is more uncertainty about this than for the other samples. Universal male suffrage sometimes preceded the introduction of the secret ballot, although we note from column three and four of Table 7 that there are many exceptions and that compulsory voting was introduced mostly after the ballot.

<Table 7 to appear here>

Table 8 reports the results of the event history study. It covers the period 1820 when the 13 countries are assumed to enter the "risk set" to 1958. Historical data on socioeconomic variables are more sparse for Latin America than for the other samples. We do, however, have data on two important aspects of modernization for all 13 countries in the sample from 1882 to 1958. The two aspects are primary school enrollment (*primary education enrollment*) and urbanization (*urbanization rate*). Data on GDP per capita are not widely available for this sample. We see from Table 8 that the two aspects of modernization

worked in opposite directions: the rise in education standards increased the likelihood of secret ballot while urbanization had the opposite effect. The latter effect goes against the modernization hypothesis and suggests that in some contexts, as discussed in relation to the party machines of the big US immigration cities, the scale economics of urbanization can enhance rather than reduce electoral corruption.

In contrast to Western Europe literacy requirements on the right to vote were widely used in Latin America (see column seven of Table 7). We use these restrictions to test the size of the electorate hypothesis. We observe that the effect of the dummy variable *literacy test* (which is equal to one if the right to vote was subject to a literacy test) is statistically significant and that this restriction reduced the likelihood of secret ballot. Literacy tests were often designed to disenfranchise poor, illiterate native voters. Since the secret ballot also requires a minimum of literacy (voters must be able to read the ballot paper), this suggests that the secret ballot and literacy restrictions might, partly, have served a common purpose. The fact literacy tests were in a number of cases abolished at the same time as the secret ballot was introduced support this interpretation.

We capture landholding equality with the same variable as in the Western Europe plus off-shoots sample, that is, by *share of family owned farms*. Again, landholding equality is not statistically significant, although the point estimate is normally positive as expected. The variables *population* and *learning* are occasionally significant, but we note that, if anything, adoptions in neighboring countries reduced the likelihood of adoption in a given country. Given the volatile political history of Latin America, we control for the general nature of the political environment (*polity dummy*) and for the level of conflict (*civil war*) in all the estimations. As it turns out, these factors are not in themselves related to the introduction of the secret ballot and do not affect the evidence on the variables of interest.

< Table 8 to appear here >

4 Turnout as an indicator of vote buying

The evidence presented support the view that rising incomes and education standards and to a lesser extent urbanization–factors all related to modernization–systematically affected

the timing of the secret ballot. The underlying mechanism, however, remains unclear. Our theoretical argument is that the link between modernization and secret ballot reform is the vote market. Direct quantitative evidence on the operation of these markets and their interaction with modernization is not available for a sufficiently broad sample to allow for a direct test of this hypothesis.[32] Even so, we can provide some indirect evidence.

The paradox of voting suggests that rational voters have little reason to vote. The well-known reason is that the likelihood that an individual voter is pivotal in a large election is effectively zero and that it takes time and effort to get to the polling station. Voting is, therefore, to a large extent an expressive act; i.e., an act that gives voters pleasure irrespective of the influence each one of them may perceive to have on the election outcome. Individuals who have a high expressive benefit relative to the cost of voting are the ones who turn out to vote. A vote market, however, provides voters with an additional reason to show up to vote: they can sell their vote. This reason disappears (or at least is diluted) after the introduction of the secret ballot. Consequently, basic voting theory predicts that turnout should, *ceteris paribus*, be lower with secret than with open voting. Exploring this logic, Heckelman (1995) demonstrates in a sample of US states that turnout did fall after the secret ballot was introduced as one would expect if the vote market was vibrant before hand.[33]

Building on this idea, we propose to test whether modernization, as we contend, made vote markets less vibrant and in that way paved the road to secret ballot by looking at turnout patterns before and after the introduction of the secret ballot.[34] In particular, if modernization reduces the value of the open vote, then the effect of the secret ballot on turnout should be numerically smaller in places with higher incomes, higher education

[32]Detailed evidence on particular cases can, however, be found as demonstrated by Ziblatt (2009) in his study of electoral corruption in Imperial Germany between 1871 and 1912, by Baland and Robinson (2008) in their study of Chile, or by Stokes (2005) in her study of vote buying in Argentina.

[33]In contrast, for a large cross national sample of countries, Przeworski (2008) finds that turnout increases after adoption of the secret ballot. One reason for this is that the expressive benefit of voting might increase when voting can be done independently. This effect might dominate the effect of the ballot on the vote market in some contexts.

[34]In our model, we assume that turnout is invariant to the ballot rules. Allowing turnout to fall as a consequence of the secret ballot would, however, not affect the predictions, as long as turnout amongst voters of type R does not fall to such an extent that voters of type E constitute the majority among those who turn out to vote.

standards, and more urbanization.

We implement this test in two different contexts: a sample of US states from 1870 to 1950 and a sample of parliamentary constituencies of Great Britain before and after the Ballot Act of 1872. It is of particular interest to study and compare these two cases because the nature of the vote markets in Great Britain and in the USA were different. As for the US states, Ostrogorski (1964, p. 170) attributes the increase in electoral bribery after the Civil War to the rapid growth of cities. In Great Britain, vote markets were most effective in the country-side or in small urban constituencies where many voters were directly dependent on the local landed elite for their livelihood.

4.1 Turnout in US states

For the sample of US states, we extend Heckelman's (1995) baseline model for the electoral turnout rate[35], and estimate the following panel model:[36]

$$(turnout\ rate)_{it} = \delta_i + \eta_t + \beta_0 SB_{it} + \beta_1 SB_{it} * M_{it} + Z_{it}\beta_2 + e_{it}, \tag{12}$$

where i represents a state, t represents election years, SB_{it} is a dummy variable equal to zero before the secret ballot and equal to one after, M_{it} is a "modernization" variable of interest, Z_{it} is a vector of additional control variables, and δ_i and η_t are state and time fixed effects. The direct effect of secret ballot on turnout, β_0, should, according to the logic suggested by Heckelman (1995), be negative. The coefficient on the interaction between the secret ballot dummy variable and the "modernization" variable, β_1, should, however, be positive if it is true that modernization reduces the value of the vote market.

<Table 9: Turnout model for US states >

Table 9 reports the results. We use three alternative measures of modernization: *income per capita*, *school enrollment,* and *urbanization rate*. The secret ballot has, as reported

[35] The turnout rate is defined as the total number of votes cast in a gubernatorial election divided by the age and sex eligible population.

[36] We use data for all elections from 1870 to 1950 for the 48 contiguous states. We follow Heckelman (1995) and begin the sample in 1870. This was the first census year after the Fifteenth Amendment, which made discrimination at the polls based on race illegal.

in Heckelman (1995), a negative effect on turnout, consistent with the hypothesis that pre-secret ballot turnout is kept high because of vote buying. Importantly, we see that the interaction between the three modernization variables and the secret ballot dummy is positive and is significant in all specifications. The turning points for the modernization variables are all within sample.[37] These results corroborate the hypothesis that modernization undermines the vote market. It is interesting that urbanization, although only marginally significant, contributed to this process despite the fact that the big city party machines clearly played a role in operating effective vote markets. We note that women's suffrage and the poll tax and literacy requirement lower turnout.

4.2 The Ballot Act of 1872

The Second Reform Act of 1867 extended the voting franchise to a fairly broad segment of the male population of Great Britain. It was followed five years later, in 1872, by the Ballot Act. This act required that elections to the House of Commons should occur by secret ballot. We use the Ballot Act as a natural experiment and study turnout patterns at the constituency level in the general elections in 1868 and 1874, both of which were conducted according to the (new) rules laid down in 1867, to investigate whether modernization undermines the vote market.[38]

To be specific, let $turnout_{it}$ be the number of voters who turned out to vote in constituency i in election t for $t = 1868, 1874$. We write

$$turnout_{it} = \alpha_i + \nu_t + \alpha_1 R_t + m_i R_t \alpha_2 + \varepsilon_{it}, \tag{13}$$

where $R_{1868} = 0$ and $R_{1874} = 1$ indicate that the reform of the ballot took place between 1868 and 1874, α_i is a constituency specific fixed effect, ν_t is an aggregate time effect, and m_i is a vector of constituency specific variables which do not exhibit any meaningful observable time variation but may interact with the ballot reform. Taking the first difference,

[37] This suggests that the "expressive effect" eventually dominates the "vote buying effect" as we observe, on average, in broader samples of countries (Przeworski, 2008).

[38] Berlinski and Dewan (2010) use a similar design to study the impact of the Second Reform Act on the rise of the Liberal Party.

we get

$$\Delta turnout_{it} = (v_{1874} - v_{1868} + \alpha_1) + m_i\alpha_2 + (\varepsilon_{i1874} - \varepsilon_{i1868}). \tag{14}$$

Clearly, the direct effect of the reform, α_1, cannot be identified independently of the common time effect, but we can identify the vector α_2 and in this way recover the interaction effect between the reform dummy variable and the time-invariant constituency characteristics of interest.

We are interested in two constituency characteristics. Firstly, we obtain information on the number of inhabitants per house from the 1871 Census and use this to proxy for the degree of urbanization in a constituency (*density*). This is our modernization variable which we use to test whether the effect of the Ballot Act on voter turnout was (numerically) smaller in constituencies that were more urban; i.e., whether the coefficient on *density* is positive. Secondly, from Craig (1977) and Berlinski and Dewan (2010), we obtain information on the number of registered voters (*electorate*). Although this systematically underestimates the size of the electorate, it is the best available proxy. We use it to test whether the effect of the Ballot Act on turnout was (numerically) smaller in constituencies with large electorates; i.e., whether the coefficient on *electorate* is positive.

It is, however, difficult to implement these tests because information on the number of voters who voted in each election is unavailable. Craig (1977) reports the votes polled for each candidate running. In constituencies with more than one seat, voters could cast as many votes as there were seats. Consequently, the number of votes is not, in general, equal to the number of voters. However, for the constituencies with only one seat, the number of votes does correspond to the number of voters who turned out to vote, and our test is based on the sub-sample of one-seat constituencies.[39]

The estimation results are

$$\Delta turnout_{it} = \underset{(-2.67)}{-186.2} + \underset{(4.08)}{27.6}(density) + \underset{(8.58)}{0.12}(electorate), \tag{15}$$

where the figures in parentheses are t-statistics. We see that the combined estimate of

[39] Our sample comprises 65 borough constituencies in England and Wales, 8 Burgh constituencies in Scotland, and 9 county constituencies in Wales and Scotland. This is not the entire universe of one-seat constituencies because i) data are sometimes missing and ii) the 1868 or 1874 elections were uncontested in a number of constituencies.

the reform and the aggregate time effect is negative, consistent with a post-reform drop in turnout. More importantly, we observe that both the proxy for urbanization and for the size of the electorate dampened the negative effect on turnout. This is consistent with the hypothesis that the vote market, before the ballot, was more vibrant in places that were less urban and had smaller electorates.

While population density data can only be recovered for census years, we do observe the number of voters registered both in 1868 and in 1874. Since the franchise rules were unchanged between the two elections, over-time differences in the number of registered voters are either due to differences in the incentive to register (which we might conjecture is lowered after the ballot) or to changes in economic conditions, which allowed more residents to meet the property value qualification. When we control for this in the estimations by including the change in *electorate*, we find, unsurprisingly, that in constituencies in which the number of registered voters fell, the number of voters who voted also fell. However, while the coefficient on *density* remains significant at the one percent level, the coefficient on *electorate* is only marginally significant at the 10 percent level [not reported].

Overall, the results of our two indirect tests of the role of the vote market point in the same direction. The interaction between modernization and the secret ballot moderates the drop in turnout in a way that is consistent with *ex ante* vibrant vote markets in places more insulated against the forces of modernization. This is consistent with the causal mechanism suggested by our theoretical framework.

5 Conclusion

This paper unbundles the concept of democracy in order to evaluate–in a more nuanced way–the interplay between modernization and democratization. Our event history study of the introduction of the secret ballot demonstrates a remarkably robust correlation between modernization and its adoption and our IV estimations point towards a causal relationship. This finding is important because it grants the forces of urbanization, rising education standards, and income growth a role in explaining political development. For sure, the role is more limited than envisaged by Lipset (1959), but we contend that modernization,

while probably not causally linked to the timing of the major suffrage reforms, was linked in a causal sense to the introduction of the secret ballot. Moreover, we propose and provide evidence that the mechanism through which this happened was the vote market.

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6 Appendix A

The first order conditions associated with the effort choices of the two parties are:

$$\pi_E \frac{x_R}{(x_E + x_R)^2} = 1 = \pi_R \frac{x_E}{(x_E + x_R)^2} \tag{16}$$

These conditions imply that the ratio of optimal efforts is $\frac{x_E^*}{x_R^*} = \frac{\pi_E}{\pi_R}$. Substituting this into equation (6) yields equation (9).

In addition to the two main comparative statics results discussed in the main text, the model also yields results related to inequality. As stressed by Ansell and Samuels (2010) in a different context, it is important to make a distinction between landholding inequality and income inequality. Landholding inequality and the asset-specificity that often goes with it means that it is easier for the poor to expropriate and tax the wealth of the elite (see, e.g., Acemoglu and Robinson 2006, chapter 9, or Boix, 2003, chapter 2). In the context of the model, we, therefore, expect that Δ_E is larger in societies with higher landholding inequality and more specific assets. Keeping the utility value of the transfer to voters of type R (Δ_R) constant, an increase in Δ_E unambiguously reduces the likelihood of the secret ballot. Landholding inequality serves to block the secret ballot as those same factors are likely to block suffrage reform (Ansell and Samuels, 2010; Boix, 2003, chapter 2; Ziblatt, 2008).

Income inequality, on the other hand, operates through two channels. A reduction in income inequality means that voters of types E and R become more alike. This simultaneously reduces the welfare gain for voters of type R and the welfare loss of voters type E of having secret ballot. As Boix (2003, chapter 2) puts it, the elite has less to fear and the common voters less to gain. The effect of this on the likelihood of secret ballot is ambiguous. To see this, let us index inequality by μ such that an increase in μ represents higher levels of income inequality, and assume that $\frac{\partial \Delta_j}{\partial \mu} > 0$ for $j \in \{R, E\}$. We can calculate:

$$\frac{\partial \pi_E}{\partial \mu} = N_E \frac{\partial \Delta_E}{\partial \mu} - \tau N_R^B \frac{\partial \Delta_R}{\partial \mu}, \tag{17}$$

$$\frac{\partial \pi_R}{\partial \mu} = \left(N_R - \tau N_R^B\right) \frac{\partial \Delta_R}{\partial \mu}, \tag{18}$$

and

$$\frac{\partial q^*}{\partial \mu} = \frac{\left[\left(\pi_R - \pi_E\right) \tau N_R^B + \pi_E N_R\right] \frac{\partial \Delta_R}{\partial \mu} - \pi_R N_E \frac{\partial \Delta_E}{\partial \mu}}{(\pi_E + \pi_R)^2}. \tag{19}$$

The sign of the first terms depends on whether the secret ballot is efficient or not and is positive for sure if it is. The second term is unambiguously negative. The ambiguity arises because higher income inequality gives party E reasons to fight harder to preserve the open ballot. At the same time, the incentive of party R to fight for secret ballot also increases.

7 Appendix B

This appendix explains how we have coded the years of *de facto* adoption of the secret ballot and lists the sources upon which our coding is based. It also describes the sources for and the construction of other variables used in the analyses.

7.1 Timing of the secret ballot

1. The Netherlands: 1849. Stuurman (1991, pp. 462-463) notes that "in the autumn of 1849 Thorbecke, the architect of the new constitution, was at last called upon to form a Cabinet and it was his government that produced the final Electoral law [...] There was a secret ballot in all elections."

2. New Zealand: 1870. "Verbal voting lasted until 1870, when Parliament finally agreed to adopt the secret ballot." (www.elections.org.nz/democracy/history/years.html). Mackie (2000) confirms this year.

3. United Kingdom: 1872. This was the year in which the Ballot Act was passed by Parliament (Asquith, 1888; Mackie, 2000). The rules followed those of the Australian Ballot, and Seymour (1915, p. 433) observes that "it is probable that secret voting tended to mitigate the force of undue influence, and it is certainly true that no petitions alleging intimidation were upheld after 1872." This suggests that intimidation, more or less, had ended with the Ballot Act. The price of a vote fell in many places from five pounds to five shillings suggesting that it was harder for the electors to extract rents from candidates when their vote decision could not be verified. In fact, the Ballot Act encouraged voters to take bribes from both Conservatives and Liberals but that the bribes were relatively small (Seymour, 1915, p. 434). While some corruption persisted, the Ballot Act was effective in weeding out the worst of these practices, and it is reasonable to date the *de facto* (and *de jure*) secret ballot in the United Kingdom to 1872 rather than to 1883 when the Corrupt and Illegal Practices Prevention Act was introduced.

4. Switzerland: 1872. Hewitt (1977) and Engerman (2003).

5. Canada: 1874. Pillon (2006) and Engerman (2003).

6. Belgium: 1877. Seymour and Fray (1918, vol. II, p. 193) and Mackie (2000).

7. Norway: 1884. Nerbørvik (1986). Some sources, e.g., Engerman (2003), give 1885, but this is the year of the first election conducted with secret ballot.

8. United States: 1891. In the USA, the ballot rules were regulated by the states. The secret ballot was adopted for presidential elections between 1884 and 1891 (Ludington, 1911; Heckelman, 1995). We date secret ballot to 1891.

9. Denmark: 1901. Elkit (1988, p. 22) and Seymour and Frary (1918, vol. II, p. 177).

10. Finland: 1906. "The Parliament Act that came into force on 1 October 1906 was a monumental reform [...] The new Parliament Act called for Members of Parliament to be elected directly and by secret ballot according to a proportional system based on districts."

    (http://web.eduskunta.fi/Resource.phx/parliament /aboutparliament/presentation/history.htx). Mackie (2000) gives 1907, but this is the first election under the new rules.

11. Sweden: 1907. Carstairs (1980). Esaiasson (1990) gives 1911 but this is the first election with secret ballot.

12. Austria: 1907. (http://www.parlament.gv.at/) and Seymour and Frary (1918, vol. II, pp. 62-63).

13. Germany: 1913. Anderson (2009, p. 88) shows that the secret ballot was effective in Germany from 1913, although Germany had partially adopted the secret ballot in 1903 (Ziblatt, 2009, p. 12).

14. France: 1913. France had semi-secret elections early in the 19th century, but it was not until 1913 that it became effectively secret, e.g. Baland and Robinson (2008, p. 1738), Seymour and Frary (1918, vol. I, p. 379), Markoff (1999) and Crook and Crook (2007). The constitution of 1795 included provisions for the secret ballot, but it is widely seen to have been ineffective because voters could write the name of their preferred candidate on their own ballot paper at home or receive a ballot in a distribution in the streets. As stressed by many authors (e.g. Seymour and Frary, 1918; Markoff, 1999; Mackie, 2000; Crook and Crook, 2007), this provided ample leeway for corruption and intimidation. For example, Seymour and Frary (1918, p. 379) note that the vote was *de jure* secret, but "in practice almost as public as in Prussia, where it is oral." In 1913, the ballot rules were tidied up and although the ballot remained non-Australian, the reform is widely considered to have been effective in providing secrecy and weeding out most corrupt practices.

15. US states: Heckelman (1995) and Ludington (1911).

16. Latin America: Nohlen (2005), Hartlyn and Valenzuela (1994), and Baland and Robinson (2008).

7.2 Data sources and definitions

Western Europe plus off-shoots

1. *GDP per capita* is real GDP in international 1990 Geary-Khamis dollars, adjusted to exclude the impact of border changes, per capita. Source: Maddison (2003).

2. *urbanization rate* is the percentage of the population living in towns with more than 20,000 inhabitants. Missing values are interpolated linearly. Source: Banks (2003) and Mitchell (2003a,b).

3. *electorate/adult population* is the electorate (for parliamentary/house elections) in percentage of the adult population. Suffrage data are only recorded in election years and we assume that the variable stayed constant between elections. Suffrage is coded zero for periods without democracy and elections of any sort. Source: Flora et al. (1983), Mackie and Rose (1991), Mitchell (2003a,b), Cook and Paxton (1998), www.elections.org.nz, and www.elections.ca.

4. *gini coefficient* is the Gini coefficient for income inequality. A value of zero expresses total equality and a value of one maximal inequality. Data is available only with 20 years intervals. We have interpolated the missing observations linearly. Source: Bourguignon and Morrisson (2001, 2002).

5. *share of family owned farms* is the share of agricultural land occupied by family farms, where family farms are defined as farms that provide employment for less than five people, are cultivated by the family itself, and are owned by the holder family or held in owner-like possession. Available only with 10 year intervals. We have interpolated the missing observations linearly. Source: Vanhanen (2003).

6. *learning* is defined as a distance weighted average of secret ballot adoptions in other countries:
$$learning_{it} = \sum_j \left(1 - \sqrt{\frac{15 - \#common_{ij}}{15}}\right) A_j(t), \tag{20}$$
where $A_j(t)$ is 1 if country j has adopted the secret ballot at time t and zero otherwise. The variable $\#common_{ij}$ is the number of common notes in the linguistic tree between country pair i and j with the maximum number of common notes being 15. The square root formulation of the weighting is suggested by Fearon (2003). Source: Fearon (2003) and Aidt and Jensen (2011).

7. *population* is the total population in 1000s. Source: Mitchell (2003a,b) and Maddison (2003).

8. *revolutionary threat* is a weighted sum of revolutionary events taking place in other countries. The weights are the distance between capitals of each pair of countries. Source: Aidt and Jensen (2011) and Tilly (1993).

9. *distance weighted GDP* is a weighted sum of log GDP in other countries where the weights are the distance (in kilometers) between the capitals of each pair of countries. Source: Maddison (2003) and own calculations.

US states: event and turnout study

1. *income per worker* is real state output (until 1920) or income (from 1929) per worker in 2000 dollars. Source: Turner et al. (2007).

2. *average years of schooling* is the average years of schooling of the workforce, estimated using the perpetual inventory method. Source: Turner et al. (2007).

3. *urbanization rate* is the share of the population living in urban areas. Available for census years only. Interpolated linearly for the years in between. Source: Lee et al. (1957) and various US Census reports.

4. *women's suffrage* is a dummy taking the value one if women had the right to vote and zero otherwise. Source: Lott and Kenny (1999).

5. *poll tax* is a dummy equal to zero in years without a poll tax requirement and equal to one otherwise. Source: Lott and Kenny (1999).

6. *literacy test* is a dummy equal to zero in years without a literacy test requirement and equal to one otherwise. Source: Lott and Kenny (1999).

7. *share of land held by the 20% largest farms* is the share of land held by the 20 percent largest farms. Source: Galor et al. (2009).

8. *learning* is defined as

$$learning_{ij} = \sum_{j} \frac{A_j(t)}{D_{ij}}, \tag{21}$$

   where D_{ij} is the distance (in miles) between the state capitals of state i and j and $A_j(t)$ is one if state j has adopted the secret ballot at time t and zero otherwise. Source: Own calculations based on Heckelman (1995).

9. *population* is the number of inhabitants in the state in 1000s. Available for census years only. Interpolated linearly for the years in between. Source: Lee et al. (1957) and various US Census reports.

10. *distance weighted income* is a weighted sum of log *income* in other states. The weights are the distance between state capitals (in miles). Source: Turner et al. (2007) and own calculations.

11. *regional dummies* are coded according to the eight Bureau of Economic Analysis regions. Source: www.bea.gov.

12. *turnout rate* is equal to the total number of votes cast in a gubernatorial election divided by the age and sex eligible population. Source: Burnham et al. (1971).

Latin America

1. *primary school enrollment/population* is total primary school enrollment as a percentage of the population. Source: Aidt and Eterovic (2011) and the sources quoted therein.

2. *urbanization rate* is the percentage of the population living in towns with more than 20,000 inhabitants. Source: Banks (2003).

3. *literacy test* is a dummy equal to zero in years without a literacy test requirement and equal to one in years with. Source: Aidt and Eterovic (2011) and Nohlen (2005).

4. *share of family owned farms* is defined above. Source: Vanhanen (2003).

5. *population* is the total population in 1000s. Source: Maddison (2003).

6. *learning* is defined as for the US state sample.

7. *civil war* is a dummy equal to one if the country is at civil war and zero otherwise. Source: Singer and Small (1994).

8. *polity dummy* is equal to one when the Polity IV index is greater than zero and zero otherwise. Source: Marshall and Jaggers (2000).

Great Britain, turnout study

1. *turnout* is the total number of votes cast in each one-seat constituency in England, Wales, and Scotland in 1868 and 1874. Source: Craig (1977) and Berlinski and Dewan (2010).

2. *density* is inhabitants per house in each constituency in 1871. Source: 1871 Census of Great Britain.

3. *electorate* is the number of registered voters in each constituency in 1868 and 1874. Source: Craig (1977) and Berlinski and Dewan (2010).

8 Appendix C

8.1 Robustness checks

This appendix summarizes a number of robustness checks. The detailed results are available upon request.

8.1.1 Western Europe plus off-shoots

We have, based on information from Flora et al. (1983), Mackie and Rose (1991), Cook and Paxton (1998), constructed an alternative measure of the size of the electorate, *voters per MP*, defined as the number of voters per seat of parliament. This measure is also insignificant. Importantly, the results for the modernization variables are unchanged. We have estimated all models with a random effects logit estimator. The test of country specific random effects fails to reject the null of no country specific effects. Importantly, the modernization variables remain significant, see column 7 of Table 2 for a representative example.

8.1.2 The US states

Boix (2003, p. 122) notes that racial motives might have played a role in relation to the secret ballot. We added the share of blacks in the population to the model. This variable is itself insignificant and it has no effect on our main results. We have also re-estimated the model for the period after the civil war and the 15th amendment (1870 onwards). Doing so, again, matters little for the results. Adding state specific random effects also has little effect on the results, see column 8 of Table 5 for an example. The test of heterogeneous random effects across states fails to reject the null of no state specific effects. In the turnout model, the outcome variable (*turnout rate*) is a fractional variable bounded between zero and one. Papke and Wooldridge (1993) propose to use a logit link for fractional variables instead of the linear estimator. We find that using this method matters little for the results.

8.1.3 Latin America

We have added an indicator variable for women's suffrage to the model. The variable is insignificant and it does not affect the other results. We have also used an alternative measure of urbanization, namely, *occupational diversification*, defined as the average of the urban and non-agricultural population (Vanhanen, 2003). Using this variable instead of *urbanization rate* gives a positive and marginally significant coefficient in specifications where *occupation diversification* is entered as the only modernization variable. In specifications that include both *primary school enrollment* and *occupational diversification* both are individually insignificant, but jointly significant at the ten percent level. For the Latin American sample, the random effects are significant, and affect the magnitude of coefficients, but not the qualitative results, see Table 8, column 6 for an example. Maddison (2003) reports GDP per capita data for nine countries before secret ballot adoption. For four of the countries the data go back to 1870; for three countries they are only available from 1920. For Chile the data go back to 1820. For Peru, the data can be tracked back to 1896. A Logit model which includes *GDP per capita* as the only independent variable yields a positive and significant coefficient. However, once we include other variables, the likelihood function becomes non-concave, and we fail to find a maximum.

9 Extra References

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Table 1: Institutional information for the Western Europe plus off-shoots sample.

Country	Year of *de facto* adoption of the secret ballot	Year of franchise extensions (1820-1913)	*Electorate/adult population* in year of first election or at independence	*Electorate/adult population* in year of adoption
Western Europe				
Netherlands	1849	1848, 1887, 1894	4.6	4.6
Switzerland	1872	1848	38.9	38.9
United Kingdom	1872	1832, 1867, 1884	8.6	14.9
Belgium	1877	1831, 1848, 1893	1.9	3.7
Norway	1884	1814, 1884, 1897	11.4	11.4
Denmark	1901	1849	25.7	29.0
Finland	1906	1869, 1906	8.3	76.2
Austria	1907	1873, 1896, 1907	10.6	37.7
Sweden	1907	1866, 1907	9.8	14.0
France	1913	1824, 1830, 1848	0.5	43.4
Germany	1913	1871[a]	33.0	38.7
Western off-shoots				
New Zealand	1870	1893	29.1	33.8
Canada	1874	1898	22.0	23.1
USA	1891	1870 (enfranchisement of blacks)	n.a.	40.6

Notes: Italy is not included in the sample because it *de facto* adopted the secret vote in 1861 at unification. Australia is not included in the sample because the secret ballot was introduced at the time of independence. a. Right from its unification, Germany had full male suffrage, and the Weimar Republic of 1920 is therefore not regarded as a reform year in terms of suffrage extension.
Sources: See Appendix B.

Table 2: Main results for the Western Europe plus off-shoots sample.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES						
Modernization						
Log(GDP per capita)	6.361**		6.620*	5.322	6.619**	11.99**
	[2.439]		[1.768]	[1.441]	[2.359]	[2.098]
urbanization rate		0.00974***	-0.00099	-0.0000591	-0.000989	0.018
		[3.648]	[-0.209]	[-0.0127]	[-0.182]	[0.832]
Joint significance of modernization variables			**6.24****	**4.91***	**10.45*****	**4.55***
Size-of-electorate						
electorate/adult population	0.0365	0.0551**	0.0338	0.0333	0.0338	-0.121
	[1.256]	[2.302]	[0.938]	[0.937]	[1.291]	[-0.74]
Inequality						
gini coefficient	28.49	12.33	28.35	26.21	28.35	-36.66
	[1.444]	[0.664]	[1.389]	[1.302]	[1.178]	[0.436]
share of family owned farms						0.173
						[1.408]
Joint significance of inequality variables						**3.54**
Log(population)	-0.498**	-0.755***	-0.464	-0.399	-0.464	-1.207**
	[-2.043]	[-2.799]	[-1.354]	[-1.181]	[-1.614]	[-2.099]
learning	-1.179	1.017	-1.257	-1.025	-1.257	-2.319*
	[-0.944]	[1.559]	[-0.945]	[-0.781]	[-0.862]	[-1.732]
Duration dependence						
years without secret ballot	0.104	0.112	0.0866	0.0589	0.0866	0.063
	[0.620]	[0.707]	[0.481]	[0.331]	[0.590]	[0.280]
spline1	0.000147	0.000155	0.000132	0.000111	0.000132	0.000197
	[1.031]	[0.992]	[0.873]	[0.744]	[1.074]	[0.779]
spline2	-9.63E-05	-0.000104	-8.84E-05	-7.75E-05	-8.84E-05	-0.00015
	[-1.195]	[-1.126]	[-1.039]	[-0.923]	[-1.274]	[-0.961]
Constant	-65.23**	-8.715	-66.87*	-55.54	-66.86**	-73.19***
	[-2.379]	[-0.903]	[-1.890]	[-1.591]	[-2.435]	[-2.166]
Observations	779	732	732	732	732	350
Number of countries	14	14	14	14	14	11[a]
Estimation method	Logit	Logit	Logit	Rare events	Random effects	Logit

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1; a. The variable *share of family farms* is only available for 1858 for the Netherlands and from 1918 for Finland and from 1908 for New Zealand. Therefore these three countries are lost in the estimation including this variable.

Table 3: Instrumental Variables Estimation for the Western Europe plus off-shoots sample.

Model	(7)	(8)	(9)	(10)	(11)
	Secret ballot	Secret ballot	Secret ballot	Log(GDP per capita)	Electorate/ adult population
Log(GDP per capita)	8.413*	0.0644**	0.0648**		
	[1.842]	[3.081]	[2.330]		
electorate/adult population	0.0466	0.000657	-0.00015		
	[1.268]	[0.814]	[-0.467]		
Instrumental variables					
distance weighted GDP				2.093***	1.282
				[26.49]	[0.664]
lagged electorate/adult population				-0.00344***	0.975***
				[-6.702]	[77.60]
revolutionary threat				0.00673*	0.352***
				[1.660]	[3.553]
Control variables					
gini coeficient	9.761	0.0856	0.147	4.097***	3.859
	[0.291]	[0.329]	[0.510]	[10.37]	[0.400]
Log(population)	-0.899**	-0.0113**	-0.00831**	0.0991***	0.121
	[-2.456]	[-2.451]	[-1.990]	[18.21]	[0.908]
learning	-2.079	-0.0219	-0.00429	0.184***	-0.39
	[-1.315]	[-0.814]	[-0.138]	[6.223]	[-0.538]
Duration dependence					
years without secret ballot	0.286	0.00248*	0.00224*	0.00306*	0.0394
	[1.176]	[1.873]	[1.946]	[1.884]	[0.994]
spline1	0.000266	3.78e-06*	3.58e-06**	8.79e-06***	5.27E-05
	[1.167]	[2.130]	[2.229]	[4.940]	[1.213]
spline2	-0.00015	-2.65e-06**	-2.57e-06**	-7.57e-06***	-4.05E-05
	[-1.118]	[-2.283]	[-2.463]	[-6.754]	[-1.478]
Constant	-70.90**	-0.443***	-0.494**	3.780***	-3.647
	[-2.512]	[-3.357]	[-2.417]	[19.29]	[-0.762]
Observations	692	692	688	688	688
F-test of instruments				236.36***	2227.99***
J-test of over-identifying restrictions					0.686
Number of countries	11	11	11	11	11
Estimation method	Logit	OLS	IV	First stage	First Stage

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Institutional information for the US states sample.

State	Secret Ballot	Women's suffrage	Poll tax	Literacy test
Kentucky	1882	1920		
Massachusetts	1888	1920	-1891	1857-
Indiana	1889	1919		
Montana	1889	1914		
Rhode Island	1889	1917	-1888	
Mississippi	1890	1920	1889-1963	1890-
Oklahoma	1890	1918		1912-
Vermont	1890	1920		
Washington	1890	1910		1896-
Wyoming	1890	1869		1889-
Arizona	1891	1912		1912-
Arkansas	1891	1917	1891-1963	
California	1891	1911		1894-
Colorado	1891	1893		
Delaware	1891	1920	-1907	1897-
Idaho	1891	1896		
Illinois	1891	1913		
Maine	1891	1919		1892
Michigan	1891	1918		
Minnesota	1891	1919		
Missouri	1891	1919		
Nebraska	1891	1917		
Nevada	1891	1914	-1910	
New Hampshire	1891	1920		1902-
North Dakota	1891	1917		
Ohio	1891	1919		
Oregon	1891	1912		1924-
Pennsylvania	1891	1920	-1933	
South Dakota	1891	1918		
West Virginia	1891	1920		
Iowa	1892	1919		
Maryland	1892	1920		
Alabama	1893	1920	1901-1963	1901-
Kansas	1893	1912		
Virginia	1894	1920	1875-1882, 1902-1963	1902-
Wisconsin	1894	1919		
Florida	1895	1920	1889-1927	
New York	1895	1917		1921-
Louisiana	1896	1920	1898-1934	1898-
Utah	1896	1870		
Texas	1905	1918	1902-1963	
Connecticut	1909	1920		1856-
New Jersey	1911	1920		
New Mexico	1912	1920		
Tennessee	1921	1919	1870, 1890-1951	
Georgia	1922	1920	-1945	1908-
North Carolina	1929	1920	1899-1920	1900-
South Carolina	1950	1920	1895-1951	1895-

Sources: Heckelman (1995) and Lott and Kenny (1999, table 1) who draw on sources listed in Appendix B.

Table 5: Main results for US states sample.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Modernization							
Log(income per worker)	1.454***			1.205**	1.160**	1.205	0.555
	[3.598]			[2.413]	[2.335]	[1.639]	[1.018]
average years of schooling		0.506***		0.299*	0.288*	0.299	0.698***
		[3.616]		[1.786]	[1.729]	[1.419]	[2.698]
urbanization rate			0.0215**	-0.00556	-0.00388	-0.00556	0.0168
			[2.055]	[-0.341]	[-0.239]	[-0.371]	[0.991]
Joint significance of modernization variables				**19.64*** **	**19.07*** **	**13.27*** **	**15.09*** **
Size-of-electorate							
women's suffrage	0.207	-0.117	0.096	0.156	0.187	0.156	-0.109
	[0.467]	[-0.254]	[0.196]	[0.335]	[0.405]	[0.253]	[-0.193]
literacy test	-0.823	-0.857	-0.848	-0.759	-0.7	-0.759	-0.306
	[-1.202]	[-1.183]	[-1.321]	[-1.088]	[-1.009]	[-1.387]	[-0.630]
poll taxes	-0.312	-0.453	-0.582	-0.265	-0.214	-0.265	-0.501
	[-0.842]	[-0.939]	[-1.402]	[-0.655]	[-0.534]	[-0.617]	[-0.934]
Joint significance of size-of-electorate variables	**2.36**	**2.07**	**3.48**	**1.76**	**1.59**	**2.46**	**1.39**
Inequality							
share of land held by the 20% largest farms							-27.93***
							[-3.283]
Control variables							
Log(population)	-0.0567	-0.265**	-0.185	-0.0742	-0.0915	-0.0742	-0.0977
	[-0.554]	[-2.406]	[-1.360]	[-0.852]	[-1.056]	[-0.476]	[-0.858]
learning	-0.412	-4.755	-13.12	-6.203	-6.518	-6.203	8.331
	[-0.0348]	[-0.390]	[-0.985]	[-0.440]	[-0.465]	[-0.646]	[0.712]
Duration dependence							
years without secret ballot	0.0109	-0.0596	-0.0729	-0.0932	-0.496***	-0.0932	-0.388
	[0.0680]	[-0.406]	[-0.444]	[-0.511]	[-2.731]	[-0.343]	[-0.866]
spline1	-0.00024	-0.00032	-0.0004	-0.00041	-0.000791***	-0.000405	-0.000602
	[-0.926]	[-1.264]	[-1.409]	[-1.361]	[-2.670]	[-1.296]	[-1.063]
spline2	0.000152	0.000196	0.000241	0.000245	0.000432***	0.000245	0.000349
	[1.080]	[1.384]	[1.520]	[1.500]	[2.652]	[1.520]	[1.165]
Constant	-20.46***	-5.136***	-5.957**	-18.14***	-9.925*	-18.14**	-0.645
	[-4.301]	[-2.960]	[-2.556]	[-3.238]	[-1.782]	[-2.066]	[-0.0693]
Observations	2,230	2,205	2,242	2,177	2,177	2,177	729
Number of states	45[a]	48	47[b]	44	44	44	44
Estimation method	Logit	Logit	Logit	Logit	Rare-events	Random effects	Logit

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1; a. Income data are missing for South and North Dakota and Oklahoma; b. Urbanization is missing for Idaho.

Table 6: Instrumental variables estimation the US states sample.

	(8)	(9)	(10)	(11)	(12)	(13)
VARIABLES	Secret ballot	Secret ballot	Secret ballot	Log(income per worker)	average years of schooling	urbanization rate
Modernization						
Log(income per worker)	1.205**	0.0103**	0.0156			
	[2.413]	[2.163]	[1.418]			
average years of schooling	0.299*	0.00244	0.00943*			
	[1.786]	[1.015]	[1.873]			
urbanization rate	-0.00556	0.000452	-0.000529			
	[-0.341]	[1.281]	[-1.016]			
Joint significance of modernization variables	**19.64*** **	**7.75*** **	**29.06*** **			
Size-of-electorate						
women's suffrage	0.156	0.00942	0.0158	-0.251*	-0.0685	0.815
	[0.335]	[0.444]	[0.738]	[-1.811]	[-0.395]	[0.375]
literacy test	-0.265	-0.0138	-0.00164	-0.0137	-0.322*	4.544
	[-0.655]	[-1.242]	[-0.128]	[-0.173]	[-2.007]	[0.937]
poll taxes	-0.759	-0.0391*	-0.0319	0.127	-0.581**	3.653
	[-1.088]	[-1.841]	[-1.308]	[1.185]	[-2.019]	[0.464]
Joint significance of size-of-electorates variables	**1.76**	**1.74**	**4.13**			
Control variables						
Log(population)	-0.0742	-0.00065	0.00185	-0.00245	0.188***	3.203*
	[-0.852]	[-0.343]	[0.658]	[-0.0914]	[2.721]	[1.909]
learning	-6.203	0.629	0.739	0.391	3.078	77.97
	[-0.440]	[1.249]	[1.582]	[0.373]	[0.795]	[1.030]
Instrumental variables						
Weighted total income per worker				0.00427	-0.00961	10.49
				[0.0277]	[-0.0413]	[1.500]
New England				-0.402	0.854**	-7.371
				[-1.434]	[2.279]	[-0.707]
Mid East				-0.322	-0.609	-7.505
				[-1.138]	[-1.450]	[-0.809]
Great Lakes				-0.419*	-0.374	-19.88***
				[-1.800]	[-0.919]	[-3.493]
Plains				-0.511**	-0.752**	-18.38***
				[-2.334]	[-2.071]	[-4.382]
South East				-1.059***	-2.255***	-28.51***
				[-4.895]	[-7.056]	[-4.904]
South West				-0.626***	-2.321***	-19.39***
				[-3.319]	[-4.029]	[-4.647]
Far West				0.216	-0.175	-2.406
				[1.022]	[-0.616]	[-0.471]
First stage F-test				390.46***	975.03***	306.31***
J-test of over-identifying restrictions			4.409			
Estimation method	Logit	OLS	IV-regression	First stage	First stage	First stage
Number of states	44	44	44	44	44	44
Observations	2,177	2,177	2,177	2,177	2,177	2,177

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1; Excluded region is Rocky Mountains; All estimations include the duration dependency variables and a constant, but are not reported in order to conserve space.

Table 7: Institutional information for the Latin America sample.

	Secret ballot	Male suffrage	Compulsory voting	Literacy tests abolished
Colombia	1853	1936	-	1936
Mexico	1857	1857	1917	1857
Ecuador	1861	1861	1929	1870
Dominican Republic	1865	1865	1966	1865
Nicaragua	1893	1893	1984	1893
Honduras	1894	1894	1894	1894
Paraguay	1911	1870	1940	1870
Argentina	1912	1912	1912	1912
Uruguay	1918	1918	1924	1918
Costa Rica	1925	1913	1936	1913
Peru	1931	1931	1931	1979
Brazil	1932	1932	1932	1985
Venezuela	1946	1857	1958	1947
El Salvador	1950	1883	1950	1945
Guatemala	1956	1879	1965	1946
Chile	1958	1925	-	1970

Sources: Aidt and Eterovic (2011) and the sources listed in Appendix B.

Table 8: Main results for Event history study for Latin American sample.

	(1)	(2)	(3)	(4)	(5)
Modernization					
primary school enrollment/ population	0.40		1.056**	0.887**	6.823**
	[1.319]		[2.311]	[1.983]	[2.453]
urbanization rate		-0.00107	-0.0235**	-0.0209**	-0.175**
		[-0.214]	[-2.553]	[-2.320]	[-2.449]
Joint significance of modernization variables			**6.94****	**5.56***	**6.26****
Size-of-electorate					
literacy test	-5.553***	-4.168***	-6.276***	-4.776**	-53.31***
	[-2.773]	[-3.770]	[-2.684]	[-2.086]	[-4.972]
Inequality					
share of family owned farms	0.0128	0.0563	0.14	0.137	-0.134
	[0.173]	[1.123]	[1.471]	[1.479]	[-0.215]
Control variables					
Log(population)	0.995*	0.484*	1.695**	1.375*	10.20**
	[1.677]	[1.659]	[2.107]	[1.744]	[2.507]
Learning	-132.7	-342.8*	-466.2***	-403.8***	-3,830***
	[-0.768]	[-1.801]	[-3.482]	[-3.080]	[-3.498]
civil war	2.381	2.020*	2.008	1.57	3.49
	[1.360]	[1.672]	[1.260]	[1.006]	[1.467]
polity dummy	-0.395	0.105	-0.701	-0.618	-11.61***
	[-0.446]	[0.0997]	[-0.801]	[-0.721]	[-2.967]
Duration dependence					
years without secret ballot	-2.843**	-1.841**	-3.146**	-2.932**	-3.961
	[-2.175]	[-2.564]	[-2.339]	[-2.226]	[-0.332]
spline1	-0.000749*	-0.000511**	-0.000813**	-0.000762**	-0.000342
	[-1.956]	[-2.339]	[-2.138]	[-2.044]	[-0.102]
spline2	0.000333*	0.000229**	0.000354**	0.000333*	-0.000113
	[1.824]	[2.142]	[1.971]	[1.892]	[-0.0721]
Constant	89.06**	55.23***	95.25**	90.06**	128.3
	[2.216]	[2.594]	[2.347]	[2.266]	[0.339]
Observations	568	848	568	568	568
Countries	13	14	13	13	13
Estimation method	Logit	Logit	Logit	Rare events	Random effects

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1; Columbia, Mexico and Ecuador are lost in the models with primary school enrollment; Ecuador is included in model (2).

Table 9: Main results for the turnout rate model for US states sample.

	(1)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
secret ballot	-143.2***	-168.7***	-168.7***	-22.93***	-28.22***	-28.22***	-8.784**	-8.784**
	[-3.898]	[-4.164]	[-4.164]	[-2.844]	[-3.339]	[-3.339]	[-2.085]	[-2.085]
secret ballot* income per worker)	15.01***	17.93***	17.93***					
	[3.801]	[4.127]	[4.127]					
secret ballot* average years of schooling				3.836**	5.245***	5.245***		
				[2.471]	[3.349]	[3.349]		
secret ballot* urbanization rate							0.160*	0.160*
							[1.780]	[1.780]
average years of schooling	4.448**	4.263***	4.263***	2.452	1.735	1.735	3.781**	3.781**
	[2.569]	[2.834]	[2.834]	[1.398]	[1.068]	[1.068]	[2.076]	[2.076]
income per worker	-22.74***	-20.64***	-20.64***	-14.31***	-9.779**	-9.779**	-13.45***	-13.45***
	[-5.033]	[-4.535]	[-4.535]	[-3.986]	[-2.559]	[-2.559]	[-3.495]	[-3.495]
urbanization rate		-0.490**	-0.490**		-0.536***	-0.536***	-0.503***	-0.503***
		[-2.495]	[-2.495]		[-2.763]	[-2.763]	[-2.803]	[-2.803]
women' suffrage	-12.19***	-11.54***	-11.54***	-10.79***	-9.484**	-9.484**	-11.27***	-11.27***
	[-4.020]	[-3.475]	[-3.475]	[-3.059]	[-2.422]	[-2.422]	[-2.992]	[-2.992]
poll tax	-15.87***	-14.57***	-14.57***	-16.96***	-15.51***	-15.51***	-15.76***	-15.76***
	[-5.510]	[-5.536]	[-5.536]	[-5.441]	[-5.521]	[-5.521]	[-5.173]	[-5.173]
literacy test	-3.483	-4.554	-4.554	-4.375*	-5.581**	-5.581**	-6.419**	-6.419**
	[-1.346]	[-1.661]	[-1.661]	[-1.744]	[-2.041]	[-2.041]	[-2.160]	[-2.160]
Time trend			-0.177			-0.19		-0.0183
			[-0.852]			[-0.871]		[-0.0799]
Constant	256.6***	258.7***	589.9	188.2***	172.0***	526.8	196.9***	231.2
	[6.431]	[6.224]	[1.563]	[5.604]	[5.159]	[1.322]	[5.580]	[0.550]
Observations	1,413	1,408	1,408	1,413	1,408	1,408	1,408	1,408
R-squared	0.812	0.823	0.823	0.809	0.821	0.821	0.813	0.813
time trend	No	No	Yes	No	No	Yes	No	Yes
Number of states	48	48	48	48	48	48	48	48
Turning point	9.54	9.41	9.41	5.98	5.38	5.38	55.07	55.07

Notes: Robust z-statistics correcting for clustering in brackets; *** p<0.01, ** p<0.05, * p<0.1; Secret ballot is a dummy variable equal to one after adoption of the ballot and equal to zero before; All estimations include state and year fixed effects.