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Abstract

This paper studies how human capital affects agents' tendency to participate in revolutions and consequently political outcomes. We show that since human capital is not expropriatable in the way land or other assets are, revolutions are more attractive if human capital is an important source of income. Specifically, we present a model of involuntary franchise extensions in which we establish a formal link between the increasing importance of human capital as a source of income for mainly the middle classes in 19th century Europe and franchise extensions. Intuitively, agents become less change averse when their income cannot be expropriated and thus larger and larger concessions from the elite are necessary to avoid any upheaval. We show that the higher human capital is in a country, the more the elite use 'populist' policies aimed at garnering the support of the poor and the larger are the franchise extensions which the elite use to counter a revolutionary threat. While we derive the mechanism linking human capital and democratisation by looking at 19th century Europe it might play an important role more generally, notably in the wave of democratisations in Latin America in the 1980s and in the current Arab uprisings.

Keywords: Democratisation, Involuntary Franchise Extensions, Human Capital, Middle Class

JEL Classification: D72, D74, J24, P16, H1

1 Introduction

At the beginning of the 19th century no European country had any significant degree of democracy but by the 1920s a large number had introduced universal male suffrage. On the road from autocracy to democracy nearly all Western countries had varying degrees of what we might call partial democracy: Voting was restricted to males with a certain income or social standing. The timing and extent of franchise extensions varied from country to country. The emergence of human capital as a key source of income, we will argue, caused an important shift in incentives for the middle classes which in turn was an important factor in European democratisation. The shift from assets to human capital as the main source of income meant that it became optimal for the middle classes to support change and the elite reacted optimally to this new situation by extending the franchise. Since human capital is not expropriatable in the way land is the middle classes became less change averse. Our model shows that the revolutionary threat posed by a social group does not necessarily have to be decreasing in their income as assumed in the seminal Acemoglu and Robinson (2005) model. This then implies that depending on the social structure of a country, more or less deprived social groups pose the marginal revolutionary threat.[1] The poorer this marginal group the more likely a large franchise extension. The elite will aim to disperse the threat of a revolution by dissuading the marginal group from starting a revolution. If the poor are the marginal group the rich dissuade them from a revolution by a large franchise extension. If on the other hand the middle class pose the marginal revolutionary threat the elites will only partially extend the franchise. Intuitively, in a society which has low human capital and a large dependence on land, revolutions are more attractive for poorer individuals since land redistribution offers an easy way for the poor to benefit after a revolution. When human capital is crucial in determining income levels then a revolution does little for the poor since it is not transferable in the way land is. A well educated middle class on the other hand has all the more to gain from the new opportunities which arise when the old elite are overthrown.

We build on the contributions by Acemoglu and Robinson (2000, 2001, 2005) and Boix (2003) which stress the threat of revolution from disenfranchised classes as the key driver of democratisation. We argue that it is important to pay attention to what exactly happens after a revolution and how this might affect incentives to start and participate in a revolution. Clearly, abstracting from any collective action problems, a revolution is only individually rational if people expect to gain from it. As Tullock (1971) points

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[1]The marginal social group is the group most easily dissuaded from starting a revolution.

out, people are likely to consider the expected private gains and losses when deciding whether to participate in a revolution and not the public-good character of a revolution. Modelling post-revolutionary payoffs more carefully thus seems crucial. By building up the economic class structure of European societies from historical evidence and then considering how the source of income of different classes affects their incentives to participate in revolutions we make a twofold contribution. First, our model can help to explain both the pattern of cross-country differences in the speed and extent of franchise extensions and the overall trend towards larger franchise extensions by linking them to the different development of human capital between countries and over time. Secondly, we rationalise the importance often attributed to the middle class for democratisation. For example, Lipset (1959) notes that a strong middle class and high levels of education are crucial for democracy. He explains this by the mediating role the middle class can play in conflicts between the poor and the elite and the fact that education furthers ideas which support democracy. We describe a novel mechanism for Lipset's 'modernization hypothesis'. Education increases human capital and because human capital is not expropriatable in the way assets are this makes agents more willing to risk moving away from the political status quo. We argue that depending on their source of income, the middle classes can either be natural allies of the elite or on the contrary be the group which has the most to gain from franchise extensions. We show that only if the middle class are well educated and thus have a high level of human capital are they a force for regime change. A large middle class who derive their income mainly from assets is likely to support the status quo. This mechanism is applicable much more generally than 19th century European franchise extensions. Specifically, we argue that it might help explain the current upheavals in the Middle East as well as the wave of democratisations in Latin America in the 1980s.

We proceed as follows. Section 2 gives a short historical overview of European franchise extensions and of class structure in 19th century Europe. Section 3 then discusses related literature. Section 4 presents and solves the model and discusses the main results and their wider applicability. Section 5 concludes.

2   Historical Overview

During the 19th and early parts of the 20th century a majority of European countries moved from an oligarchic political system controlled by a small elite to a full democracy, often via several stages of partial democracy. As Tilly (2004) observes, there was usually

a gap of several decades between the establishment of parliamentary representation and full manhood suffrage. The speed and degree of franchise extension varied considerably between European countries during the 19th century (Aidt, Dutta and Loukoianova, 2006). Britain is the classical example for gradual franchise extensions.[2] The Reform Acts of 1832, 1867, 1884 and 1918 allowed more and more men to vote in democratic elections. In 1832 the majority of the population was still excluded but the Great Reform Act extended the franchise to some relatively wealthy parts of the middle classes. Overall the electorate comprised 3.5% of the male population then. This franchise extension had been preceded by half a century of popular mobilisation backing political reform. The next Reform Act in 1867 then enfranchised larger parts of the population but still used property and income restrictions to exclude the poorer segments of society. Full manhood suffrage was finally reached in 1918. Most other European countries also gradually extended the franchise. In Italy, for example, economic restrictions on who could vote where only lifted in 1919, 80 years after the first elections. A similar pattern, albeit with varying restrictions and timing of franchise extensions, can be observed in Norway, Sweden, The Netherlands and Belgium. In Sweden, for example, a limited democracy was installed in 1866 and nearly full manhood suffrage was reached in 1909. Generally speaking, most European countries had introduced full male suffrage by the 1920s. It is also worth noting that similarly to Britain initially only very small fractions of the male population could vote in other countries. In 1861 only 7.9% of male adults could vote in Italy and in 1830 only 90,000 French men out of a population of 31 million formed the electorate (Pilbeam, 1990). In Belgium 4.5% of males were allowed to vote in 1831 (Aidt, Dutta and Loukoianova, 2006).[3]

Some countries seem to offer an exception to the gradual franchise extension model. Switzerland, for example, introduced full democracy at once in 1848 and similarly in Germany there were no economic limitations on who could vote from the first time there were elections held in a united German state in 1871. Upon closer inspection it becomes apparent, however, that those countries too went through a phase of restricted franchise. As Tilly (2004) notes, on a local level property restrictions existed in Switzerland prior to full manhood suffrage in 1848. During the 18th century only 200,000 out of roughly 1.6 million people had the rights to participate in public politics. Similarly, elections to the

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[2]We only discuss franchise extensions by class and not by gender throughout the paper. In Europe women tended to be enfranchised post-WWI and the rationale for female enfrachisement might have have been quite different than that for franchise extensions by class. See, for example, Bertocchi (2011) for a contribution to the literature on female enfranchisement.

[3]Suffrage restirctions based on income or wealth were also very common throughout the Americas, including the US. See Engerman and Sokoloff (2012) for a detailed and very insightful discussion of enfranchisement in the Americas.

Prussian national assembly were property restricted when they were introduced in 1808. While all countries thus seem to have gone through some form of partial democracy there are large and interesting differences in the speed and extent of franchise extension worth explaining.[4] It is important to note that we use a very narrow definition of democracy: We qualify a country as a full democracy if de jure all male citizens have one vote. Clearly this is not a perfect measure of democracy since for example Germany post 1870 had a very large franchise de jure but not de facto.[5] Furthermore, in a more sophisticated measure of democracy we would want to include an understanding of freedom of speech, freedom of the press, access to politics, etc. However, since all of those are more difficult to measure and the size of the franchise does seem to be the single most important measure of democracy we follow most of the literature in political economy by using the terms full franchise and full democracy interchangeably.

In light of the above discussion we can differentiate between two broad groups of countries. One in which the middle class and working class were enfranchised more or less at the same time (eg Germany, Switzerland) and one in which the working class were enfranchised significantly after the middle class (eg Britain, Italy). As an illustration consider the following two graphs which show the de jure electorate as a percentage of its reference age and sex group. Figure 1 shows the group of countries which passed through partial democracy and Figure 2 shows the group of countries in which the middle class and (most) of the working class were enfranchised at the same time. We can see that the UK stands out as having the most gradual approach while Belgium is noteworthy for having had a very limited electorate until the very late 19th century. France, Germany, Denmark and Switzerland had one large franchise extension and from there on a more or less constant electorate. Overall for the period 1815 to 1920 the trend towards full enfranchisement is very clear. Towards the second decade of the 20th century all countries had lifted most income and property restrictions so that rich, middle class and poor men all had a vote.

It is worth looking at what it meant to be upper, middle and working class in 19th century Europe to try and discern some explanations for the cross-country variation in democratisation and the general trend towards full democracy over time. The upper class, or elite, were mostly aristocracy and derived the largest part of their income

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[4]Looking at franchise extensions for the whole world, Przeworski (2009) identifies 185 franchise extensions by class for the period 1793 to 2000.

[5]In Prussia and a few smaller regions of Germany the so-called three-class franchise divided the electorate into three groups based on how many taxes each person paid. The top group comprised all those who contributed to paying the top third of taxes. Each group could then vote for the same number of electors. Hypothetically, one very rich person who paid a third of all taxes collected by the state would, therefore, have been able to vote for a third of all electors on her own.
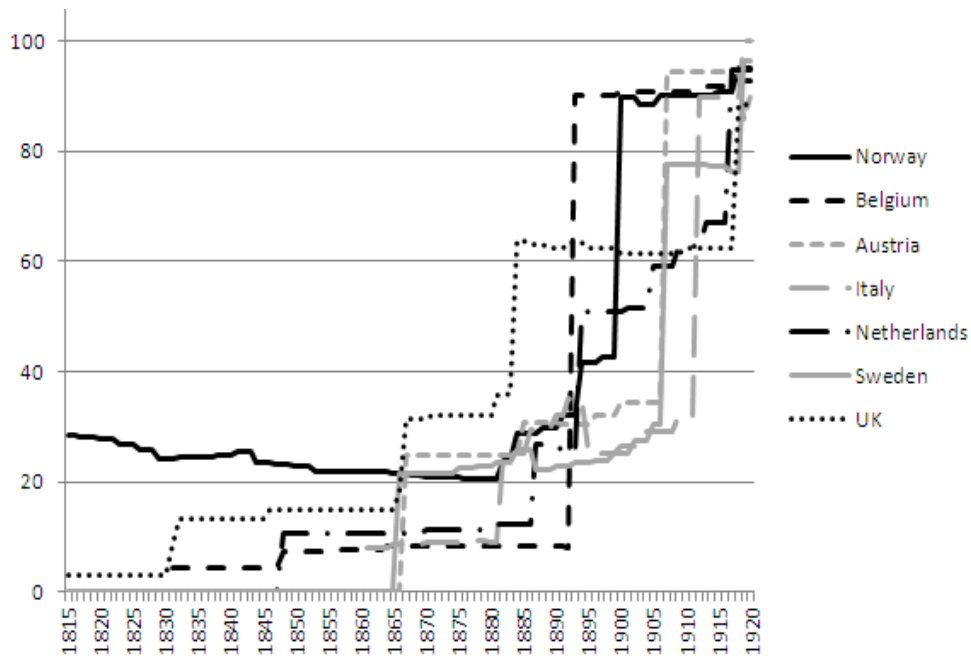
Figure 1: Electorate as a percentage of the reference age and sex group over time. Data from Aidt and Jensen (2010).
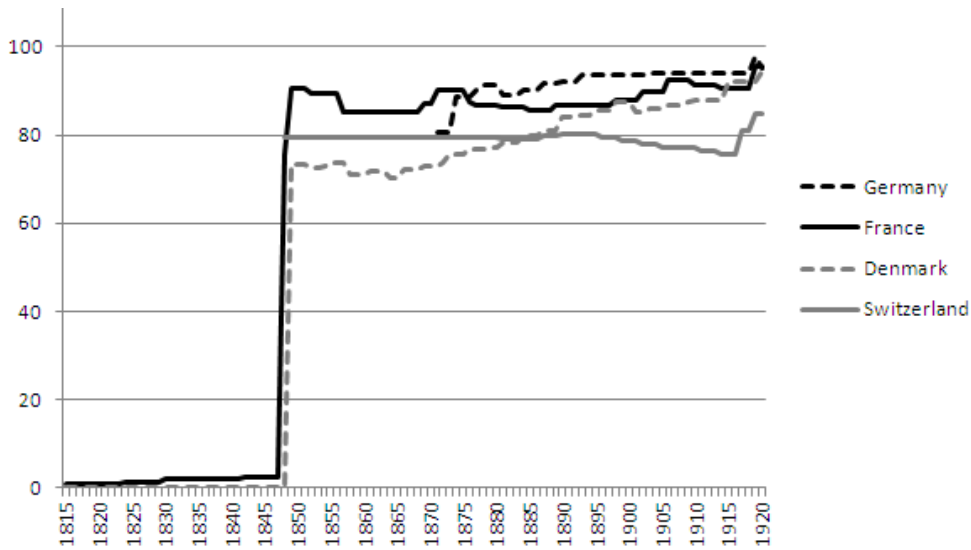

Figure 2: Electorate as a percentage of the reference age and sex group over time. Data from Aidt and Jensen (2010).

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from land (Pilbeam, 1990). Land was considered the prime asset since it was safe and profitable. In fact, a market for land as we know it today, had not yet developed in all European countries so that land was mostly acquired through bequests. The lower class was made up of peasants, labourers and workers with no or a low level of education and no or very little property.[6] These lower classes made up the vast majority of the population in all European countries. In between the elite and the lower classes were the middle classes. The term is not exact in its definition and in fact incorporates many layers within it. Marx distinguished between two main groups of middle classes, the 'old middle classes' or 'petty bourgeoisie' and the new middle classes (Giddens, 1973). The 'old middle classes' are defined as small property owners whereas the new middle classes are propertyless and rely on a salary. Similarly, Weber differentiates between small property-owners and white collar workers within the middle class. Kocka (1995), from the viewpoint of a modern historian rather than a contemporary sociologist, splits the middle classes into two subgroups: the 'Bildungsbuergertum' or educated middle class and the 'Wirtschaftsbuergertum' or economic middle class. The gist of the distinction is the same as in Marx and Weber, some groups within the middle classes derive their income from smallish property and land holdings while others derive their income from human capital which they have developed in education. Although the middle classes were not a homogenous group, Kocka observes that they slowly developed an attitude which '[stressed] the principles of achievement and education, work and self-reliance, a vision of a modern, secularised, post-corporate, self-regulating, enlightened "civil society"' and 'opposed the privileges and autocracy of the ancien regime'.

Two important trends can be observed throughout the century. Firstly, the overall number of middle class citizens consistently grew and secondly the importance and size of the 'old middle class' within the middle classes strongly decreased. Weber notes that 'the category of small property-owners tends to become progressively more restricted with the increasing maturity of capitalism'. This implies that human capital replaced property as the main source of income for the middle classes. As an example for the expansion in human capital it can be noted that the number of university students in Germany more than tripled in the 19th century and the very large majority of these students were from a middle-class (often 'old middle class') background (Pilbeam, 1990). Government spending on basic education also significantly increased in the latter half of the 19th century (Galor and Moav, 2006). Both the size of the middle class and

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[6]According to Mitch (1993) only half of all adults could sign their name at marriage in England at the beginning of the 19th century.

the importance of human capital for their income thus increased at the same time as democratisation was advancing in Europe and larger and larger segments of society were enfranchised. The model in section 4 will link these historical observation and will put forward the hypothesis that the change in the size and composition of the middle class was an important factor for the extension of the franchise.

3   Related Literature

Various explanations have been given in the economic, political and sociological literature to try and explain why and when democratisation occurs. In political economy we can divide the literature into two broad groups: those which stress the importance of involuntary franchise extension and those which argue that the elites extended the franchise largely voluntarily (Przeworski, 2009). The most influential contribution to the former group are Acemoglu and Robinson (2000, 2001, 2005)[7] who build on some of the ideas developed by Moore (1966), North and Weingast (1989) and Rueschemeyer, Stephens, and Stephens (1992) among others. Their key contention is that democratisation occurs as a consequence of a revolutionary threat from the disenfranchised classes. Poorer citizens want a higher level of redistribution from rich to poor than that which the current rulers engage in.[8] The elites would ideally prefer to remain in an autocracy but since redistributive promises they make in an autocracy are not entirely credible they have to democratise in order to avoid a revolution. AR use various historical examples to show that the threat of revolution tended to be a powerful catalyst for suffrage extension. A similar argument is made by Conley and Temini (2001) who argue that the elites extend the franchise when the cost to them of doing so is smaller than that of a revolution. Conley and Temini show that when the disenfranchised group is weak there will never be a franchise extension since the enfranchised group is not threatened. When the disenfranchised group is strong, however, enfranchisement depends on the degree of conflict between the two groups. A higher degree of conflict makes it both more desirable for the disenfranchised to get a say and more costly for the enfranchised to relinquish their privilege. This leads to a non-monotonic relationship between the degree of conflict and enfranchisement. Boix (2003) also bases his analysis on the redistributive demands of the poorer classes. He shows that higher inequality makes democratisation less likely since repression is relatively less costly for the elites when inequality is high.

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[7] AR from here on.

[8] ARs model also builds on the work by Meltzer and Richard (1981) who show that a franchise extension will increase redistribution since it makes the median voter poorer and thus supportive of a higher tax rate.

Furthermore, Boix stresses the importance of asset mobility for democratisation. When the elite hold highly immobile assets (for example land) then it is very difficult for them to avoid paying high levels of taxation in a democracy and they thus strongly oppose it. If on the other hand assets are more mobile then taxes in a democracy are limited by the threat of asset relocation. Distinguishing between the transferability of different asset classes is an important point which we use in our model to explain the changing incentives of the middle classes in the 19th century.[9]

The literature on voluntary or "from above" franchise extension, on the other hand, discusses several reasons why it might be optimal for part or the whole elite to extend the franchise even in the absence of any revolutionary threat. Lizzeri and Persico (2004) take the view that franchise extensions occur voluntarily because some of the elite can benefit from it through a shift in government spending towards public goods. They distinguish between government spending ad personam and public good spending and argue that when the value of the public good increases it can become optimal for a majority of the elite to extend the franchise to incentivise the government to spend on the public good rather than personal transfers from which only the swing voters benefit. As an example for an increase in the value of public goods Lizzeri and Persico cite the need for public health in Britain's urban centers in the 19th century which as a consequence of industrialisation had become overcrowded and infected with mainly water born diseases. In a slightly different approach Aidt, Daunton and Dutta (2010) construct a model where the elite might want to voluntarily extend the franchise because doing so increases the tax base to include the middle class and the elite thus do not have to handle the full tax burden. They show that the franchise is voluntarily extended if it results in a Pareto improvement.

In a very interesting contribution to the voluntary franchise extension literature Llavador and Oxoby (2005) explain different degrees of franchise extension by different preferences within the ruling elite.[10] Conservative landowners and liberal capitalists have conflicting policy preferences and will thus try to extend or restrict the franchise as best suits their policy goals. Conservatives either restrict the franchise to the elite or fully extend it, while liberals prefer partial franchise extensions such that the median voter favours pro-industry policies. Depending on the structure of the society the franchise is thus extended to a larger or smaller degree. Llavador and Oxoby's model is particularly insightful since it can explain different degrees of franchise extensions. Boix's model of

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[9]Ellis and Fender (2010) have also noted the fact that human capital is intrinsically different from other forms of capital since it cannot be expropriated.

[10]Collier (1999) also argues that part of the elite might want to extend the franchise for partisan reasons.

involuntary franchise extensions (2003) also allows for partial suffrage extensions but offers the exact opposite conclusions in terms of franchise extension preferences. If the assets of capitalists are significantly more mobile than those of the landowners, the capitalists might enter an alliance with the poor and push for full democracy at the expense of the landowners. Perhaps the most forceful recent contribution to the voluntary franchise extension literature is Congleton's book "Perfecting Parliament" (2011). He argues that an existing constitutional environment is only changed through an intra-elite bargaining process when it is mutually beneficial for the elite to do so. In his view, the new economies of scale in production which came up in the 19th century provided a shock which markedly pushed gradual reform towards liberal outcomes. Revolutionary pressures only played a marginal role.

It does seem, however, that the repeated occurrence of revolutions in Europe and elsewhere and their often quite substantial impact on the elite as well as the striking timing of franchise extensions following popular mobilisation offer strong support for the importance of explanations based on involuntary franchise extension. In fact, Przeworski (2009) compares the empirical prediction of several models of franchise extension and concludes that the enfranchisement of poorer classes would not have occurred if it were not for some sort of revolutionary threat. He uses a variable which measures social unrest in a country and finds that its lagged value has a strong positive impact on franchise extensions by class. Przeworski's analysis focuses on the post-1917 period but Aidt and Jensen (2010) confirm his results for the period from 1820-1938. By using contentious situations in neighbouring countries they construct an exogenous measure of the perceived revolutionary threat level and find that this measure strongly impacts suffrage extensions.[11] They conclude that 'the threat of revolution was a major cause of franchise extension during the first wave of democratisation in Europe'. Similarly, Weyland (2010) argues that a successful revolution in one country has strong spillover effects and in 19th century Europe often lead to preemptive suffrage extensions in the neighbouring countries. In light of the above evidence we thus take the view that revolutionary threats have an important part to play in explaining many instances of democratisation.

Both the importance of the middle classes and of education for democratisation has received a substantial amount of attention in the political and sociological literature. In a classic paper Lipset (1959) argues that education is important for democratisation since 'the higher one's education, the more likely one is to believe in democratic values

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[11]Also see Aidt and Franck (2008) for an empirical test of the different theories proposed to explain the 1832 Great Reform Act in Britain.

and support democratic practices'. Lipset sees the importance of the middle classes in their ability to mediate between elite and poor and thereby generate a democratic outcome. Huntington (1991) comes to a similar conclusion about the moderating effect of the middle classes as does Moore (1966) in his seminal contribution to the literature on democratisation. We propose a novel mechanism through which education leads to democratisation by increasing human capital and thereby making agents politically less change averse. Throughout most of the paper we focus on 19th century franchise extensions and show that the composition of the middle class in the 19th century was an important factor in determining democratisation. However, the mechanism we describe is likely to be much more widely applicable as we discuss in Subsection 4.3.5.

Bourguignon and Verdier (2000) and Galor and Moav (2006) offer an explanation for why education and thus human capital expanded in the second half of the 19th century. They argue that the elite furthered human capital accumulation because this benefited their profit rates due to complementarities between physical and human capital accumulation. At the same time the elite were aware that citizens with a higher human capital are likely to be more politically active. In their view the elite thus consciously undermined their own position on the social ladder in return for higher profits. In their models it is exogenously assumed that education is a pre-condition for political participation. We complement their research by showing what one possible mechanism linking higher education (and thus higher human capital) to franchise extensions could be.

4   The Model

In this section we introduce our model and solve it to prove the main results referred to in previous sections. In Subsection 4.1 we outline the basic setup of the model and in Subsection 4.2 we then discuss how we extend the standard model which is now used widely in the literature by incorporating the historical facts discussed in Section 2. Once we have clarified the core assumptions we proceed by solving the model in Subsection 4.3.

4.1   Basic Setup

We follow the classic AR (2005) framework where democratisation occurs as a consequence of a revolutionary threat. There are three groups: rich (r), middle class (m) and poor (p). Group i has measure m_i and total population is equal to $\sum_i m_i = 1$. Each indi-

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vidual of group i has an exogenous pre-tax income of y_i where $y_r > y_m > y_p$ so that each rich individual has more income than a middle class individual who has more income than a poor one. Furthermore, $m_p, m_m > m_r$ and $m_p > 1/2$. This is the situation which according to Kocka applies to all European countries in the 19th century. In line with the income distribution of most countries we also assume that it is skewed towards the right (mean income is higher than median income), i.e. $m_p y_p + m_m y_m + m_r y_r = y > y^M$ where y^M is median income.[12]

The state levies an income tax τ on all incomes and uses the revenue to finance a transfer T. At a tax rate of τ there is an aggregate deadweight loss of $C(\tau)y$ where $C'(\tau) > 0, C''(\tau) > 0$, $C(0) = 0, C'(0) = 0$ and $C'(1) = 1$ so that the deadweight loss is a convex function of the tax level, costs are very low at low levels of taxation and prohibitively high when τ is close to 1. The government's budget constraint is $T = \tau m_p y_p + \tau m_m y_m + \tau m_r y_r - C(\tau)y = (\tau - C(\tau))y$. Individuals have linear utility functions which are increasing in post-tax income and transfers $U(y_i, \tau, T) = (1-\tau)y_i + T$. Substituting for T using the government's budget constraint $U(y_i, \tau) = (1 - \tau)y_i + (\tau - C(\tau))y$.

The society is originally an autocracy ruled by the rich which means they are unconstrained to choose their preferred tax rate (τ^r). Maximising $U(y_r, \tau)$ w.r.t. τ gives a corner solution since $y_r > y$. Utility of an individual in group i is therefore simply equal to y_i in autocracy. Similarly we can derive the preferred tax rate of the middle class τ^m and that of the poor τ^p by maximising $U(y_m, \tau)$ and $U(y_p, \tau)$, respectively. Given our assumptions on mean income, median income and the measure of the groups we get interior solutions such that $\tau^p > \tau^m > 0$.

The disenfranchised citizens can pose a revolutionary threat to the regime, using sheer numerical superiority to overthrow it. We assume that a revolution is only successful if both middle class and poor agents participate. An individual will engage in a revolution only if it is individually rational for him to do so, i.e. when his expected post-revolutionary utility is higher than his status quo utility. Note that we abstract from the collective action problem.

The game is static and the timing is as follows:

1. The elites decide whether to stay in an autocracy, partially democratise (enfranchise the middle class) or fully democratise.

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[12] In practice we also make the slightly stronger assumption that $y > y_m$, so that the preferred tax rate of the middle class is positive.

2. If the elites decided to remain in an autocracy, they decide what tax rate to set.

   If the elites partially democratised then the rich and middle class agents vote on a tax rate.

   If the elites fully democratised then all agents vote on a tax rate.

3. The middle class and the poor simultaneously decide whether to start a revolution.

4. In an autocracy the rich can reset the tax rate with probability $(1 - p)$ since they keep political power and promises are thus not entirely credible.

5. Payoffs are realised.

Note that stage 4 occurs because as in Boix (2003) and in the AR model, the rich face a commitment problem under autocracy; with a certain probability $1 - p$ they can reset the promised tax rate once the revolutionary threat has subsided. p thus measures the level of commitment. In fact, the probability $1 - p$ arises because we are using the reduced form of a fully dynamic model in which the middle class and the poor are only organised enough to stage a revolution with a certain probability less than 1 in any given period. What we are trying to capture is that if the institutional arrangement (political power) does not change then as soon as there is no imminent threat of a revolution the elite might simply decide to renege on their promises. Since the middle class and the poor foresee this, promises made under autocracy are not entirely credible. While the interpretation of p is thus slightly more intuitive in a repeated game setting it does not offer any insights beyond those of the static model and comes at the cost of reduced analytical tractability (AR, 2005).

Some of the above assumptions warrant a further discussion. We will outline in turn the reasoning for the assumption on when revolutions are successful, the collective action problem and the options which the rich have to avoid a revolution.

The assumption that both middle class and working class are necessary for a successful revolution is standard in the literature. And in fact, most revolutions do take place when cross-class coalitions are formed. The French and Russian revolutions for example were marked by a very important bourgeois contribution (Pilbeam, 1990 and Wade, 2005). While the working class provide the critical mass of people necessary for a popular upheaval, the middle class can provide leadership, vision, organisation and motivation for a revolution. Tilly (2001), for example, notes that 'cross-class coalitions frequently create or expand revolutionary situations'. In terms of the model, poor and middle class agents play a simultaneous move game in stage 3. The assumption that

both groups are necessary for a successful revolution determines the structure of that game by specifying that only when it is a Nash Equilibrium for both to participate in the revolution is the revolution successful.[13]

While the collective action problem plays a prominent role in the study of revolutions, abstracting from it on an intra-group level is standard in the political economy literature on involuntary franchise extensions. One way to think about how the collective action problem is solved in the context of our model is to assume that each group has a political activist who decides on whether or not the group should participate in a revolution. Once the political activist has made the decision for the group as a whole, each member of the group is committed to taking part (AR, 2005). The literature suggests several ways how groups can solve their internal collective action problem. Among the most prominent are ideological indoctrination (Olson 1965) or excluding members of the group who did not participate in the collective action from benefits which arise from it (AR, 2005). In fact, in a recent paper Kalyvas and Kocher (2007) question the consensus about the severity of the collective action problem facing rebels. They argue that if non-participation is costly as it might well be since insurgencies are marked 'by patterns of violence that systematically, though variably, select nonparticipants for victimization', then the collective action problem might not be as much of an issue as is commonly assumed. What is crucial for our model is that through one of the ways set out in the literature the groups do manage to solve their collective action problem whenever it is individually-rational to have a revolution.

Lastly, while we assume that the rich can deal with the threat of revolution in two ways only (by promising redistribution and by extending the franchise) in reality they can also attempt to use repression to quell any threat to their power. However, we do not pursue this possibility because it does not offer any additional interesting insights beyond those already explored in the literature. If we assumed that repression was an option for the rich and that there repression is costly then we would get the result that when repression is sufficiently cheap the rich will use it as a tool but the more expensive repression becomes (it could be a function of inequality for example) the more likely the rich are to promise redistribution or extend the franchise. We thus choose to omit repression altogether from the analysis to focus on the parts of the model where we add to the literature.

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[13]We focus on Nash Equlibria in weakly dominant strategies as do AR (2005). At most there are 2 NE in pure strategies in the game at stage 3, one of which is in weakly dominant strategies while the other one is in weakly dominated strategies.

4.2 The payoff from revolution

As the consequence of a revolution total income in the economy is reduced by a fraction μ so that it is $(1-\mu)y$. This can be thought of as the upheaval destroying a part of the economy's productive assets for example.[14] In the classic AR model of democratisation it is assumed that after a successful revolution the middle class and the poor expropriate the rich (and in fact all resources of the economy) and then divide the country's wealth equally between the $m_m + m_p$ poor and middle class agents. The utility of a middle class individual and a poor individual after a revolution is thus $\frac{(1-\mu)y}{m_m+m_p}$. Effectively this implies that revolutions are significantly more attractive for the poor. In autocracy the income gap between middle class and poor is $y_m - y_p > 0$ and after a revolution it is $\frac{(1-\mu)y}{m_m+m_p} - \frac{(1-\mu)y}{m_m+m_p} = 0$.

The above assumption can be questioned on a number of grounds. First of all, it seems to contradict empirical evidence on post-revolution payoffs. Goldstone (2001) in a survey article and Kelley and Klein (1977) present evidence that the ones who are better off after a revolution are the ones who were better off before already (i.e. the middle class have higher income than the poor after a revolution). The main explanation offered in the literature is that the middle class tend to be the better educated and the returns from education tend to be at least as high after a revolution as they were before. The new government needs to employ administrators and new entrepreneurs replace the old elite, thereby making the middle class better off than the poor who are not in a position to capitalise on the new opportunities.

Secondly, the assumption of equal post-revolution payoffs is difficult to sustain if the middle class can retain some land or physical capital after the revolution. Bar a complete breakdown in property rights and redistribution of land the middle class would be better off than the poor even if we disregard the effect of superior human capital.

In fact, the above empirical evidence can be show to be naturally consistent with the discussion of class structures and income sources in section 2. As established above the elite largely derived their income from their land holdings (LH_r), i.e.

$$y_r = LH_r.$$

The poor get their income from unskilled human capital income which we define as y_p for convenience. Lastly, the middle class are made up of small-scale property holders

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[14]We think of μ as the cost of revolution and let it affect all forms of assets as well as human capital. This can be easily rationalised considering complementarities between various forms of capital.

which derive their income mainly from some form of asset (assume land for simplicity of notation (LH_m)) and white collar workers which earn skilled human capital income made up of unskilled human capital income and a skill premium ($HC_m = y_p + SP$). We could thus express y_m as[15]

$$
\begin{aligned}
y_m &= HC_m + LH_m \\
&= y_p + SP + LH_m.
\end{aligned}
$$

We thus capture the fact that the middle class as a whole has two sources of income, its human capital and its asset holdings.[16] Now the crucial difference between human capital and other assets, notably land, which was also pointed out by Boix (2003) and Ellis and Fender (2010), is that while land can be easily expropriated, human capital is largely non-transferable and non-expropriatable.

Having specified the economy's asset allocation we can now proceed to establish what happens after a revolution. All assets which can be expropriated are indeed expropriated and middle class and poor agents then decide how to split them.[17] It is natural to think about this as some sort of bargaining process between middle class and poor individuals. In practice these would be decisions regarding the tax system, group specific transfers, etc.[18]

Prior to redistributing the expropriated resources the income of agents is thus as follows. A rich agent looses all his assets and therefore has an income of $y_r^e = 0$.[19] The income of a poor agent is unchanged so that $y_p^e = y_p$ and lastly the income of a representative middle class agent is $y_m^e = y_p + SP$. Now, note that we can rewrite the

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[15] Clearly $y_r > y_m$ requires $LH_r >> LH_m$. This is exactly what we oberve in historical data since the large majority of assets where held by a small elite.

[16] Since the middle class solve their internal collective action problem and act as one group it does not matter if we differentiate between two types of middle class agents or assume that each middle class agent has two sources of income.

[17] This fits in with the observation by Goldstone that the most frequent economic change after a revolution is a redistribution of land.

[18] Alternatively, it might also be reasonable to assume that the rich are expropriated to a greater extent than the middle class. If the middle class are not expropriated at all their behaviour is independent of what their source of income is. However, as long as there is some uncertainty over who will be expropriated the original intuition holds and the incentives of the middle class are different when they have expropriatable instead of inexpropriatable capital. We opt for full expropriation of all expropriatable assets to get the most analytically tractable results.

[19] It would be more realistic to assume that the rich also earn the income they can derive from human capital after a revolution. We sidestep this since it makes most expressions more cumbersome without adding any extra insights.

latter so that

$$y_m^e = \alpha y_p + (1 - \alpha)y_m$$

where

$$\alpha = \frac{LH_m}{LH_m + SP}.$$

This means that in a situation where the middle class are made up entirely of small-scale property owners, $SP = 0$ and consequently $\alpha = 1$. When on the other hand the middle class consists exclusively of propertyless white collar workers then $LH_m = 0$ and thus $\alpha = 0$. For all combinations of SP and LH_m $\alpha \in [0, 1]$. Note that for α to fall it is not necessary that LH_m decreases, it is sufficient if SP, i.e. education or the return from education, rises.

If the middle class and the poor cannot agree on how to split the economy's expropriated assets they remain with the incomes they have bar these assets. To get the simplest possible results we will assume that how to split the expropriated assets is determined by multiplayer Nash Bargaining. Nash bargaining relies on the assumption that given the disagreement point the players optimally divide the overall pie to reach a point on the efficient frontier. Since the disagreement point is equal to zero for every agent the expropriated assets are simply split equally between all agents. This implies that each poor and each middle class agent gets $\frac{(1-\mu)(m_m LH_m + m_r LH_r)}{(m_m + m_p)}$ from the expropriated assets.[20] Noting that $y = y_r m_r + y_m m_m + y_p m_p$ and $m_r LH_r + m_m LH_m = y_r m_r + m_m(y_m - y_p - SP)$ we can plug into the above to get

$$\frac{(1 - \mu)(m_m LH_m + m_r LH_r)}{(m_m + m_p)} = \frac{(1 - \mu)(y - y_p(m_p + \alpha m_m) - y_m m_m(1 - \alpha))}{(m_m + m_p)}.$$

Given the above discussion the total income of a poor agent after a revolution is then

$$\frac{(1 - \mu)(y - y_p(m_p + \alpha m_m) - y_m m_m(1 - \alpha) + (m_p + m_m)y_p)}{(m_m + m_p)}$$

$$= \frac{(1 - \mu)(y + (1 - \alpha)m_m(y_p - y_m))}{(m_m + m_p)}. \tag{1}$$

---

[20] A more elaborate mechanism might assign a greater fraction to either middle class or poor individuals. The middle class might end up with a greater fraction if the leaders of the revolution are middle class for example, and the poor might be able to increase their share if their numerical superiority gives them an advantage in the bargaining process. The former scenario makes revolutions more attractive for the middle class and thus makes full franchise extensions more likely while the later makes full franchise extensions less likely.

and that of a middle class agent is

$$\frac{(1-\mu)(y+(1-\alpha)m_p(y_m-y_p))}{(m_m+m_p)}. \tag{2}$$

Having derived our results from historical observations about the asset allocation between classes we get the result which is suggested by empirical evidence. The post-revolution payoff of a middle class agent is generally higher than that of a poor agent because of the formers higher human capital. The degree to which a middle class agent is better off crucially depends on α, and is monotonically decreasing in α. When $\alpha = 1$ (i.e. $SP = 0$) then middle class and poor agents are equally well-off after a revolution.

4.3 Equilibrium Analysis

We solve for the Subgame Perfect Nash equilibrium of the game. We show that a lower α is associated with larger franchise extensions. After the mathematical analysis of the model we discuss the intuition and historical relevance of the results. The formal proofs are in the Appendix.

First, note that to maximise their own utility the rich will try to avoid a revolution at all cost since their payoff after a revolution is 0. Furthermore, since their utility is decreasing in the tax rate they will aim for the lowest possible τ which achieves this.

We proceed as follows. First, we outline the crucial parameter regions and the optimal behaviour of the middle class and the poor after the rich choose Autoracy, Partial Democracy and Democracy respectively. We then solve for the equilibrium.

4.3.1 Autocracy

If either the middle class or the poor have a higher utility under autocracy than after a revolution then there is no revolutionary threat. This is the case if either

$$y_p > \frac{(1-\mu)(y+m_m(1-\alpha)(y_p-y_m))}{(m_m+m_p)}, \tag{3}$$

or

$$y_m > \frac{(1-\mu)(y+m_p(1-\alpha)(y_m-y_p))}{(m_m+m_p)}. \tag{4}$$

Rearranging we can see that the poor are indifferent between a revolution and the status quo for

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$$\mu^{P,1} = \frac{y - (1-\alpha)y_m m_m - y_p(m_p + \alpha m_m)}{y + m_m(1-\alpha)(y_p - y_m)} \tag{5}$$

and the middle class are indifferent for

$$\mu^{M,1} = \frac{y - (1-\alpha)y_p m_p - y_m(m_m + \alpha m_p)}{y + m_p(1-\alpha)(y_m - y_p)} \tag{6}$$

Clearly, for all values of $\alpha < 1$ it is true that $\mu^{P,1} > \mu^{M,1}$, [21] so that the poor always pose more of a revolutionary threat than the middle class unless the middle class derive no income at all from human capital. This is intuitive since the poor have less to lose than the middle class as their status quo is worse. Note that the larger is the income gap between poor and middle class agents $(y_m - y_p)$ the larger is the difference between $\mu^{P,1}$ and $\mu^{M,1}$. When $\mu > \mu^{M,1}$ then the rich are unconstrained and therefore simply set their most preferred tax rate $\tau^r = 0$. However, if the cost of a revolution is lower than this, then both the middle class and the poor prefer a revolution to the status quo. The rich, therefore, have to make some concessions in terms of setting a higher tax rate or even democratising.

The rich can avoid a revolution by promising a tax rate τ^2 if either

$$p[(1-\tau^2)y_p + (\tau^2 - C(\tau^2))y] + (1-p)y_p > \frac{(1-\mu)(y + m_m(1-\alpha)(y_p - y_m))}{(m_m + m_p)}, \tag{7}$$

or

$$p[(1-\tau^2)y_m + (\tau^2 - C(\tau^2))y] + (1-p)y_m > \frac{(1-\mu)(y + m_p(1-\alpha)(y_m - y_p))}{(m_m + m_p)}. \tag{8}$$

Rearranging (7) and (8) we find $\mu^{M,2}$ and $\mu^{P,2}$. Both $\mu^{M,2}$ and $\mu^{P,2}$ are functions of the promised tax rate τ^2. $\mu^{M,2}(\tau^2)$ is thus the level of μ at which the middle class are indifferent between autocracy with promised redistribution at tax rate τ^2 and a revolution and $\mu^{P,2}(\tau^2)$ is the level of μ at which the poor are indifferent between autocracy with promised redistribution at tax rate τ^2 and a revolution.

Whenever $\mu^{M,2} > \mu^{P,2}$ it is easier to satisfy the demands of the poor than those of

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[21] We use the notation $\mu^{i,1}$ for the revolution cost at which an agent from group $i \in \{M, P\}$ is indifferent between a revolution and autocracy without redistribution. Similarly $\mu^{i,2}$, $\mu^{i,3}$ and $\mu^{i,4}$ specify indifference between autocracy with redistribution and a revolution, partial democracy and a revolution and full democracy and a revolution, respectively.

the middle class. Noting that $\mu^{M,2} - \mu^{P,2}$ is a decreasing function of a and an increasing function of p and τ^2 we find that a higher share of human capital in the income of a middle class agent and a higher level of commitment make it more likely that the rich appease the poor instead of the middle class to avoid a revolution.

Proposition 1 *Above a certain threshold value for taxes (τ^{co}) the poor become the marginal social group ($\mu^{M,2} > \mu^{P,2}$). A lower α and a higher p increase the parameter range for which $\mu^{M,2} > \mu^{P,2}$.*

The rich will choose τ^2 such that either (7) or (8) is satisfied as an equality. Since the utility of the rich is decreasing in τ they will want to have the outcome with the lowest possible tax rate and since our above analysis shows that for low tax rates it is cheaper to buy-off the middle class they would prefer to do so. If (8) holds for some $\tau^2 \in (0, \tau^m]$ then the rich will choose such a τ^2 given that $\tau^{co} > \tau^2$. If the necessary $\tau^2 > \tau^{co}$ then the rich choose τ^2 to make (7) hold as an equality. If at τ^m neither (7) nor (8) hold and if $\tau^{co} < \tau^p$ then the rich choose $\tau^2 \in (\tau^m, \tau^p]$ to make (7) hold. If on the other hand at τ^m neither (7) nor (8) hold and if $\tau^{co} > \tau^p$ then a revolution cannot be avoided by promising redistribution and the rich have to democratise. This is the case when $\mu < \min\{\mu^{P,2}, \mu^{M,2}\}$.

As an illustration consider the following two graphs. The top line represents $\mu^{P,2}$ and the bottom line represents $\mu^{M,2}$. In Figure 3(a) $\alpha = p = 0.5$ and we can see that no matter how much taxes the rich promise $\mu^{P,2} > \mu^{M,2}$ so that the poor are always more difficult to dissuade from a revolution ($\tau^{co} > 1$) and the rich bribe the middle class since this is cheaper. In Figure 3(b) where $\alpha = 0.1$ and $p = 0.9$ we can see that $\tau^{co} \in (0.1)$. Note that while for certain α and p it can be possible to buy-off the poor but not the middle class, we have established above that the revolutionary threat of the poor absent any redistribution is always at least as great as that of the middle class, i.e. $\mu^{P,1} \geq \mu^{M,1}$. That we can get $\mu^{P,2} < \mu^{M,2}$ is due to the fact the utility of the poor is increasing in taxation for $\tau^r > \tau > \tau^m$ while the utility of the middle class is decreasing over this range.
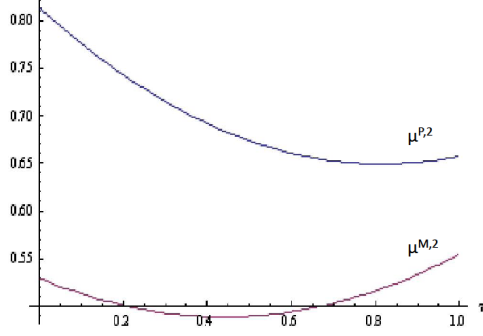
3(a) Illustration of $\mu^{P,2}$ and $\mu^{M,2}$ when $\alpha = 0.5$ and $p = 0.5$. The Middle Class are the marginal social group for all tax rates.
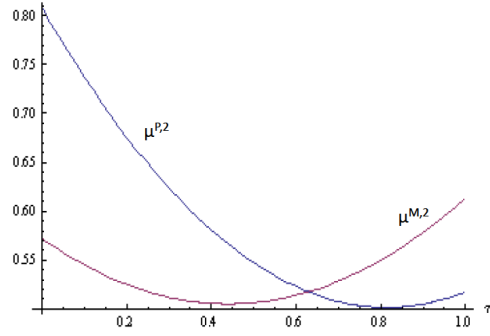
3(b) Illustration of $\mu^{P,2}$ and $\mu^{M,2}$ when $\alpha = 0.1$ and $p = 0.9$. Above a certain tax rate the poor are the marginal social group.

4.3.2 Partial Democracy

Since by definition the middle class are more numerous than the rich the median voter is a middle class agent. Since we are facing a unidimensional voting problem the median voter is the decisive one and in partial democracy the equilibrium tax rate will be τ^m. Whether partial democratisation can prevent a revolution depends on whether

$$(1 - \tau^m)y_p + (\tau^m - C(\tau^m))y > \frac{(1 - \mu)(y + m_m(1 - \alpha)(y_p - y_m))}{(m_m + m_p)} \qquad (9)$$

or

$$(1 - \tau^m)y_m + (\tau^m - C(\tau^m))y > \frac{(1 - \mu)(y + m_p(1 - \alpha)(y_m - y_p))}{(m_m + m_p)} \qquad (10)$$

The trade-off here for the middle class and the poor is whether they are better off in a partial democracy where the tax rate is τ^m or whether they get a higher payoff by expropriating the economy's assets and then bargaining over how to split them. It is important to note that the fact that the rich are expropriated means that the middle class can prefer a revolution even when the rich partially democratise (i.e. the middle class get their ideal tax rate).[22]

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[22]This might seem counter-intuitive at first but can easily be interpreted by noting the reasoning in Subsection 4.2 which stressed the new opportunities which arise for the middle class once the old elite has to be replaced. However, if we allowed for targeted taxes or transfers then clearly this would not

4.3.3 Democracy

The equilibrium tax rate in democracy is $\tau^p > \tau^m$. First note, that since the utility of the middle class is decreasing in τ for $\tau > \tau^m$, they are worse off now then they are under partial democracy. This means that they are now more likely to start a revolution than they are in partial democracy. The poor on the other hand are strictly better off in democracy than in partial democracy and so are less likely to start a revolution. Whether full democratisation can prevent a revolution depends on whether

$$(1 - \tau^p)y_p + (\tau^p - C(\tau^p))y > \frac{(1 - \mu)(y + m_m(1 - \alpha)(y_p - y_m))}{(m_m + m_p)} \tag{11}$$

or

$$(1 - \tau^p)y_m + (\tau^p - C(\tau^p))y > \frac{(1 - \mu)(y + m_p(1 - \alpha)(y_m - y_p))}{(m_m + m_p)} \tag{12}$$

Clearly, given the above discussion (9) is less likely to hold than (11) and (10) is more likely to hold than (12).

4.3.4 Equilibrium

We have now put in place all the pieces to solve for the sub-game perfect equilibrium of the game. For ease of presentation we break up the proposition which states the equilibrium into sub-propositions and discuss each of those sub-propositions in turn.

Proposition 2 *There is a unique Subgame Perfect Nash Equilibrium.*

2 (i) *If $\mu > \mu^{M,1}$ there is no threat of revolution and the rich opt to remain in autocracy without any redistribution.*

2 (ii) *If $\mu^{M,1} > \mu$ the rich promise the lowest possible tax rate such that either (7) or (8) holds as an equality.*

As mentioned above the rich are unconstrained and simply set their most preferred tax rate $\tau = 0$ unless $\mu < \mu^{M,1}$. When the rich are forced to make concessions they

hold anymore. The middle class could then levy a special tax on the rich and transfer the income to themselves. In general allowing for targeted taxes and transfers increases the relative attractivness of autocracy for the rich and of partial democracy for the middle class. It also gives the rich in autocracy and the middle class in partial democracy additional tools to consolidate their power by using targeted transfers to the poor to dispel the threat of revolution. Democratisation is thus restricted to a smaller parameter set relative to the case without targeted transfers.

will try to avoid democratising by promising the lowest possible level of redistribution which avoids a revolution. They do this as discussed in the autocracy section. When p is sufficiently small and α sufficiently large then the middle class have higher demands than the poor even though, a priori their preferences are more closely aligned with those of the rich than those of the poor are. This result can help to explain why we frequently observe autocratic regimes engage in populist policies aimed at garnering the support of the poor rather than that of the middle class. An interesting trade-off arises when the rich need to offer $\tau^2 \in (\tau^m, \tau^p]$ to avoid democratisation. The rich then have to decide whether they are willing to promise a higher tax rate than they would get in partial democracy knowing that they have a chance of resetting it with probability $(1-p)$. They prefer to partially democratise if $U(y_r, \tau^m, p=1) \geq U(y_r, \tau^{2,P}, p)$, i.e.

$$\frac{(\tau^m - C(\tau^m))y - \tau^m y_r}{(\tau^{2,P} - C(\tau^{2,P}))y - \tau^{2,P} y_r} = p^* \leq p \tag{13}$$

When the probability of being able to reset the tax rate is sufficiently low the rich prefer partial democratisation. If the rich can avoid democratisation by offering a tax rate $\tau^{2,P} \leq \tau^m$ then $p^* \geq 1$ and clearly the rich will never voluntarily democratise. When the rich need to offer a tax rate $\tau^{2,P} = \tau^p$ to avoid a revolution, then $p^* = p^H$. We thus get a mapping from $\tau^{2,P} \in [\tau^m, \tau^p]$ to $p^* \in [p^H, 1]$ which defines the range of p for which the rich voluntarily democratise.

There are two counteracting effects at work here, however. The higher is p the more likely the rich are to voluntarily democratise but also the lower is $\mu^{P,2}$, thereby making it feasible to avoid democratisation for a larger set of revolution costs. This indicates a non-linear relationship between the level of commitment and democratisation. On the one hand a larger p makes the promises of the rich more credible and thus reduces the commitment problem which leads to less democratisation. On the other hand, a larger p leads the rich to prefer democratisation over autocracy in some case precisely because they cannot reset the tax rate ex post. The rich are then willing to accept a relatively high tax rate for sure rather than promising an even higher one in the hope of being able to reset it.

When promising redistribution is not enough to avoid a revolution (or suboptimal as discussed above) the rich democratise to make their promises credible. Whenever possible the rich will opt for partial democracy over full democracy since it results in a lower tax rate. However, it is possible that partial democracy does not avert a revolution (neither (9) nor (10) are satisfied) and then the rich are forced to fully democratise.

2 (iii) *If $\mu^{M,1} > \mu$ and either both (7) and (8) cannot be satisfied or (7) can be satisfied*

but $p^* \leq p$ and either (9) or (10) are satisfied then the rich partially democratise.

2 (iv) *If $\mu^{M,1} > \mu$ and neither (9) nor (10) are satisfied but (11) is satisfied then the rich fully democratise.*

Lastly, if a revolution is so attractive that the middle class prefer it to partial democracy and the poor prefer it to full democracy then the rich cannot prevent it and a revolution occurs in equilibrium.

2 (v) *If $\mu^{M,1} > \mu$ and none of (9),(10), (11) or (12) are satisfied then there is a revolution.*

The key observation is that since the poor prefer a higher tax rate than the middle class it is possible that the two groups have switched order and the poor become the marginal revolutionary threat when we move from partial to full democracy. In other words it is possible that (11) holds but (9), (10), and (12) do not hold. Intuitively, while the middle class were less likely to start a revolution in partial democracy the poor are less likely to do so in full democracy. There is thus a parameter range for which partial democracy does not avoid a revolution but full democracy does. Noting that this is more likely to be the case for a low α establishes our main result:

Proposition 3 *For a high share of human capital in a middle class agent's income (low α) there is a parameter region in which the rich will optimally choose to fully democratise rather than partially democratise.*

When the middle class rely on income from property then their interests are naturally closely aligned with those of the rich since both have a lot to loose if assets are expropriated after a revolution. However, if the middle class is made up mainly of propertyless white-collar workers who's main asset is their human capital then they are much less change averse since their assets cannot be expropriated.[23] The rich might then have to fully democratise to find an ally in the poor to keep the demands of the middle classes in check. Figure 4 illustrates the above discussion. The upward sloping line represents $\mu^{M,3}$ while the downward sloping one represents $\mu^{P,4}$. As long as partial democracy can avert a revolution that is the option the rich choose. However, for low values of α we get the situation $\mu^{M,3} > \mu^{P,4}$ and the rich are forced to fully extend the franchise to avoid a revolution.

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[23]Wade's (2005) account of the Russian revolution corroborates this statement. He notes that nearly all leaders of the revolution were from a white-collar background.
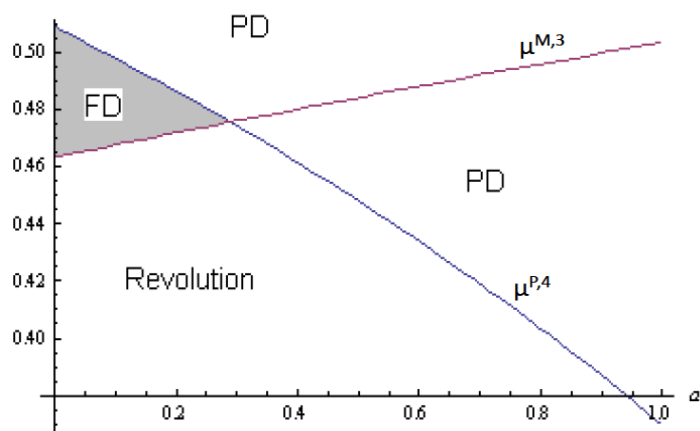
Figure 4: SPNE of the game for a range of α and μ.
When the share of human capital in a middle class
agents income is sufficiently high it can be optimal for
the elite to fully rather than partially democratise.
(FD=Full Democracy, PD=Partial Democracy).

4.3.5   Discussion

19th Century Europe   The model offers a possible explanation for why some European countries fully extended the franchise while others only partly did so at a similar time. Namely, countries in which the middle class had little property and high human capital would be expected to have extended the franchise more fully early on. Ideally, one would like to be able to formally test this hypothesis but there are severe data constraints since even data for a proxy such as school enrollment is not consistently available prior to 1870 and there is hardly any cross-country data on asset holdings, human capital and income. Nevertheless, we can look at anecdotal evidence so see whether it is in line with the model's predictions. In Figure 2 we had identified four countries as 'full franchise extension countries' (Denmark, France, Germany and Switzerland). It is interesting to note that this group contains the two countries in the world in which primary schooling was first made compulsory, namely Germany (Prussia) in 1763 and Denmark in 1814 (Soysal and Strang, 1989). Furthermore, the 1833 'Guizot Law' in France had substantially increased the provision of schooling there, increasing human capital fifteen years prior to the 1848 franchise extension (Lynch. 1974). Lastly, also Switzerland was

among the countries with the highest level of education in Europe in the early part of the 19th century and was certainly far ahead of England in terms of schooling (Peterson, 1952). All this seems rather suggestive that human capital might have been higher in those countries which fully extended the franchise early on. A further insight into the level of human capital could be gained by comparing school enrollment rates between the countries in our franchise extension sample. Using the earliest available measures of enrollment rates (1870) we can calculate the average enrollment rate for the 'partial franchise extension countries' and the ' full franchise extension countries'. The average for the latter is 68.5% compared to 53% in the former, a large and significant difference. Unfortunately since the enrollment data is only consistently available for dates after the first franchise extensions have already taken place it is not clear whether perhaps the observed correlation does not stem from countries with larger franchises voting for more education. However, combined with the previous discussion on education levels pre-dating franchise extensions it would seem that there is at least some evidence that human capital was indeed higher in those countries which fully extended the franchise early on.

A useful comparison can be made between Britain which gradually extended the franchise through a series of reforms and Germany which introduced full male suffrage at once in 1871.[24] In fact, Kocka's historical account (1995) does indeed seem to suggest that α was higher in Britain than in Germany. In Britain the middle classes were not banned from acquiring land, while in most parts of Germany (notably Prussia) they were. This created a situation in which the 'Bildungsbuergertum' became the core of the German middle classes. Hobsbawn (1993) notes that in Britain, on the other hand, 'manufacturers in the expanding new industrial areas, were seen as the core of the middle class'. Furthermore, 'the English aristocracy and gentry were notoriously open to middle-class marriages' strengthening a bond based on the mutual interest in avoiding all to abrupt change which could threaten property holdings. This is in contrast to Germany's 'Wirtschaftsbuergertum' which according to Kocka (1993) 'was confronted [...] with an early-established, self-conscious and sometimes anti-capitalist Bildungsbuergertum'. In general the German middle classes placed a large importance on education and harboured a sentiment of being distinctly different from the elite. Peterson (1952) notes that the mid-nineteenth century rapporteur of the Board of Education in England, Matthew Arnold, repeatedly pointed out that England's middle class was 'the worst educated in

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[24]Caramani (2000) dates full manhood suffrage in Germany in 1848 but continuos parliamentary rule only in 1871 when a united Germany was created. The crucial point, however, is that there was a jump to full manhood suffrage compared to Britain's gradual extensions.

Europe'. In England only 1 in 1300 boys received any form of secondary education, this compares to 1 in 249 in Prussia.

The Modernisation Hypothesis and the Arab Spring   More generally, the model describes a possible mechanism through which Lipset's famous modernisation hypothesis might work. Lipset (1959) suggests that a high income level and a high level of education are prerequisites of a functioning democracy[25]. One of the few papers proposing a mechanism linking education and wider political participation is Glaeser et al (2007). They argue that education raises the private benefits from political participation and thus more educated societies are more democratic. We offer an alternative explanation. Education increases human capital and because human capital is not expropriatable in the way assets are this makes agents more willing to risk moving away from the political status quo. Societies with high levels of education are therefore very difficult to control by autocratic regimes and populist policies are less successful at averting regime change.

It is interesting to note this mechanism might well play a role in the recent Arab uprising. The Arab countries currently undergoing transitions or challenges to the established order are noteworthy for relatively large well-educated groups of people which are unemployed. Over the past thirty years Arab states have seen a marked increase in schooling rates, roughly on a par with Asia and slightly ahead of Latin America. Among Arab states, the Maghreb and the Gulf are the two regions with the highest increase. Comparing the countries in the Maghreb which are currently undergoing a political transition to the ones which are not, the gap in years of schooling is striking. Libya and Tunisia have 16.5 and 14.5 while Algeria and Morocco have 12.8 and 10.5 expected years of schooling, respectively (Kuhn, 2012).[26] Importantly, many of those gaining access to education were the first to do so in their family and often came from modest backgrounds

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[25]Following Barro's (1999) extensive study into the determinants of democracy a large empirical literature has developed which tries to test the validity of this assumption. Barro uses lagged variables of GDP/Capita and school attainment (average years of primary schooling) and a large number of control variables to conclude that a higher standard of living furthers democracy. His results are thus broadly supportive of the modernization hypothesis. Glaeser et al (2004), in a study focusing on the determinants of growth, reach the same conclusion as Barro. They show that human capital is more important for growth than institutions are and that in fact human capital predicts improvements in institutions but not the other way around. In two much discussed papers Acemoglu et al (2005, 2008) argue that the results of previous studies had been driven by omitted variable bias and that when one controls for country fixed effects the causal relationship from income and education to democracy breaks down. However, a host of later studies (Bobba and Coviello, 2007, Papaioannou and Siourounis, 2008 and Castello-Climent, 2008) offer evidence in favour of the effect of education on democracy.

[26]Kuhn notes that ' "expected schooling" of children is a synthetic cohort estimate of the years of schooling a child would expect to complete if current grade-to-grade transition rates applied throughout her life course.'

with very little assets in the family so that their human capital offered the potential to a significant increase in income. This mirrors the development in 19th century Europe. Furthermore, Chabaan observed in 2009 that one in three young Arabs, who were often well educated, were unemployed. Clearly, the incentives of those people are such that they have a lot to gain from a change in regime since their human capital cannot be lost in the process but in a new system they could reap far higher returns on it than they currently do.

Latin American Democratisation   Lastly, the model also offers some insights into the latest wave of democratisations in Latin America. Remmer (1991) notes that Latin American countries underwent both an economic crisis and a substantial political transformation during the 1980s. At the beginning of the 1980s most of Latin America was affected by a debt and currency crisis which led to a collapse in growth, large capital outflows and high inflation, triggered by a combination of internal mismanagement and external shocks (see for example Diaz-Alejandro, 1984 and Krugman, 2000). This crisis coincided with the establishment of democracy in Argentina in 1983, Bolivia in 1982, Brazil in 1985, Chile in 1990 and Uruguay in 1985 (Mainwaring and Hagopian, 2005). In an interesting study on the effects of the 1980s crisis in Latin America Minujin (1995) shows that overall income levels fell and the drop in income tended to be large for those in the second and third quintile of the income distribution. This forced many middle-class families into a category he terms "new poor". Interestingly, Minujin observes that 'persons with six to nine years of study experienced a greater loss in income than did those with a lower level of education' and that 'the fall was greatest for those with the highest level of education.' Furthermore, since inflation was as high as 1,000% the savings of many middle-class families were eroded. This created a situation in which there was a well-educated middle class with little wealth but high potential income due to their human capital. One could conjecture that for a long time democratisation proved difficult in Latin America because the middle class held substantially more assets than the poor and were thus more naturally aligned with the elite. The economic crisis changed the incentives of the middle class and made them a more natural ally of the poor since they now had more to gain from political change. The resulting pressure on the elite then led to democratisation.

The discussion of the above examples highlight the two ways through which the middle class can become a force for democratisation in our model. Either through an increase in their human capital which is not accompanied by a significant increase in assets or through a reduction in assets brought about by an economic crisis, for example.

Both make the middle class less averse to change and shift the balance of power away from an autocratic status quo.

5   Conclusion

We developed a model of involuntary franchise extensions which accounts for the fact that human capital is not expropriatable and thus intrinsically different from other sources of income. We used this observation to create a link between the increasing human capital levels of the middle class in 19th century Europe and the democratisation process which was taking place at the time. The importance of the middle classes has been noted repeatedly in earlier and influential contributions by Lipset, Moore and others. The middle classes do in our account not play an important role simply by the virtue of being in between poor and rich but because economic development and the rise in education changed their incentives more than it changed those of other groups. The insights of the model can be used to understand cross-country differences in the speed and extent of franchise extensions in 19th century Europe but also more broadly to describe a mechanism which links education and democratisation. As de Toqueville noted 'only those who have nothing to lose ever revolt'. Perhaps, it would be correct to add as a qualifier that those who have little to loose but the most to gain are the most likely to revolt.

Appendix

Proof of Proposition 1. Setting $\mu^{M,2} > \mu^{P,2}$ we find that the poor are cheaper to "bribe" when

$$\frac{(p[(1 - \tau^2)y_p + (\tau^2 - C(\tau^2))y] + (1 - p)y_p)}{(y + m_m(1 - \alpha)(y_p - y_m))}$$
$$> \frac{(p[(1 - \tau^2)y_m + (\tau^2 - C(\tau^2))y] + (1 - p)y_m)}{(y + m_p(1 - \alpha)(y_m - y_p))}. \quad (14)$$

First of all, note that the derivative w.r.t. α of the LHS is always negative while that of the RHS is always positive. A increase in α thus makes the inequality less likely to hold. Furthermore, as $\alpha \to 1$ we get $(p[(1 - \tau^2)y_p + (\tau^2 - C(\tau^2))y] + (1 - p)y_p) > (p[(1 - \tau^2)y_m + (\tau^2 - C(\tau^2))y] + (1 - p)y_m)$ which clearly never holds since $y_m > y_p$. On the other hand, an increase in p reduces the gap between the nominators and thus makes the inequality more likely to hold. Now, recall that the optimal tax rate of the middle class is τ^m and that of the poor is $\tau^p > \tau^m$. Finally, also note that increasing the tax rate makes the inequality more likely to hold. Taking the limit of $\alpha \to 0$, and $p \to 1$ we obtain $\frac{y_p(1-\tau)+y(\tau-C(\tau))}{y-m_m(y_m-y_p)} > \frac{y_m(1-\tau)+y(\tau-C(\tau))}{y+m_p(y_m-y_p)}$. Now we can see that for high tax rates the inequality always holds and for low ones it does not. There thus exists some cutoff value for the tax rate (τ^{co}) for which the rich appease the poor instead of the middle class. The higher α is and the lower p is the higher will be that cutoff value. ∎

Proof of Proposition 3. The proof follows immediately from the proof of Proposition 1 by setting $p = 1$. ∎

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