Political Rights, Property Rights, and Economic Development*

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Abstract

Some part of modern economic growth must have been due to a reduction of deadweight losses associated with upward redistribution of income. In turn, upward redistribution was reduced when new groups won political rights and used them to defend their interests. I construct a model in which extensive redistribution from the poor to the rich occurs when few people enjoy suffrage, redistribution declines as new groups are enfranchised, reaches a minimum when the median income among the enfranchised equals the average income in the population, and then changes direction and increases. As a result, growth rates first increase and then decline as the enfranchised proportion of the population increases. This model is supported by econometric results covering the world from the inception of representative institutions until today.

Note: This version was doctored by placing the formal model on which the results are based in the Appendix and relying on an intuitive example to motivate them. Hopefully, in this way the text is comprehensible without the mathematics. I would obviously appreciate, however, if those among you who can looked at the model. Some of the footnotes are based on the model.

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1 Introduction

Some part of modern economic growth must have been due to a reduction of deadweight losses associated with upward redistribution of income. In turn, upward redistribution was reduced when new groups won political rights and used them to defend their interests. Once one thinks about it, the first claim is embarrassingly obvious. The second, however, entails some subtle theoretical issues and is not easy to demonstrate empirically.

Since economic models often require a poetic license, I analyze redistribution in terms of "taxes" and "transfers." But this is just a reduced form of representing the redistributive effect of any kind of policies. As Stigler (1975) observed, all policies – from credentialing nurses, to issuing taxi medallions, to prohibitions of noxious products – affect incomes differentially. A woman with two years of vocational education has a different earning capacity when anyone can become a nurse and when becoming one requires this training. In turn, incomes of everyone using nursing services are different when entry into nursing is open than when it is regulated. And the moment one thinks of policies other than those that pass through the fiscal system, it becomes obvious that they may have regressive, not only progressive, effects (Peltzman 1976). Redistributions may occur in both directions: upward, from those relatively poorer to the wealthier, and downward, from the wealthier to the poorer. In fact, all societies redistribute simultaneously in both directions. For example, patent laws concentrate incomes but anti-monopoly laws diffuse them, free primary education redistributes incomes downward but free tertiary education redistributes it upward, minimum wage legislation raises low wages but anti-union laws depress them.

One can easily imagine that some such policies constitute "barriers to riches" (Parente and Prescott 2000): they reduce investment, misallocate labor and talents, or retard technical progress. Although Parente and Prescott use as their prime example the protection by the state of unions which oppose adoptions of labor-saving technologies, one would expect that the barriers could be erected and maintained only by the powerful. And when suffrage was restricted, the powerful were the rich. As documented in the last section, incumbent elites maintained barriers to labor mobility, entry, credit, and new technologies. My claim is that these barriers were gradually removed when new groups conquered political rights, thus stimulating growth.

Focusing exclusively at the tax rate in the narrow, formal sense of this term captures only one aspect of the deadweight costs of redistribution. The arguments of Justman and Gradstein (1999), Acemoglu and Robinson (2000), as well as of Lindert (2004), that extensions of suffrage

increased *downward* redistribution through the fiscal system generate a puzzle – the "puzzle of a free lunch" in the language of Lindert (2004: 16-19) – namely that between roughly 1880 and 1980 growth accelerated as tax rates mounted dramatically. Clearly, one possibility is that tax revenues were used to finance investment in productive resources, notably education (Saint Paul and Verdier 1996, Bourgignon and Verdier 2000, Mariscal and Sokoloff 2000, Lindert 2004), health and sanitation (Lizzeri and Persico 2004), or public goods that enter into production (Barro 1990). But another possibility is that extensions of franchise liberated productive capacities of the broad masses by removing the most onerous mechanisms of *upward* redistribution, so that growth accelerated in spite of an increase in downward redistribution through the fiscal system.

In turn, the claim that economic growth was due at least in part to a reduction of upward redistribution is not inconsistent with findings such as those of Lizzeri and Persico (2004: 710), who observed with regard to England that "the expansion of the franchise does not seem to be associated with a large redistribution of resources from the elite to the disenfranchised," of Aidt, Dutta, and Loukoianova (2001), who found that franchise extensions had no impact on the size of government in twelve European countries between 1830 and 1938, or of Galor (2004: Section 3.3.3.C), who maintains that "political reforms that took place in the 19th century had no apparent effect on education reforms over this period...." All that was needed for growth to accelerate was for policies to become less regressive.

The story goes as follows: When people who owned productive property acquired political rights, their property became secure from encroachments by the monarch, they began to invest, and growth was launched (North and Thomas 1973). But barriers to development continued to be politically maintained because they generated a distribution of income beneficial for the narrow elite. Thus, Lindert and Williamson (1985: 342) observe that "since only the top economic classes had political voice and literacy in the 18th- and early 19th-century Britain, policy tended to be regressive." As political rights became more extensive, many fetters to development were removed and growth accelerated. Yet when people without productive property or reasonable prospects of acquiring it conquered political rights, they used these rights to redistribute incomes downwards and growth slowed down. The conclusions is thus that when political rights were highly restricted, redistribution was from the poor to the rich, its rate was high, and growth was slow. As political rights became more extensive, the rate of upward redistribution declined, and growth accelerated. Finally, as political rights became

nearly universal, redistribution changed direction, its rate increased, and growth slowed down.

Note immediately that this pattern is visible in the raw data (growth rates from Maddison 2003, suffrage from own data). The rate of growth accelerated as the extent of political rights, measured as the proportion of the population that is enfranchised, increased up to some level and then slowed down as suffrage became almost universal.

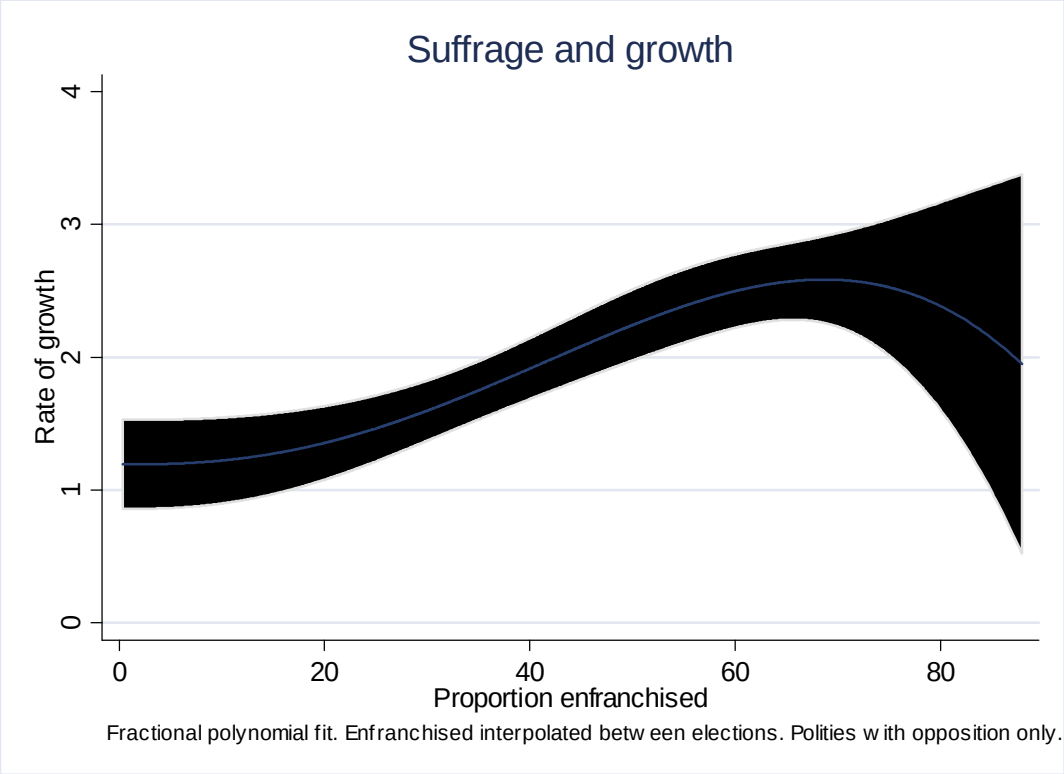

Figure 1

The paper is organized as follows. The next section is a discussion of the relation between political rights and property rights. An intuitive example is then provided to motivate the results that follow. This example is based on a reduced form of a model presented in the Appendix. The implication of this model is that economies grow slower when suffrage is highly restricted and when it is universal than when its extent is intermediate. This implication is tested in the section that follows, using a new data set that covers the world from the inception of representative institutions until today. A glance at mechanisms of upward redistribution closes the paper.

2 Political Rights and Property Rights

To understand the issues involved, we need some conceptual clarifications. "Property" is a bundle of rights that regulate the use, the benefits, the transfers, and the exclusions from access to objects in possession of physical or moral individuals. Legal scholars (Grey ****) often point out that these rights need not go together, but what matters here is that "property" is a construct of rights. Physical possession is not property and it can be defended by means other than exercise of rights. Hafer (2006), for example, offers a story in which those who end up possessing land are those who are better at defending it physically and in equilibrium their ownership is perfectly secure in that no one would want to grab it. In Europe before the advent of absolutism and for many years after independence in Latin America, possession of land was guarded by private militias (North and Thomas 1973, López-Alves 2000: 20). Private protection may be inefficient (de Meza and Gould 1992), but nevertheless effective: indeed, arms may protect better than votes. Possession becomes property only when it is regulated by laws which determine the rights to be associated with ownership. "Property" cannot be defended privately: it can be made secure only if laws protect it, if courts apply these laws in particular instances, and law enforcement agencies implement judicial decisions. Hence, property rights are a product of public, political decisions. This is why it matters who can participate in allocating these rights: suffrage can be used to protect ones's own property or to take away the property of others.

Now, when owners of productive endowments, historically land, did not enjoy the right to participate in political decisions, their ownership was vulnerable to encroachments by the sovereign and could be protected only by force. This is why according to North and Thomas (1973) the English revolution of the end of the seventeenth century, by making political rights coextensive with ownership, ushered in the era of modern economic growth. Political rights became the weapon with which owners of productive resources could defend their property and, as already Machiavelli observed, "everybody is eager to acquire such things and to obtain property, provided that he be convinced that he will enjoy it when it has been acquired" (*Discourses on Livy.* II.2).

The belief that secure property rights are the key to economic development appears so axiomatic in contemporary economics that it needs little documenting. Claiming that institutions are "the deep cause" of development, deeper than factor supply or technology, Acemoglu, Johnson, and Robinson (2000: 1262) narrow down the development-promoting institutions to "a cluster of (political, economic, and social)

institutions ensuring that a broad section of society has effective property rights." This view is echoed by Easterly (2002), Hall and Jones (1999), Kaufmann, Kraay, and Zoido-Lóbaton (1999), Rodrik, Subramanian, and Trebbi (2002), and many others.

Which institutions, however, make property rights secure?[1] An influential answer to this question was offered by North and Weingast (1989), who claimed that economic development was launched in the post-1688 England when the power to raise taxes was transferred from the Crown to the Parliament[2] and "As Parliament represented wealth holders, its increased role markedly reduced the ability of the king of renege." Their theoretical argument is that "The more likely it is that the sovereign will alter property rights for his or her own benefit, the lower the expected returns from investment and lower in turn the incentive to invest. For economic growth to occur the sovereign or government must not merely establish the relevant set of rights, but make a credible commitment to them" (North and Weingast 1989: 803). An autocrat, Olson (1991: 153) observed, cannot credibly commit himself: "If he runs the society, there is no one who can force him to keep his commitments." The only credible way to safeguard property rights – here the argument of North and Weingast is broadly echoed – is to transfer the control over distribution of resources to those who own them. Indeed, already in 1771, in the first analysis of the "English Constitution," De Lolme (2000: 54) observed that "If any other person, besides the Representatives of the People, had a right to make an offer of the produce of the labour of the people, the executive power would soon have forgot that it only exists for the advantage of the public."

This entire line of reasoning would bewilder nineteenth century observers. They believed that political equality would inevitably threaten property. Albeit referring to direct democracy, Madison (*Federalist* #10) observed in 1788 that "such Democracies have ever been spectacles of turbulence and contention; have ever been found incompatible with personal security or the rights of property; and have in general been as short

[1] While to indicate these institutions recent econometric literature uses a variety of subjective indicators, typically the "constraints on the chief executive" from the Polity data base, this is just an expedient dictated by the availability of historical data. Thus Acemoglou, Johnson, and Robinson (2002: 1270) observe that their operational measure of institutions may "correspond poorly to the real concept that is relevant to development (which is likely to be a broad range of institutions, whereas we only have an index for a particular type of institutions)." So do Easterly and Levine (2002: 33): "Nor does the kind of general indicator of institutional quality we use, ..., provide much guidance to officials making real laws and regulations."

[2] Stasavage (2xxx) as well as Sussman and Yafeh (2005) claim, however, that North-Weingast their story does not hold empirically.

in their lives as they have been violent in their deaths." Decades later he admitted that this danger also confronts representative democracy: "the danger to the holders of property can not be disguised, if they are undefended against a majority without property. Bodies of men are not less swayed by interest than individuals.... Hence, the liability of the rights of property...." (Note written at some time between 1821 and 1829, in Ketcham 1986: 152).

Indeed, at some moment at the end of the eighteenth century, political and economic equality became connected by a syllogism: Universal suffrage, combined with majority rule, grants political power to the majority. And since the majority is poor, it will use this power to confiscate the riches. This inference was perhaps first drawn by a French conservative polemicist, J. Mallet du Pan, who insisted in 1796 that legal equality must lead to equality of wealth: "Do you wish a republic of equals amid the inequalities which the public services, inheritances, marriage, industry and commerce have introduced into society? You will have to overthrow property" (cited by Palmer 1964: 230).[3] Once coined, this syllogism has dominated the fears and the hopes attached to democracy ever since. Conservatives agreed with socialists that democracy, specifically universal suffrage, must undermine property. The Scottish philosopher James Mackintosh predicted in 1818 that if the "laborious classes" gain franchise, "a permanent animosity between opinion and property must be the consequence" (Cited in Collini, Winch and Burrow, 1983: 98). David Ricardo was prepared to extend suffrage only "to that part of them which cannot be supposed to have an interest in overturning the right to property" (In Collini, Winch and Burrow, 1983: 107). Thomas Macaulay in the 1842 speech on the Chartists pictured the danger in dramatic terms:

> The essence of the Charter is universal suffrage. If you withhold that, it matters not very much what else you grant. If you grant that, it matters not at all what else you withhold. If you grant that, the country is lost.... My firm conviction is that, in our country, universal suffrage is incompatible, not only with this or that form of government, and with everything for the sake of which government exists; that it

[3] Hamilton formulated something like this syllogism in his "Plan for the National Government" (in Ketcham 1986: 75), delivered at the Convention on June 18: "In every community where industry is encouraged, there will be a division of it into the few and the many. Hence separate interests will arise. There will be debtors and creditors, etc. Give all power to the many, they will oppress the few." Yet he thought, like Madison, that this effect can be prevented.

> is incompatible with property and that it is consequently incompatible with civilization. (1900: 263)

Eight years later, from the other extreme of the political spectrum, Karl Marx expressed the same conviction that private property and universal suffrage are incompatible:

> The classes whose social slavery the constitution is to perpetuate, proletariat, peasantry, petty bourgeoisie, it puts in possession of political power through universal suffrage. And from the class whose old social power it sanctions, the bourgeoisie, it withdraws the political guarantees of this power. It forces the political rule of the bourgeoisie into democratic conditions, which at every moment jeopardize the very foundations of bourgeois society. From the ones it demands that they should not go forward from political to social emancipation; from the others they should not go back from social to political restoration. (1952: 62).

But it is not just nineteenth-century observers who would have been bewildered: so should be contemporary political economists. Just consider our favorite toy, the median voter model (Meltzer and Richards 1981). It asserts that when the distribution of incomes is right-skewed, as it is in all countries for which data exist, majority rule equilibrium is associated with a high degree of equality of post-fisc (tax and transfer) incomes, tempered only by the deadweight losses of redistribution.

The coexistence of such diametrically opposed view is puzzling and obviously directs us to an empirical investigation. Yet it is also possible that both of these beliefs are held because both are true. This is the possibility I explore.

3 Suffrage and Growth: An Intuition

Let s stand for the proportion of the population that holds political rights in the form of suffrage. Assume that decisions concerning redistribution are the prerogative of the enfranchised and that the agent with the median income among them is decisive. They extract wealth (or incomes) of everyone at a uniform rate and, at some cost, distribute the revenue equally among themselves.[4]

[4] This fiscal scheme and the political mechanism was formulated in general terms in a seminal article by Lee (2003), who allowed different relations between the set of decision makers and the set of transfer recipients.

To build intuitions, consider the following distribution of alienable income among seven agents: $\{10, 7, 5, 3, 3, 0, 0\}$, with $\sum_{i \in N} y^i = 28$ and the average income of $y = 4$. Assume that the amount of income lost in the process of redistribution is proportional to the rate of redistribution.[5] If only the first three agents have the right to vote, so that $s = 3/7$, the median income among them is 7, and the optimal redistribution rate of the voter with the median income among the enfranchised is then $\tau^M = 0.5$. When suffrage is extended to two additional agents, $s = 5/7$ and the median voter has an income of 5, his optimal rate is $\tau^M = 0.21$. Hence, the redistribution rate declines as franchise is broadened. While a higher rate would generate more revenue, there is nothing to extract from the disenfranchised, and the revenue has to be now shared among five agents while the income of the decisive voter is still sufficiently high that his own tax bill would not be compensated by a larger transfer. Finally, when suffrage is universal, the median voter has an income of 3 and revenue is shared among everyone. Now the median voter is sufficiently poor to benefit from higher redistribution, and her optimal rate is again $\tau^M = 0.5$.

Hence, when only some among property owners decide how much to extract from others, incomes are redistributed from the poor to the rich and at a high rate. As the proportion enfranchised increases, the rate of redistribution falls. But when the proportion enjoying political rights increases further, the direction of net redistribution changes and its rate increases again. Note that the redistribution rates are the same when $s = 3/7$ and $s = 1$, but their distributional consequences are very different.

Figure 2 shows how the ratio of the median income among the enfranchised to the average income in the population changes as a function of the proportion enfranchised (assuming that the distribution of income is exponential). When only few people enjoy suffrage, the median among them has assets about five times larger than the average in the entire population. When suffrage is universal, the ratio of the median to the mean is 0.69, which is about the average ratio of the income of the middle quantile to the average income in the Deininger and Squire (1996)

[5] Specifically, the accounting scheme used to generate these numbers is

$y^a = (1 - \tau)y^b + \frac{\tau(1-0.25\tau)}{s} I_S y,$

where a stands for "after," b for "before," y is the average income, I_S indicates whether an individual is enfranchised, and $0.25\tau^2$ is the deadweight loss. Hence, the voter with median income in S chooses the tax rate

$\tau^{M \in S} = 2(1 - \frac{y^M}{y} s).$

In the formal model the deadweight losses originate from the effect of taxes on investment.

data set.

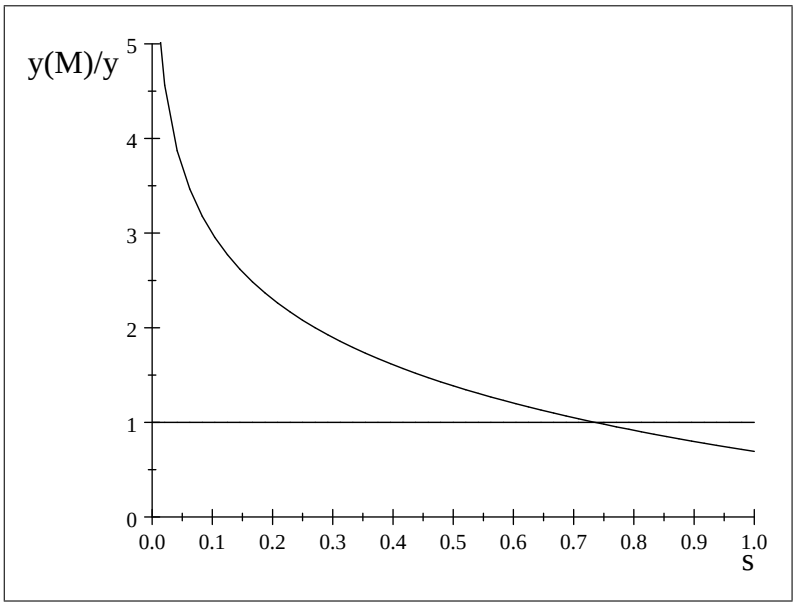

Figure 2

To see the behavior of the tax rate as a function of the proportion enfranchised, I calibrate the model given in the Appendix. The solid line is for the case when everyone has some productive assets, the dashed line for the case where 20 percent of the population does not.

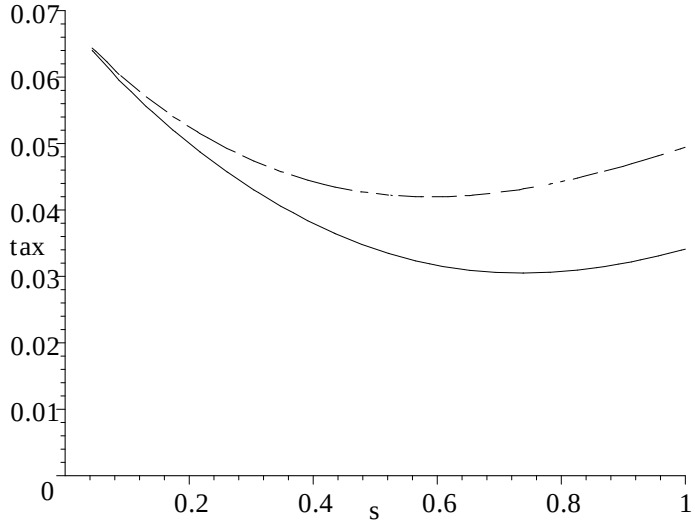

Figure 3

Tax rates decline, reach a minimum (when the voter with the median income among the enfranchised has an average population income, see Proposition 2), and then increase.[6]

If these tax rates appear low, it is because these are taxes on wealth. In terms of taxes on income, in a society in which everyone has some assets, the redistribution rate is about 70 percent when only 4 percent has the right to vote (United Kingdom before the 1832 reform); the redistribution rate reaches the minimum of 33 percent when suffrage reaches 73 percent and the median among the enfranchised equals the average in the population; and it is 38 percent when suffrage is universal.

Finally, if the deadweight losses consist of reduced investment (see the model in the Appendix), the growth rates accelerate when suffrage becomes extended from low levels, reach a maximum, and then decline. Under an illustrative calibration of the model, they increase from 1.1 when $s = 0.04$, to 2.9 when $s = 0.73$, and decline to 2.7 when $s = 1$.

This is, then, the central result. It says that as political institutions evolved from representing only the rich to mass democracies, redistribution, which was from the poor to the rich, declined, changed direction, and increased somewhat again. When political rights were highly restrictive, property of the wealthy was secure because it was protected by policies that restricted the ability of everyone else to compete with them. As a result, the rich were extracting various kinds of monopoly rents and growth was slow. When the middle sectors gained political rights, they abolished some of these barriers, while continuing to protect their incomes from the poor. Since most property was now secure, growth increased. Finally, when the poor conquered rights, they could use them not only to defend themselves but also to take some incomes away from the rich. But the poor are constrained by the investment decisions of the rich (Przeworski and Wallerstein 1988, Bertola 1993), so that downward redistribution remained moderate and growth decelerated only modestly.

4 The Political Economy of Suffrage

4.1 Suffrage and Welfare

When first established – in England, the United States, France, Spain, and the newly independent Latin American republics – representative government was not a "democracy" as we would now define the term, nor was it seen as such by its founders (Manin 1997, Dunn 2005). In spite

[6] Note that this result holds only for some distribution of incomes. For other distributions the tax rate declines monotonically. See Remark 1 in the Appendix.

of their egalitarian pronouncements, the problem of "founders," pretty much everywhere, was how to construct representative government for the propertied while protecting it from the poor. As a result, political rights were everywhere restricted to wealthy males. The road from representative government to democracy took a long time to traverse. As of 1900, only one country had fully universal suffrage while seventeen enfranchised all males. Only during the second half of the twentieth century, more than 150 years after representative institutions were first established, did universal suffrage become an almost irresistible norm.

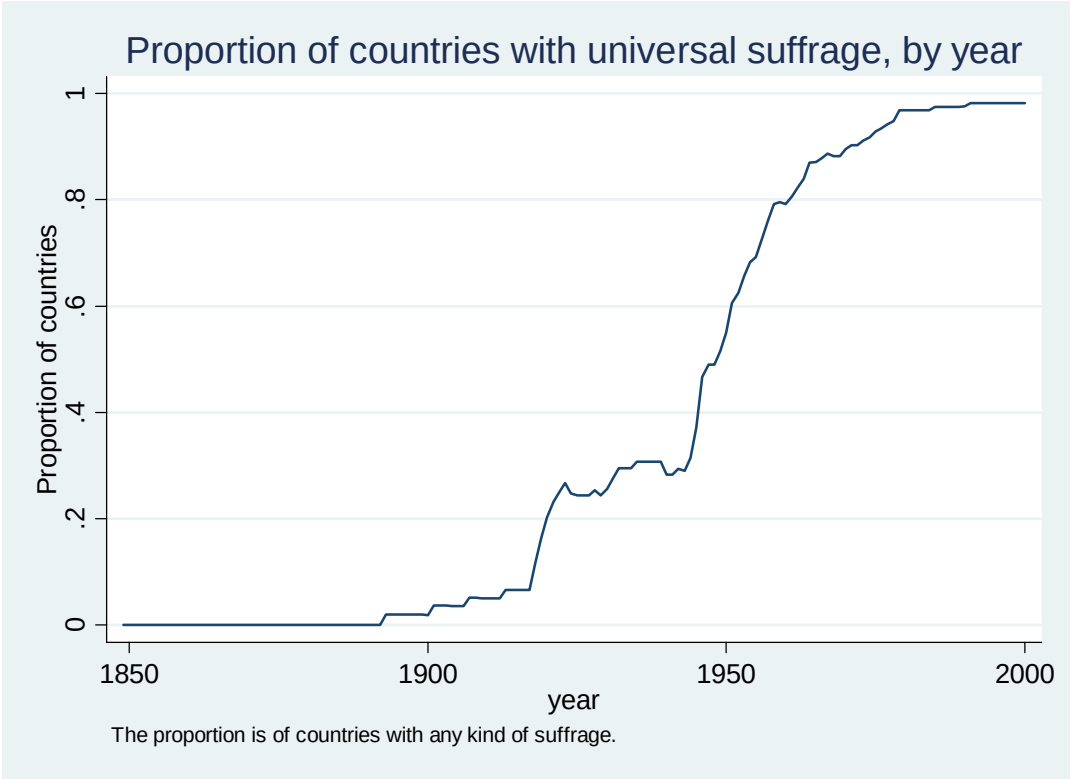

Figure 4

Since, at least up to some point, extensions of suffrage lead to an acceleration of growth, it is an open question whether the incumbents of political rights benefit or suffer from their extensions. The model implies (see Proposition 3) that all current holders of political rights had an interest in guarding them for themselves. This proposition is illustrated in Figure 5. Let s^i stand for the percentile in the income distribution at which agent with relative wealth $\triangle^i$ is enfranchised, where $\triangle^i$ is the

ratio of the wealth of i to average wealth. Consider four agents, each characterized by $\{\triangle^i, s^i\}$. The agents are the Rich or $\{3, 0.05\}$, the Average or $\{1, 0.37\}$, the Median (in the population) or $\{0.69, 0.5\}$, and the Poor or $\{0.22, 0.8\}$. Figure 5 shows the function $V(\tau^*(s))$ for each of these agents. ($V(\tau^*(s))$ is the value of future flow of income when the proportion enfranchised remains for ever at s).

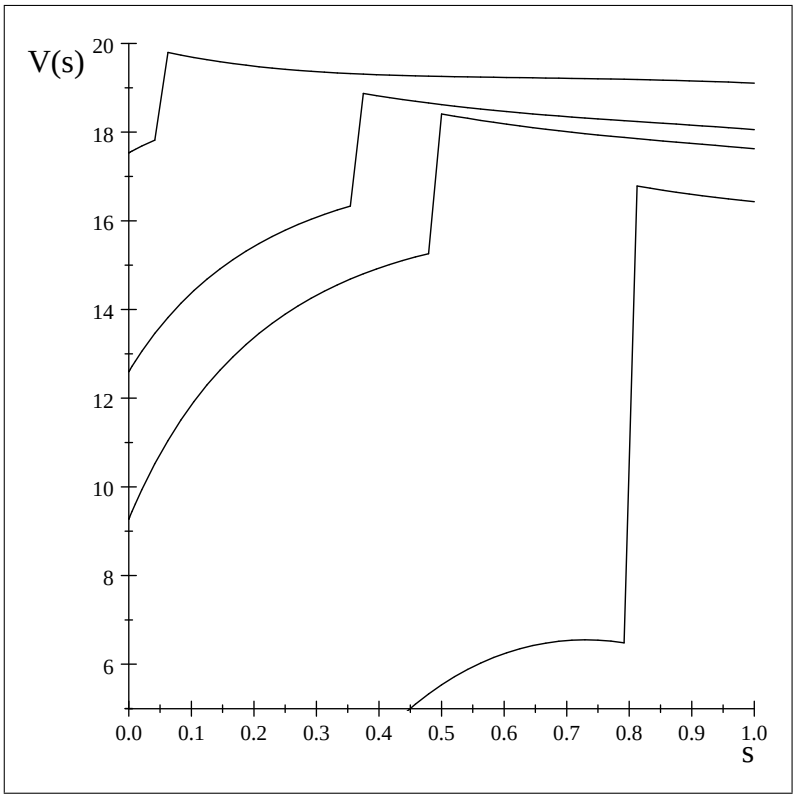

Figure 5

Note: The timing of enfranchisement is indicated by the vertical segment of each line. The Rich has 3 times the average income and becomes enfranchised at $s = 0.05$. The Average becomes enfranchised when $s = 0.37$. The Median (in the population) has 0.69 and is enfranchised at $s = 0.5$. The Poor has 0.22 and is enfranchised at $s = 0.8$.

Here then is what happens as new individuals become enfranchised:

(1) Since taxes decline until the agent with the average income becomes the median among the enfranchised, everyone who is still not enfranchised benefits when others are enfranchised. Those in the bottom 27 percentiles of income distribution, however, suffer from further extension until they become enfranchised. Since this may be not visible

in Figure 5, here is a snippet of the value function of the poor agent with $s^i = 0.8$ when the 7 percent of agents with incomes higher than her's become enfranchised:

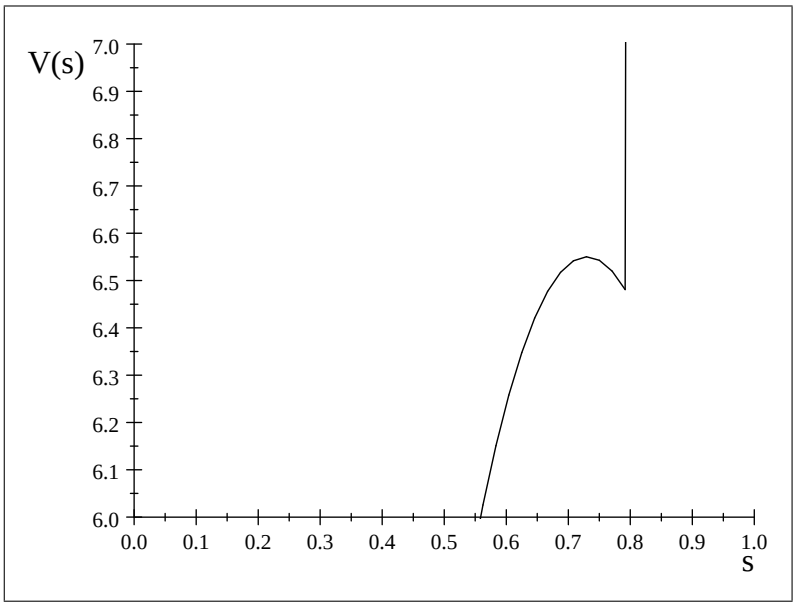

Figure 5.1

(2) Enfranchisement causes a discrete improvement for each newly enfranchised agent. Note that the improvement is larger for poorer agents. Political rights are a powerful equalizer: they drastically reduce the inequality of post-redistribution incomes.

(3) As each one more agent becomes enfranchised, the welfare of those already enfranchised declines. This decline is small, because enfranchisement has mixed effects. Although the entrants join the incumbents in sharing tax revenue as taxes decline, investment increases and growth accelerates. In turn, when s is larger, tax rates increase, so that there is more revenue to share, but the proportion sharing this revenue increases and growth slows down. Yet this analysis was conducted in marginal terms, while the expansion of suffrage was due historically mostly to discrete changes of qualifications, rather than drift caused by increasing incomes, inflation, or increasing literacy. Larger extensions are more costly to the incumbents. Hence, incumbents should always resist further extensions.

These results speak in favor of the class of stories in which franchise was extended only in response to revolutionary threats: political rights were *conquered* by the insurgent masses (Bendix and Rokkan 1962: 30,

Przeworski and Cortés 1971, Freeman and Snidal 1982, Acemoglu and Robinson 2000, Conley and Temini 2001). In turn, there are stories in which elites *granted* suffrage voluntarily, in their own interest, either because additional enfranchisement has a positive externality for the already enfranchised (Justman and Gradstein 1999), or because the elite prefers public goods over transfers (Lizzeri and Persico 2004), or because the elite needs to prepare for war (Ticchi and Vindigni 2006), or because a particular elite wants to obtain an electoral mandate for some economic policies supported by the disenfranchised (Llavador and Oxoby 2005). Another way to see this distinction is that in the first type of explanation suffrage is extended even though the extension would make the elite worse off than they are under the status quo, while in the second type extensions occur only if they would make the elite or at least a majority thereof better off. The model developed here implies that the incumbents of political rights are always worse off when these rights are extended. Hence, they resist extensions as long as they can. Przeworski (2006) shows statistically that extensions along class lines tended to occur under the threat of revolution, while extensions to women followed a partisan logic.

4.2 Winners and Losers

Consider the proportion of the population that consists of net losers from redistribution at each level of suffrage. This proportion is composed of two groups: those who have no political rights and those among the enfranchised whose incomes are sufficiently high that a part taxed away is not compensated by the gains from exploiting the disenfranchised. The first proportion is simply $(1 - s)$. The second proportion is $\exp(1/s)$.[7] Note that while the proportion disenfranchised declines in s, the proportion that consists of wealthy losers increases from 0 when $S = 1$ (decisions about redistribution are the prerogative of one person, the monarch) and $s \approx 0$, to include all those with incomes below the mean when $s = 1$. Figure 6 plots these proportions, as well as their sum (thick line), which is the total proportion of losers in the population.

[7] The net losers among the enfranchised are those for whom $\triangle^i > 1/s$. Let $\triangle^L(s)$ be the relative income of the marginal enfranchised, where $\triangle^L(s) = -\log s$. Then $1/s = \exp(\triangle^L(s))$. Hence, the proportion with incomes higher or equal to $1/s$ is $\exp(-\exp(\triangle^L(s)) = \exp(\exp(-\log s)) = .\exp(1/s)$.

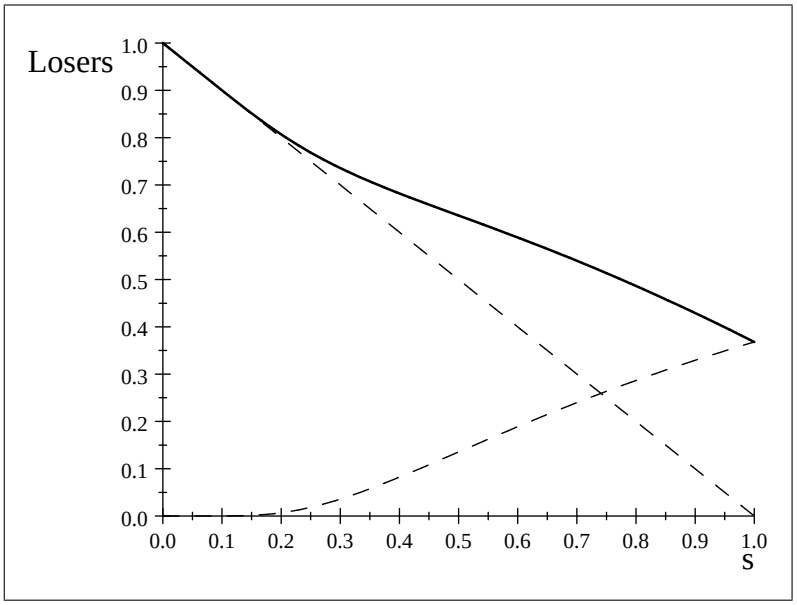

Figure 6

Now, since the poorest and the wealthiest agents are net losers, the beneficiaries are those with incomes in between. This is not quite Director's Law as Stigler (1970) thought about it: only the very wealthy gain when $s \approx 0$ and only those with incomes below the mean when $s = 1$. But if the "middle strata" comprise those who are in the middle three quantiles, they are the beneficiaries throughout most of the range of s. Figure 7 shows that the beneficiaries consist of only the wealthy until $s \approx 0.2$, of the wealthy and the middle in $0.2 \lesssim s \lesssim 0.63$, of only the middle quantiles in $0.63 \lesssim s \lesssim 0.8$, and of the middle and the poor when $s \gtrsim 0.8$.

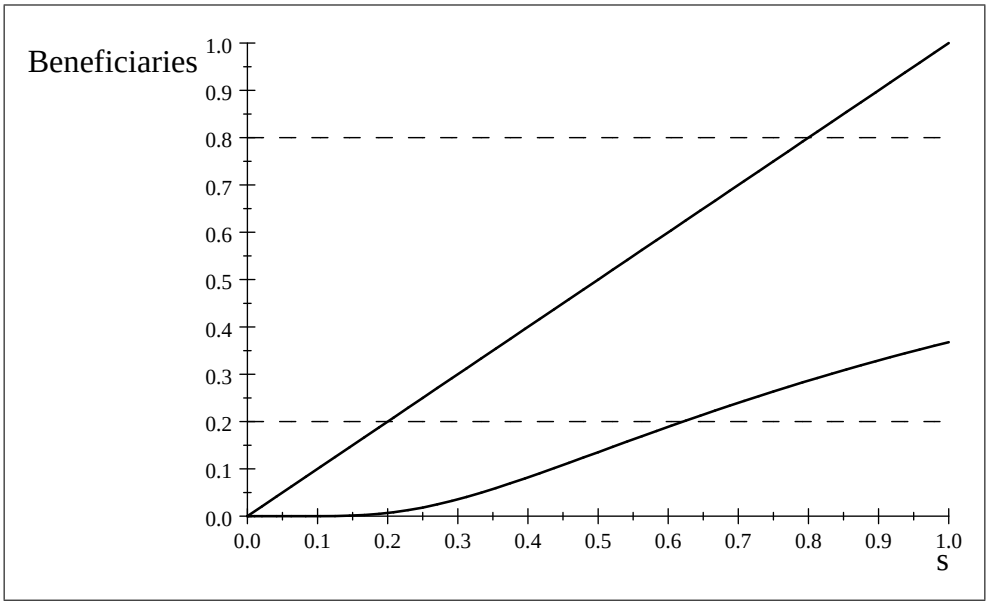

Figure 7

Note: The vertical axis is the percentile (from the top) in income distribution. Hence, those below 0.2 are in the top quantile and those above 0.8 in the bottom. The net beneficiaries are those between the two lines. Those above the upper line are not enfranchised; those below the lower line are the enfranchised who are net losers from redistribution.

Finally, the model implies that the distribution of income should become more equal as enfranchisement becomes more extensive. This consequence, however, is due to the assumption that all assets earn the same rate of return at every level of enfranchisement. Yet one could easily imagine that as methods of redistribution change, the relative rates of return to different assets change as well. Under the aristocratic systems, for example, access to public positions was conditioned on birth. When this restriction was abolished and talented soldiers could become marshals, as in Napoleon's army, the return to human capital must have increased relative to land or physical capital. Hence, I prefer to remain agnostic about the effect of enfranchisement on income distribution. Note that our knowledge of income distribution during the nineteenth century is extremely limited. Even the longest series on income distribution available today reach at most only few years before the advent of universal suffrage. Earlier data are scarce. Concentration of wealth in France (Piketty, Postel-Vinay, and Rosenthal 2006) increased from 1807 until 1914 and declined sharply afterwards. In England, the income share of the top 10 percent peaked in the second half of the nineteenth century and inequality began a secular decline (Justman

and Gradstein 1999: 109). Bourguignon and Morrison (2002), in turn, who reconstructed income distribution data for 33 countries show that within-country inequality increased slightly from 1820 to 1910, only to fall sharply as of 1919 and again as of 1950. These data, however, are too fragmentary to relate them to the extent of suffrage.

5 Theory and History

5.1 Econometric Evidence

From the econometric point of view, the model implies that growth rates should first increase and then decline as the extent of suffrage becomes larger. Hence, the general form of the equation to be estimated is

$$\gamma_{it} = \delta_1 s_{it} - \delta_2 s_{it}^2 + \sum_k \beta_k x_{itk} + \sum_l \beta_l z_{itl} + \varepsilon_{it}, \tag{1}$$

where γ is the rate of growth of per capita income, s is the extent of suffrage, $\mathbf{x}$ are economic factors that affect growth and $\mathbf{z}$ are control variables. Per capita income *(gdpcap)* is the economic control variable in all the specifications.

The data cover the longest possible period and all the political units in the world for which information is available. The growth rates are from Maddison (2003). The data concerning suffrage are based on an originally constructed data set, derived from multiple sources (Przeworski et al. 2007). They were originally available only for years of elections and were linearly interpolated for the interim periods. Note that s is measured as the proportion enfranchised in the entire population. Altogether, the data cover, albeit unequally, 114 countries between 1821 and 2000, yielding 5,403 annual observations.

The analysis is conditioned on legislatures being open. While suffrage rules are often left on paper by various kinds of dictators, they are irrelevant when the legislature is not elected. In Model 2, I also exclude periods in which legislatures are "elected" without any competition, since under such conditions suffrage cannot be exercised as an instrument of choice.

The results, based on a country fixed-effect model with ar(1), are in Table 1.

Table 1: Suffrage and growth

$Variable$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 4$
s	0.0539^{**}	0.0564^{***}	0.0726^{***}	0.0532^{**}
	(0.0228)	(0.0229)	(0.0252)	(0.0269)
s^2	-0.0006^{**}	-0.0006^{**}	-0.0008^{**}	-0.0005
	(0.0003)	(0.0003)	(0.0003)	(0.0004)
$gdpcap$	0.0554	0.0537	0.0352	0.0380
	(0.0405)	(0.0401)	(0.0461)	(0.0469)
$pop > 20$			-0.0185	0.0176
			(0.4188)	(0.4100)
$female$				0.5010
				(0.4424)
age				0.1657^{**}
				(0.0765)
$constant$	0.7675^{***}	0.8739^{***}	0.6196	-2.9752^{***}
	(0.3395)	(0.3361)	(0.3920)	(1.4678)
max at	0.48	0.44	0.45	0.53
$condition$	$openl = 1$	$openl = 1$ $opposition = 1$	$openl = 1$	$openl = 1$
N	5278	3996	3707	3531

Note: Country fixed effects with ar(1) estimates.

Models 3 and 4 present checks for robustness. Since s is measured to the base of the total population, the negative part of the slope may result from the presence of older, unproductive agents in the electorate. For a subset of data for which this information is available, Model 3 replicates the analysis of Model 1 controlling for for the proportion of population over the age of 20 ($pop > 20$). It turns out that while ageing has a slight negative effect on growth, this effect is almost zero, and suffrage still has the predicted effect. One might also think that the changes in growth rates are due to the inclusion of women or of younger voters. Model 4, therefore, replicates the analysis by including a dummy variable indicating that women could vote on the same basis as men ($female$) as well as the age at which people qualified for suffrage (age). Inclusion of women has a positive but not significant effect on growth rates, perhaps because of their relatively higher preference for public goods that increase productivity (Lott and Kenny 1999 for the United States; Aidt, Dutta, and Loukoianova 2001 for Europe). In turn, lowering the voting age reduces growth and when voting age is introduced into the specification the term with square suffrage loses significance ($t = -1.35; p = 0.178$). But since younger people tend to be poorer, this only means that the effect of ex-

tensive suffrage is now split in two parts. The two coefficients are jointly significant with $t = -3.33; p = 0.001$ (the sign of *age* is inverted here).

Note that the econometric evidence indicates that growth rates reach a maximum at $s \in (0, 1)$. This maximum does not seem to be due to the influence of young voters: although growth rate are higher when the age of eligibility is about 21 than when it is lower or higher, the coefficient on s^2 remains negative when age is introduced along with its square. In turn, it is possible that the maximum is due to the worldwide slowdown of growth after 1978, when almost all countries had universal suffrage: different specifications of the econometric model generate different results.

That the model fits to a cross-section time-series does not mean that it fits in all countries. But the overall pattern is not due to cross-sectional effects. As shown in Figure 8, among the twelve Western European countries for which a sufficient range of enfranchisement can be observed, an internal maximum of growth occurs in all but the United Kingdom; among the seven Latin American countries that satisfy this condition, growth peaks at intermediate levels of suffrage everywhere except in Chile and Uruguay. That the United Kingdom, always taken to be the paragon of democratic history, is an outlier is striking: most likely the reason is that barriers to growth were removed in that country before the introduction of modern, individual suffrage in 1832 (Ekelund and Tollison 1991).

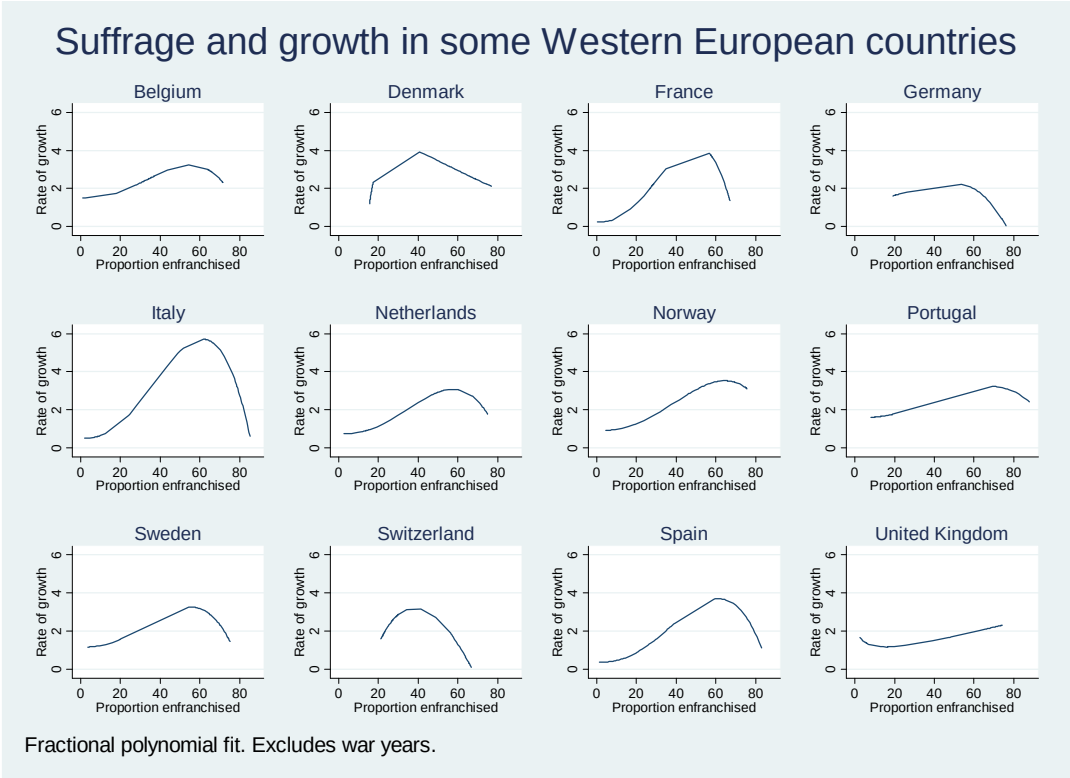
Suffrage and growth in some Western European countries
Belgium
Denmark
France
Germany
Italy
Netherlands
Norway
Portugal
Sweden
Switzerland
Spain
United Kingdom
Rate of growth
Proportion enfranchised
0
2
4
6
0
20
40
60
80
Fractional polynomial fit. Excludes war years.

Figure 8.1

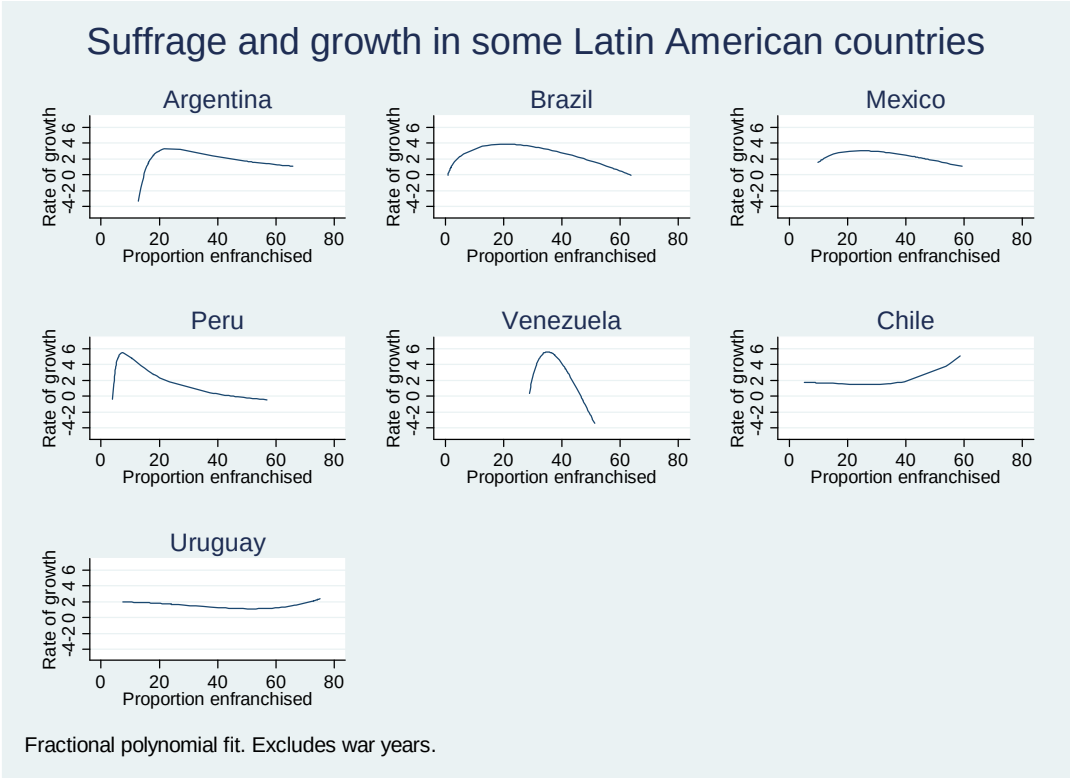

Figure 8.2

5.2 Fetters (*** still incomplete)

The main thesis developed above is that the acceleration of growth rates over the past two centuries was at least in part due to a gradual removal of politically induced barriers to development and that these fetters were removed as a consequence of extensions of political rights. Yet, although econometric evidence shows that the first cause in the chain of causality, the extent of suffrage, is related to the ultimate consequence, economic growth, it is next to impossible to systematize evidence about the intermediate causal chain. Ideally, one would find direct evidence, such as in this textbook of history of Portugal (De Oliveira Marques 1998: 95):

> In Portugal, as in revolutionary France, and as in entire Europe, extensive legislation had as its well-defined objective to *liberate* the rural worker and to permit an agricultural resurgence... The tithe to the Church was abolished.... All the feudal privileges disappeared: forced labor, monopolies of furnaces and oil presses, banishment, payments to the lord or the king, etc. Other feudal traditions, such as game preserves and stud farms, were also abolished.... All this legislation was

decreed between 1821 and 1823 by the parliaments elected in 1820 and in 1821...."

Yet while it is obvious that many barriers were removed during the past two hundred years, the historical information is often too fragmentary to relate it systematically to the extent of political rights.

The story told above generalizes a class of models in which, to defend their incomes, incumbent elites maintain barriers to labor mobility, entry, credit, or technology adoption (Parente and Prescott 2000, Djankov et al. 2002, Rajan and Zingales 2003, Acemoglu, Aghion, and Zilibotti 2004, Comin and Hobjin 2004, Llavador and Oxoby 2005, Acemoglu 2005, 2007, Rajan and Zeingales 2003). Perhaps the closest is Acemoglu (2007), who points out that where political power is in the hands of major producers, it protects their property rights while erecting barriers against the entry of new entrepreneurs. Acemoglu, Aghion, and Zilobotti (2004) analyze an equilibrium in which capitalists bribe politicians to maintain anti-competitive policies. Djankov et al. (2002: 33) offers contemporary evidence that "countries with more limited government, governments more open to competition, and greater political rights have lighter regulation of entry even holding per capita income constant." In the remainder, I use the intuitions of these models to provide some evidence that barriers to growth were gradually removed over time and, whenever possible, that some particular barriers were removed as a consequence of extensions of political rights.

5.2.1 Barriers to factor mobility

Coercive attachment to land: Slavery, corvée, debt peonage, long term contracts, seasonal compulsory labor, anti-vagrancy laws.[8] Slavery persisted in several Latin American countries, Brazil being the last one to abolish it in 1889. Yet even freemen were attached to land through a variety of mechanisms. According to Bulner-Thomas (2003: 86-90), in Latin America "Employers were extremely reluctant to tempt workers with higher wages. Even when they did pay higher nominal wages there were often able to reduce the real cost through the operation of company stores at which workers had to redeem their wages on goods sold at inflated prices. The advance was not necessarily cancelled with the death of the debtor; instead, it could pass to his children, so the system has often been described as debt bondage. Thus coercion ... was still found in many parts of Latin America on the eve of the First World War. " In several Latin American countries, Indians had to

[8] Note, however, that Bardhan (1986: 71) points out that not all forms of attachment to land are necessarily inefficient.

provide free labor on the haciendas during harvests (Yashar 1997). Even specialized cattle-breeding workers "were victims of legislative measures that obliged them to be constantly employed, under pain of imprisonment, forced labour or recruitment into the army...." (Halperin-Donghi 1985: 315). Beginning with Denmark in 1788, France in 1791, and Spain in 1812, all these forms of coercive attachment to land were progressively abolished. The process, however, was gradual, to the point that residual forms of attachment to land persisted in Sweden until 1925.

Inter-sectoral efficiency One piece of more direct evidence about the effect of suffrage is that the variance of output per worker declined as suffrage became more extensive. Output per worker differs across sectors when there are some barriers to the mobility of factors (data are from Asadurian 2007). Hence, the variance of productivity across sectors indicates the strength of such barriers. Figure 9 shows that these barriers were sharply reduced when modern parliaments were first established, under highly restricted suffrage. Yet they also continued to decline as suffrage was further extended.

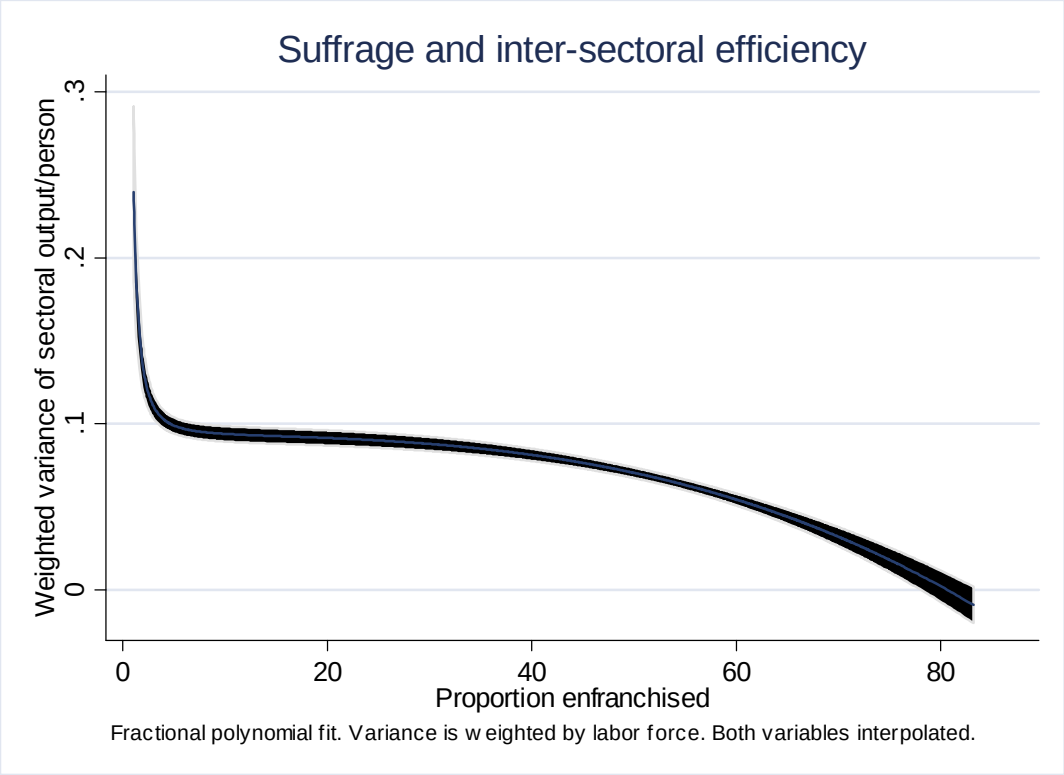

Figure 9

Protectionism

5.2.2 Barriers to entry

Monopolies and monopsonies Salt was the most widespread royal monopoly, but there were also royal monopolies on sugar, tobacco, and alcohol, as well as a variety of local monopolies on mills, oil and wine presses, or furnaces. According to Morgan (1989: 23), in eighteenth century England even hunting was legislated to be an aristocratic privilege: "no pheasants for peasants." Both the British and the Dutch East India companies were protected by legal monopolies. In Peru, guano was a monopoly of a group of concessionaires. Cartels were encouraged and forced by the state in the late nineteenth century Austria and Germany.

Legal monopolies were abolished in most countries as barriers to trade. In England, the Statute of Monopolies curtailed in 1624 the royal prerogative to create private monopolies in domestic trade. In the United States they became illegal after 1890 and in Britain they were neither enforceable nor illegal (Mokyr 1990: 268). In Japan, the abolition of domainal monopolies in the late eighteenth century "led to an enormous boom in small-scale production of exports such as high-quality paper" (Pomeranz 2000: 251).

Guilds Commercial and craft guilds were widespread in late mediaeval period. They died early in China under the pressure of competition from peasants and were officially abolished in 1645. They were made illegal in France during the revolution, in Prussia in the 1840s, in the United Kingdom by parliamentary acts of 1814 and 1835. My impression is that such changes occurred before major extensions of suffrage and that guilds lost their monopoly power because of competition from rural industries rather than because of legislation.

Access to professions and occupations By the end of the eighteenth century, access to public service was reserved for the aristocracy. "Democracy" was a slogan directed against legal recognition of inherited distinctions of social status. One of the main points of the revolutionary tract of Sieyes (1979 [1789]) was that noble birth need not be an indication of talent. "Aristocracy" was attacked as a system that promoted incompetence and corruption. "Could any further proof be required of the republican complexion of this system," wrote Madison in *The Federalist* # 39, "the most decisive might be found in its absolute prohibition of titles of nobility." In France, the Constituent Assembly decided that aristocratic privilege was in conflict with the very principle of popular sovereignty (Fontana 1993: 119). The Batavian (Dutch) Republic established in 1796 required voters to swear an oath to the belief that

"all hereditary offices and dignities" were illegal (Palmer 1964: 195). In Chile, General O'Higgins, the first Director of the State, abolished in 1818 all outward and visible signs of aristocracy (Collier and Sater 1006: 42). The legal discrimination under which those of mixed race suffered during colonial times was abolished in most Latin American countries (Halperin-Donghi 1985: 322).

Yet legal restrictions of access to occupations or professions are not the only mechanism that causes a misallocation of talents (Murphy, Shleifer, and Vishny 1995). All barriers to factor mobility, entry, or credit may result in mismatching skills and opportunities. Overall productivity may be low since some irrelevant personal attributes or personal connections will dominate the choice of professions.

5.2.3 Barriers to credit

Financial development In personalistic credit markets, lending depends on the identity of the lender and the borrower, not on the merits of a project. Rajan and Zingales (2003) argue that incumbents oppose financial development because it breeds competition. Unfortunately, data on financial development are almost non-existent before World War I and still rare before World War II. Yet among the sixteen countries for which data on financial development (from Rajan and Zingales 2003) and on suffrage overlap in 1913, the relation between them seems to be positive.

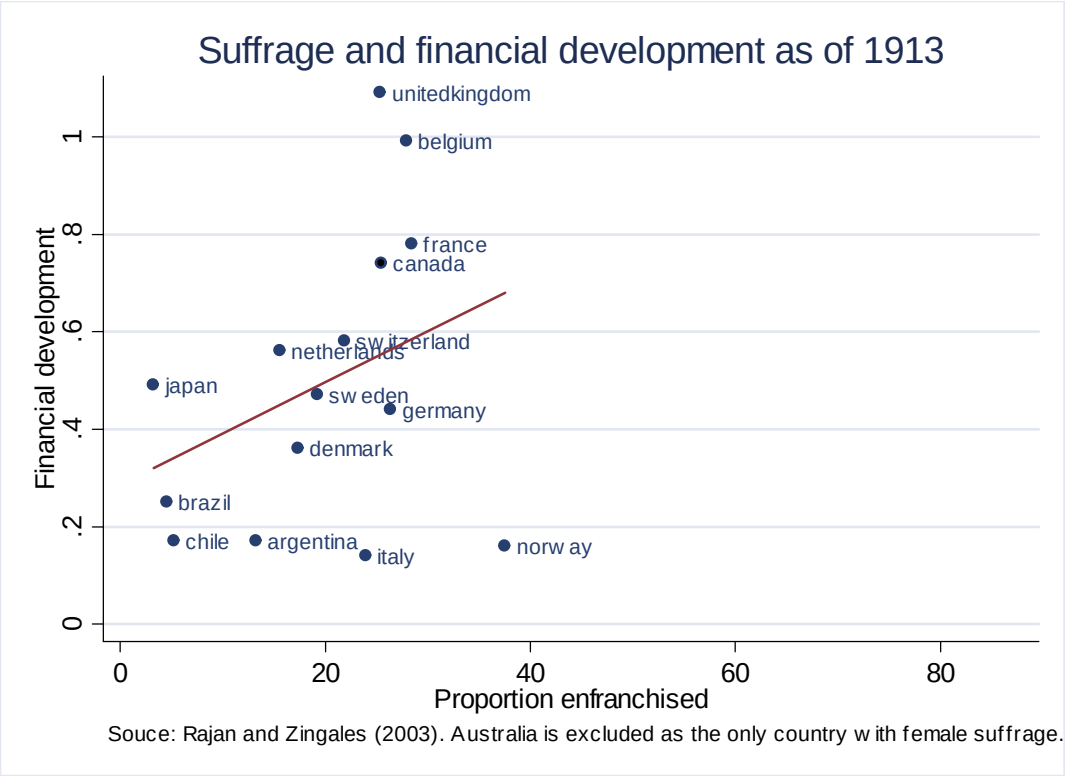

Figure 10

Land as collateral If the poor are credit constrained when they have no collateral, ownership of land gives them access to credit. According to data collected by Thomas (2005), there were at least 175 land reforms entailing redistribution in the world between 1946 and 2000 and, at least during the earlier period, land reforms were often associated with franchise extensions.

Since a long historical series on the proportion of farms that were owned and operated by family units ("family farms") is available from Vanhanen (1996), we can relate land ownership to the extent of suffrage. As Figure 10 shows, this relation is positive and very tight.

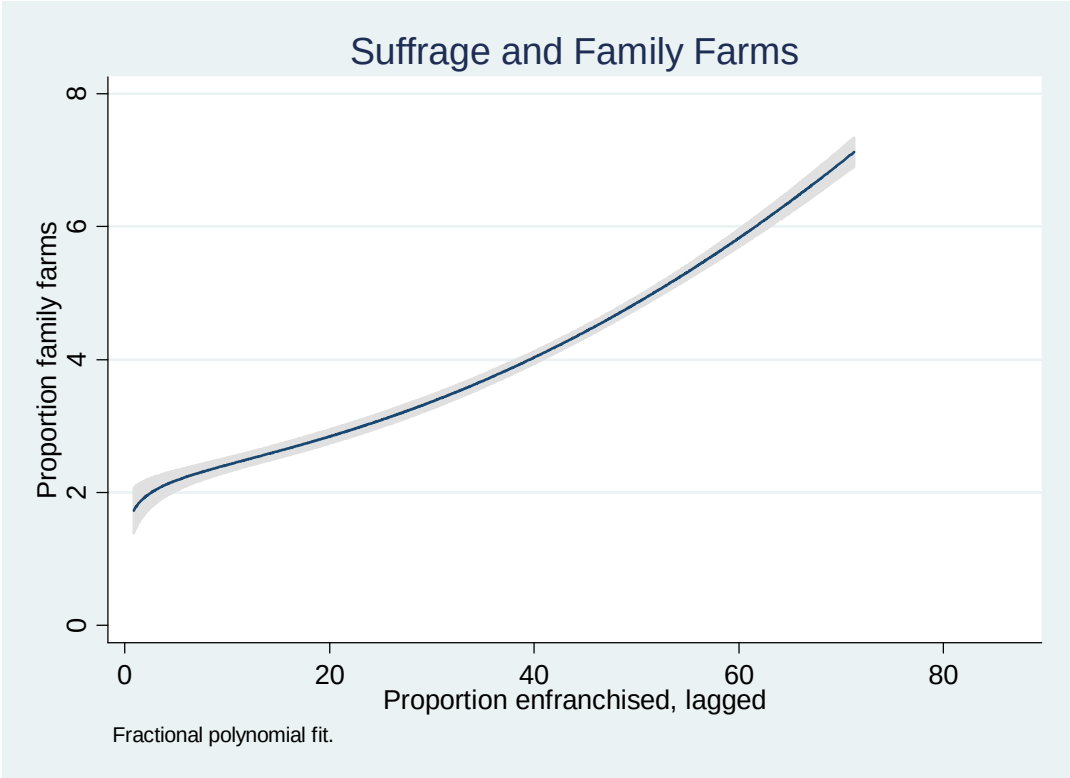

Figure 11

5.2.4 Barriers to technology

As Banerjee and Dufflo (2004: 29) observe, firms may not choose the latest technology either because governments do not protect investors too much or because they protect them too much. Parente and Prescott (2000) offered the classical argument to the effect that technology adoption can be slowed down by the resistance of workers it would displace. Comin and Hobjin (2004) argue that those who operate the extant technology resist innovations that would make it obsolete and show that technology adoption is faster in countries that have a formal political structure (chief executives with formal titles) and slower in countries that have effective legislatures. Other evidence is largely anecdotal but vivid (See several examples in Mokyr 1990).

5.2.5 Summary

These are just scattered illustrations, but the overall picture is manifest: various kinds of legally enabled forms of upward redistribution were abolished or mitigated as new groups became enfranchised. And since these mechanisms appear prima facie to have had nefarious consequences for development, growth accelerated. The effects of increasing

factor mobility, opening the access to professions and occupations, abolishing legally supported monopolies, opening access to credit and to new technologies must have contributed significantly to increase investment and productivity. Which of these reforms were a direct consequence of extended suffrage, however, remains not quite clear.

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7 Appendix: A Model

7.1 The Economy

Consider a growth model in which the agent with the median income among the enfranchised chooses the tax rate and the revenue is distributed equally among the enfranchised. Since the economy assumed here is standard, I use several results without proofs (see Benhabib and Przeworski 2006). Note only that the tax rate is assumed to be constant for any fixed s. My strategy is to solve for $\tau^M(s)$ and then study comparative statics with regard to s. Thus the model is not fully dynamic, in that changes of suffrage are not anticipated by the agents.

There are N agents indexed by i, ordered by their assets k^i that represent a combination of physical and human capital. These assets produce incomes according to

$$y_t = rk_t, r > 1. \tag{2}$$

S among the agents, those with k^i or y^i above some threshold, have the right to vote, so that the proportion of eligible voters in the population is $s = S/N$. When S agents have the right to vote, the post-redistribution income of an agent endowed with k^i is

$$y_t^i = (1-\tau)rk_t^i + \tau I_S^i \frac{1}{S}\sum_{i\in N} rk_t^i, \tag{3}$$

where I_S^i indicates whether agent i is a member of S. Since $\frac{1}{S}\sum_{i\in N} rk^i = \frac{N}{S}\frac{1}{N}\sum_{i\in N} rk^i = \frac{1}{s}rk_t$, where k_t is the average value of assets,

$$y_t^i = (1-\tau)rk_t^i + I_S^i \frac{\tau}{s} rk_t. \tag{4}$$

The utility function is

$$U(C_t) = \frac{C_t^{1-\sigma} - 1}{1-\sigma}. \tag{5}$$

The value of holding k^i at $t = 0$ is then

$$V^i(k_0^i) = \max_{\{c_t\}} \sum_{t=0} \beta^t \frac{(C_t^i)^{1-\sigma} - 1}{1-\sigma} \tag{6}$$

Now, it can be shown that this economy grows at the rate

$$\frac{C_{t+1}}{C_t} = (\beta r\,(1-\tau))^{\frac{1}{\sigma}}, \tag{7}$$

and that the propensity to consume out of wealth is

$$\lambda = 1 - \beta^{\frac{1}{\sigma}} r^{\frac{1-\sigma}{\sigma}} (1-\tau)^{\frac{1-\sigma}{\sigma}}, \tag{8}$$

the same for all agents. Each agent consumes a fraction λ of his net capital income $(1-\tau) rk_t^i$ plus the value of transfers that he receives, discounted at $r(1-\tau)$. Note that λ is the propensity to consume out of wealth because r is one plus the rate of return, net of depreciation. To bound λ away from zero, it must be true that $\tau < \overline{\tau}$, where $\overline{\tau}$ satisfies $\beta^{\frac{1}{\sigma}} r^{\frac{1-\sigma}{\sigma}} (1-\overline{\tau})^{\frac{1-\sigma}{\sigma}} = 1$.

Making all the substitutions, iterating backwards and solving for C_0^i yields

$$V(k_0^i) = \frac{1}{1-\sigma} \frac{\left(\lambda (1-\tau) rk_0^i + I_s^\tau rk_0\right)^{1-\sigma}}{\lambda} - \frac{1}{(1-\sigma)(1-\beta)} \tag{9}$$

7.2 Optimal Rate of Redistribution

Now, since all incomes grow at the same rate, for any fixed s the same agent has at all times the median income among agents who have suffrage. As s increases, however, the ratio of the endowment of the voter who is median in S to the average income, denoted by $\triangle^M(s) \equiv \frac{k_0^{M \in S}}{k_0}$, declines.

Let $M \in S$ be the agent with the median income among the S enfranchised agents. The first order condition $\partial V(k_0^M)/\partial \tau|_s = 0$ implies

$$\frac{1-\lambda(\tau^M)}{\lambda(\tau^M)} \frac{\tau^M}{1-\tau^M} = \sigma(1 - s\triangle^M(s)). \tag{10}$$

This expression implicitly determines the optimal tax rate, $\tau^*(s)$, of the median voter in S. The second order condition is satisfied as long as $\sigma \gtrapprox 0.5$, which is assumed throughout.

The function $\tau^*(s)$ is described by the following proposition.

Proposition 1 *As s increases from 0, the tax rate $\tau^*(s)$ declines, reaches a minimum at $s = -\frac{\triangle^M(s)}{d\triangle^M(s)/ds}$, and then increases.*

Proof. To study $\frac{d\tau^*}{ds}$, note that
$\frac{d}{ds}\frac{\partial V(\tau,s)}{\partial \tau} = \frac{d\tau}{d\tau}\frac{d}{ds}\frac{\partial V(\tau,s)}{\partial \tau} = \frac{\partial^2 V(\tau,s)}{\partial \tau^2}\frac{d\tau}{ds}$.
Now, tedious algebra shows that
$\frac{d}{ds}\frac{\partial V(\tau,s)}{\partial \tau} = \frac{d\tau}{ds} f(\tau,\sigma) - \frac{d}{ds}\sigma(1 - s\triangle^M(s))$, where $f(\tau,\sigma) > 0$ for all values of σ that satisfy the second-order condition.

Hence,

$\frac{d\tau}{ds}[f(\tau,\sigma) - \frac{\partial^2 V(\tau,s)}{\partial \tau^2}] = \frac{d}{ds}\sigma(1 - s\triangle^M(s))$.

By second-order condition, the term in the square bracket is positive. In turn,

$\frac{d}{ds}\sigma(1 - s\triangle^M(s)) = -\sigma(\triangle^M(s) + s\frac{d\triangle^M(s)}{ds})$, where $\frac{d\triangle^M(s)}{ds} < 0$.

so that

$\frac{d\tau}{ds}[f(\tau,\sigma) - \frac{\partial^2 V(\tau,s)}{\partial \tau^2}] = -\sigma(\triangle^M(s) + s\frac{d\triangle^M(s)}{ds})$,

which implies that $\frac{d\tau}{ds} \lesseqqgtr 0$ as $\triangle^M(s) + s\frac{d\triangle^M(s)}{ds} \gtreqqless 0$.

In turn, $\triangle^M(s) + s\frac{d\triangle^M(s)}{ds} \gtreqqless 0$ as $s \lesseqqgtr -\frac{\triangle^M(s)}{d\triangle^M(s)/ds}$. Hence, $\frac{d\tau}{ds} < 0$ when s is low, $\frac{d\tau}{ds} = 0$ at $s = -\frac{\triangle^M(s)}{d\triangle^M(s)/ds}$, and $\frac{d\tau}{ds} > 0$ when s is higher. ■

Remark 1 *Note that nothing guarantees that* $\triangle^M(s) + s\frac{d\triangle^M(s)}{ds} = 0$ *when* $s \in (0,1)$. *For example, for a Pareto distribution,* $F(k^i) = 1 - (\frac{c}{k^i})^\alpha$, $\triangle^M(s) + s\frac{d\triangle^M(s)}{ds} = \left(\frac{\alpha-1}{\alpha}\right)^2 2^{1/\alpha} s^{-1/\alpha} > 0$ *for all* s. *Since the cdf of lognormal cannot be expressed in terms of elementary functions, I could not determine what would happen in this case.*

The value of the term $s\triangle^M(s)$ depends on the distribution of income. To determine the value of the ratio $\triangle^M(s)$, note first that for any distribution the percentile of the median value of assets among the enfranchised is

$$F(\triangle^M(s)) = 1 - \frac{1}{2}s. \tag{11}$$

Assume that the distribution of assets is exponential, with the cdf given by

$$F(\triangle^i) = 1 - p\exp(-\triangle^i), \tag{12}$$

where $\triangle^i \equiv \frac{k_0^i}{k_0}$. $F(0) = 1 - p$ is then the proportion of agents without any assets, and p is the proportion with.

Substituting $\triangle^M$ in (11), equalizing (10) and (11), and solving for $\triangle^M(s)$ yields

$$\triangle^M(s) = \log 2 + \log p - \log s. \tag{13}$$

We can now prove something that may be obvious:

Proposition 2 *If the distribution of assets is exponential, the optimal tax rate reaches the minimum when the median income among the enfranchised equals the average income in the population.*

Proof. The median value of assets among the enfranchised equals the average in the population when $\triangle(s) = \log 2 + \log p - \log s = 1$, or $s = \frac{2}{e}p$. Now, by Proposition 1, $d\tau^*/ds = 0$ when $\triangle(s) + s\frac{d\triangle(s)}{ds} = 0$, which implies under exponential distribution that $\log 2 + \log p - \log s - 1 = 0$, which is the same. ■

7.3 Suffrage and Welfare

The value function of agent with $\triangle^i$ when s agents are enfranchised is given by:

Proposition 3 *An agent with $\triangle^i$ is enfranchised when $s = 1 - F(\triangle^i) \equiv s^i$. Hence, when the distribution of income is exponential, an agent who is enfranchised at s^i has $\triangle^i = -\log s^i$.*

If i is enfranchised before the median among the enfranchised is poorer than the average agent, $s^i < \frac{2}{e}$, or $\triangle^i > 1 - \log 2$, the value function $V^i(\tau^*(s))$ changes according to the following pattern:

dV/ds	if	Comments
$\frac{d\tau}{ds}(-\triangle^i) > 0$	$s < s^i$	
$\frac{d\tau}{ds}\|_{s^i}(-\triangle^i) + \frac{\tau(s)}{s}\|_{s^i} > 0$	$s = s^i$	$\triangle^i = -\log s^i$
$\frac{d\tau}{ds}(-\triangle^i + \triangle^M(s)) - \frac{\tau(s)}{s^2} < 0$	$s^i < s < 2s^i$	$\triangle^i < \triangle^M(s)$
$-\frac{\tau(s)}{s^2}\|_{2s^i} < 0$	$s = 2s^i$	$\triangle^i = \triangle^M(s)$
$\frac{d\tau}{ds}(-\triangle^i + \triangle^M(s)) - \frac{\tau(s)}{s^2} < 0?$	$2s^i < s < \frac{2}{e}$	$\triangle^i > \triangle^M(s)$
$-\frac{\tau(s)}{s^2}\|_{s=\frac{2}{e}} < 0$	$s = \frac{2}{e}$	$\triangle^M(s) = 1$
$\frac{d\tau}{ds}(-\triangle^i + \triangle^M(s)) - \frac{\tau(s)}{s^2} < 0$	$\frac{2}{e} < s \leq 1$	$\triangle^i > \triangle^M(s)$

If i is enfranchised when the median among the enfranchised is poorer than the average agent, $s^i > \frac{2}{e}$ and $\triangle^i < 1 - \log 2$, the value function $V^i(\tau^*(s))$ follows:

dV/ds	if	Comments
$\frac{d\tau}{ds}(-\triangle^i) > 0$	$s < s^i$	
0	$s = \frac{2}{e}$	$\triangle^M(s) = 1$
$\frac{d\tau}{ds}(-\triangle^i) < 0$	$s < s^i$	
$\frac{d\tau}{ds}\|_{s^i}(-\triangle^i) + \frac{\tau(s)}{s}\|_{s^i} > 0?$	$\frac{2}{e} < s = s^i$	$\triangle^i = -\log s^i$
$\frac{d\tau}{ds}(-\triangle^i + \triangle^M(s)) - \frac{\tau(s)}{s^2} < 0?$	$\frac{2}{e} < s^i < s \leq 1$	$\triangle^i < \triangle^M(s)$

Proof. After some algebra, it can be shown that at the maximum at which $\tau = \tau^*(s)$,

$$\frac{dV(\tau^*(s))}{ds} = \frac{rk_0}{\lambda}\{\frac{d\tau}{ds}(-\triangle_0^i) + I_S^i[\frac{d\tau}{ds}\triangle^M(s)) - \frac{\tau}{s^2}]\}, \tag{14}$$

where $\triangle_0^i = k_0^i/k_0$.

The rest follows from Proposition 2. ■

Remark 2 *The term $\frac{d\tau}{ds}(-\triangle_0^i)$ is the loss or gain, depending on the sign of $\frac{d\tau}{ds}$, from the tax bill $(1-\tau)\triangle_0^i$: $\frac{d}{ds}(1-\tau)\triangle_0^i = -\frac{d\tau}{ds}\triangle_0^i$. The term multiplying I, in turn, is the loss or gain resulting from the change of the value of transfers. These transfers are $\frac{\tau}{s}$, so that $\frac{d}{ds}\frac{\tau}{s} = \frac{1}{s}\frac{d\tau}{ds} - \frac{\tau}{s^2}$. But $\frac{1}{s} = -\frac{d\triangle^M(s)}{ds}ds = -\frac{d}{ds}(\log 2 - \log s)$, so that $\triangle^M(s) = -\int \frac{1}{s}ds = -\log s + \log 2$. Hence, the term $\frac{d\tau}{ds}\triangle^M(s)$ should be interpreted as $-\frac{d\tau}{ds}\int \frac{1}{s}ds$: it is the part of the loss(gain) of transfers due to transfers changing as a result of changing s, while the part $-\frac{\tau}{s^2}$ is the part due to fixed s.*

Hence, for $i \in S$,

$$\frac{dV^*}{ds} = \frac{rk_0}{\lambda}[\frac{d\tau}{ds}(-\triangle_0^i + \triangle^M(s)) - \frac{\tau}{s^2}],$$

and for $i \in N - S$,

$$\frac{dV^*}{ds} = \frac{rk_0}{\lambda}\frac{d\tau}{ds}\left[-\triangle_0^i\right]$$

There are some situations in which the sign of dV/ds is ambiguous:

(1) As long as the agent who entered at $s = s^i$ is wealthier than the median in S, who is in turn still wealthier than the average in the population, the term $(-\triangle^i + \triangle^M(s))$ is negative and since $d\tau/ds < 0$, the entire first term is positive. Yet for $\triangle_0^i \approx \triangle^M(s)$, this term is close to 0. In turn, in the vicinity of $\triangle^M(s) = 1$, $d\tau/ds \approx 0$. I cannot prove that $dV/ds < 0$ in the entire interval $2s^i < s < 2/e$. All numerical simulations (see below), however, indicate that it is.

(2) A similar situation occurs with agents who are poorer than the average. If their $\triangle_0^i \approx 1$, they enter when $d\tau/ds \approx 0$, so that $dV/ds > 0$. If they are very poor and enter right before $s^i = 1$, their $\triangle_0^i \approx 0$ and again they get a boost from being enfranchised. I cannot prove again what happens in the interval $1 > \triangle_0^i > 0$, but numerical example indicate again that enfranchisement increases the value of these agents. Finally, the same applies to the interval $\frac{2}{e} < s^i < s \leq 1$, but simulations show that the slope of $dV/ds < 0$.