The Form of Property Rights: Oligarchic vs. Democratic Societies*

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Abstract

This paper develops a model where there is a trade-off in the form of property rights enforcement. A society can either be "oligarchic" with political power in the hands of major producers, or it can be "democratic," with political power more widely diffused. An oligarchic society protects the property rights of the major producers, but also tends to pursue other distortionary policies favorable to this group, such as erecting significant entry barriers. Democracy, on the other hand, imposes redistributive taxes on the producers, but tends to avoid entry barriers. When taxes in democracy are high and the distortions caused by entry barriers are low, an oligarchic society achieves greater efficiency. However, even in this case, the inefficiency created by the entry barriers gets worse over time, as comparative advantage in entrepreneurship shifts away from the incumbents. The typical pattern is therefore one of the rise and decline of oligarchic societies: of two identical societies, the one with an oligarchic organization will first become richer, but then in time fall behind the democratic society. I also discuss how democratic societies may be better able to take advantage of new technologies, and how the unequal distribution of income in an oligarchic society supports the oligarchic institutions and may keep them in place even when they become significantly costly to society, thus creating path dependence in the process of development.

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1 Introduction

There is now a growing consensus that only societies that possess institutions protecting the property rights of producers generate sufficient investment in physical and human capital and in new technologies, and attain long-run economic growth.[1] There is no agreement, however, on what constitutes "protecting the property rights of producers". There is also little analysis of the trade-offs introduced by various different "forms of property rights". One possibility is an *oligarchic* society where political power is in the hands of the economic elite, for example, the major producers/investors in the economy. This type of organization will ensure that the major producers do not fear expropriation or high rates of taxation. But power in the hands of the major producers (the current elite) will typically enable them to create a non-level playing field and a monopoly position for themselves, thus effectively violating the property rights of future potential producers. The alternative is a *democratic* society where political power is more equally distributed, thus effectively in the hands of poorer agents who can use their power to tax the producers' profits. But in return, current producers will be unable to create significant entry barriers against entrants, thus ensuring better property rights for future potential producers.[2]

Many accounts of successes or failures in economic development take a position on whether protecting the property rights of current producers at the cost of creating a monopoly position for them is good for economic growth. The classic by North and Thomas forcefully articulates the view that monopoly arrangements are the most important barrier to growth, and cite "the elimination of many of the remnants of feudal servitude,..., the joint stock company, replacing the old regulated company" and "the decay of industrial regulation and the declining power of guilds..." as key foundations for the Industrial Revolution in Britain (1973, p. 155). This point of view is also developed in Parente and Prescott (1999), Djankov, La Porta, Lopez-de-Silanes and Shleifer (2002), and in the recent book by Rajan and Zingales, where they emphasize the threat to successful capitalism from the "incumbents, those who already have an established position in the marketplace and would prefer to see it remain exclusive." (2003, p. 18). These

[1] See, among others, the general discussions in North (1981), Olson (1982), and Jones (1981), and the empirical evidence in De Long and Shleifer (1993), Knack and Keefer (1995), Barro (1999), Hall and Jones (1999), and Acemoglu, Johnson and Robinson (2001, 2002).

[2] Naturally, in certain societies a highly predatory state, such as in Zaire under Mobutu, may violate the property rights of both current and future producers. The focus here is not these cases, but the trade-offs involved in protecting the property rights of certain producers. Nevertheless, a full taxonomy of regimes would have to distinguish predatory regimes from oligarchic and democratic regimes.

arguments ignore an important part of the trade-off, however. To ensure that incumbent producers do not gain a monopoly position there need to be limits on their political power. But without their political power to protect them, the rest of the society can impose relatively high levels of redistributive taxes on these producers.

A different view emphasizes the importance of protecting the property rights of the elites and major producers. Barro, for example, points out the potential economic costs of a democratic regime as "...the tendency to enact rich-to-poor redistribution of income (including land reforms) in systems of majority voting and the possibly enhanced role of interest groups in systems with representative legislatures." (1999, p. 49). The view that oligarchic societies can grow rapidly also receives support from a large literature documenting how successful growth in Japan, South Korea, Singapore and Taiwan relied on the state pursuing policies protecting the interests of powerful incumbent producers (e.g., Amsden, 1989, Wade, 1990, Evans, 1995, and Kang, 2002).

This paper constructs a simple model to analyze the trade-off between oligarchic and democratic societies, or in other words, the trade-off between the property rights of current producers and those of future potential producers. In the model, agents with heterogeneous productivity decide between entrepreneurship and employment as workers. Entrepreneurs hire workers and undertake investments. There are two potential distortions. First, entrepreneurial income can be taxed and redistributed to the rest of the society; taxes discourage investment and reduce aggregate income. Second, incumbent entrepreneurs can erect barriers to prevent entry and depress wages; entry barriers reduce aggregate income by preventing the entry of more productive agents into entrepreneurship. These entry barriers may take the form of direct regulation, or policies that reduce the costs of inputs, especially of capital, for the incumbents, while raising them for potential rivals.[3]

The trade-off between these two different types of distortions determines whether

[3] Cheap loans and subsidies to the chaebol appear to have been a major entry barrier for other firms in South Korea (see, for example, Kang, 2002). See also La Porta, Lopez-de-Silanes and Shleifer (2003) on the implications of government ownership of banks, which often enables incumbents to receive subsidized credit, thus creating entry barriers for potential entrants.

An interesting case in this context is Mexico at the end of the nineteenth century, where the rich elite controlled a highly concentrated banking system, protected by entry barriers, and the lack of loans for new entrants implied by this banking system enabled this rich elite to maintain a monopoly position in other sectors. The simultaneous development of the financial markets in the United States, which is closer to the ideal-type democratic regime here, contrasts starkly with the situation in Mexico. See Haber (1991).

an oligarchic or a democratic society is more efficient and generates greater aggregate output. An oligarchic society avoids the distortionary effects of taxing the producers, but has a tendency to introduce significant entry barriers distorting the (future) allocation of resources. Democratic societies impose higher redistribution taxes, but since poorer segments of the society have less to gain from entry barriers, they tend to create a more level playing field.[4] When the taxes that a democratic society will impose are high and the distortions caused by entry barriers are low, an oligarchic society achieves greater efficiency and generates higher output; when democratic taxes are relatively low and entry barriers create significant misallocation of resources, a democratic society achieves greater aggregate output. In addition, a democratic society always generates a more equal distribution of income than an oligarchic society; a democratic society redistributes income from entrepreneurs to workers, while an oligarchic society adopts policies that increase the profits of incumbents.

More interesting, however, is that the trade-off between these two types of political regimes is not constant over time. Initially, entrepreneurs will tend to be those with greater productivity, so an oligarchic society generates only limited distortions. However, as long as comparative advantage in entrepreneurship varies over time, it will eventually shift away from the incumbents, and the entry barriers erected by an oligarchic society will become progressively more costly to efficiency. The typical pattern is therefore one where, of two identical societies, the one with an oligarchic organization will first become richer, but then over time become poorer than the democratic society.

I also show that democratic societies are typically better able to take advantage of new investment opportunities or the introduction of new technologies than oligarchic societies. This is because democracy allows agents with comparative advantage in new technology to enter entrepreneurship, while oligarchy typically blocks their entry.

The above discussion takes the political regime and the distribution of political power (i.e., whether the society is oligarchic or democratic) as given. A major area of research in political economy is to endogenize the political institutions of societies. When should we expect a society to become oligarchic and remain so even when this becomes increasingly costly? I analyze this question by embedding the basic setup into a model of regime change whereby groups with greater economic power are also more likely to prevail politically.

[4] This argument does not deny the presence of entry barriers in democratic societies, for example in much of Western Europe, but suggests that the role of entry barriers in these instances may be to create rents to a specific group of workers rather than protecting incumbent firms.

An interesting implication of this setup is that as a particular group in society becomes substantially richer in a given political regime, it may be able to successfully sustain the existing political regime and protect its privileged position. In the current model, in oligarchy incumbents have the political power to erect entry barriers, which increase their profits, and the increase in their political power due to these profits make a switch from oligarchy to democracy more difficult, even when the oligarchic entry barriers become progressively more costly to society. In this context, I also discuss how an economic crisis or a large shock that reduces the economic power of the elite may facilitate reform. This provides a potential explanation for why significant economic reforms and political change often occur amidst economic crises (see, for example, Haggard and Kauffman, 1995).

Although the model economy analyzed in this paper is highly abstract, it may nevertheless shed some light on a number of interesting questions. These include: how do certain oligarchic and highly centralized societies grow rapidly, as in the examples of Japan, Singapore, South Korea and Taiwan discussed above? Relatedly, why, in the postwar period, don't democratic countries grow on average faster than dictatorships despite the well-documented presence of disastrous dictatorships with very weak record of property rights enforcement (e.g., Barro, 1999)? And more broadly, what drives the rise and decline of nations?

Even though many factors need to be considered to construct satisfactory answers to each of these questions, the issues emphasized in this paper may also be important. As emphasized by Amsden (1989), Wade (1990), Evans (1995), and Ramseyer and Rosenbluth (1995), in Japan, Singapore, South Korea and Taiwan during the postwar period as well as in pre-war Japan, growth was driven by rapid capital accumulation and technology adoption in an environment in which major investors and producers had secure property rights and protected internal markets. This environment was supported by close links between these major firms and the state, and effectively by the considerable political power that these firms wielded (see, e.g., Evans, 1995, Kang, 2002). In contrast, a number of more democratic societies such as India or Jamaica created less favorable environments for businesses. However, in Japan and South Korea, and probably in Singapore, this rapid growth came with an inability to generate much entry from new firms, and led to severe slowdowns. Similarly, a number of Latin American countries, most notably Brazil, were able to grow under highly oligarchic regimes, but were unable to continue these initial bursts of growth.

Turning to the rise and decline of nations, a common conjecture is that successes of these societies also lay the seeds of their future failures (e.g., Kennedy, 1987, Olson, 1982). But the mechanism is not always clear. The analysis in this paper suggests a specific mechanism: early success might often come from providing security to the major producers, who then become sufficiently powerful to prevent entry by new groups. To illustrate this possibility, consider the case of the Caribbean plantation economies of the 17th and 18th centuries. These were highly dictatorial regimes with the plantation owners controlling both the economy and politics, preventing entry from any other businesses and pushing down wages by coercion (in fact, in its most extreme form, slavery, see, for example, Dunn, 1972). Nevertheless, these were highly prosperous societies, richer and more productive than the United States at the time. They were able to achieve these levels of productivity because the planters had every incentive to invest in the production and export of sugar. But the Caribbean economies lagged behind the United States and many other more democratic societies in the 19th century when the world presented new investment opportunities, especially in industry and commerce (e.g., Acemoglu, Johnson and Robinson, 2002, Coatsworth, 1993, Eltis, 1995, Engerman, 1981, and Engerman and Sokoloff, 1997). While new entrepreneurs invested in industry in the United States and parts of Western Europe, power in the Caribbean remained in the hands of the planters, and they had no interest in encouraging entry by new groups (see Acemoglu, Johnson and Robinson, 2002, for a further discussion on this issue).

The current paper is related to a number of studies in economics and political science. How redistribution in democratic regimes may distort investment decisions is analyzed in Romer (1975), Roberts (1977), Meltzer and Richard (1981), Persson and Tabellini (1994), and Alesina and Rodrik (1994), while Benabou (2000) shows that under certain circumstances democracies may not generate enough redistribution. More closely related are studies that emphasize the costs of existing powerful groups blocking the introduction of new technologies, the entry of new entrepreneurs or economic reform, for example, Kuznets (1968), Olson (1982), Krusell and Rios-Rull (1994), Parente and Prescott (1999), Acemoglu and Robinson (2001, 2002). In this context, the emphasis in Rajan and Zingales (2003) on the incentives of incumbents to create barriers to protect their privileged position is most closely related, though their focus is on financial markets, and they do not present a formal model or analyze the trade-off between these distortions and the underinvestment that results in more democratic regimes because of taxes imposed on the entrepreneurs.

The paper by Acemoglu, Aghion and Zilibotti (2003) is also closely related, since it develops a theory where protecting existing producers at the early stages of development is beneficial because it relaxes potential credit constraints, but it becomes progressively more costly as the economy approaches the world technology frontier and selecting the right entrepreneurs becomes more important. Furthermore, it shows how an economy that starts with a high level of protection for existing producers may get stuck in a "non-convergence trap" and discusses the political economy of these traps. That paper also provides some empirical evidence that economies with high levels of entry and international trade restrictions suffer severe growth slowdowns as they approach the world technology frontier. In addition, as in Acemoglu, Aghion and Zilibotti (2003) and in Brezis, Krugman and Tsiddon (1994), the current paper features a potential for leapfrogging—that is, countries that were initially successful falling relatively behind. The possibility of leapfrogging arises because an oligarchic society at first generates greater investment, but as existing elites prevent entry from more productive entrepreneurs, it may lag behind a more democratic society.

The rest of the paper is organized as follows. Next section describes the economic environment, and characterizes the equilibrium for a given sequence of policies. Section 3 analyzes the political equilibrium in a democratic and an elite-controlled society and compares the outcomes. Section 4 models the endogenous changes in regime from oligarchy to democracy. Section 5 concludes.

2 The Model

2.1 The Environment

I consider a non-overlapping generations economy consisting of a continuum 1 of dynasties. There is a unique final good which can be used for consumption or for bequest. Each agent has a single offspring, and is imperfectly altruistic with the utility function:

$$(1-\beta)^{-(1-\beta)}\beta^{-\beta}\left(c_t^j\right)^{1-\beta}\left(b_{t+1}^j\right)^{\beta}, \tag{1}$$

where c_t^j is the consumption of agent j at time t and b_{t+1}^j is the bequest he leaves to his offspring.

This utility function is convenient since it implies a constant savings rule for each agent of the form:

$$b^j_{t+1} = \beta y^j_t, \tag{2}$$

where y^j_t is the income of the agent at time t. It also implies that the indirect utility function of agent j at time t is simply given by his income, y^j_t.

I assume that each dynasty disappears (dies) with a small probability ε in every period, and a mass ε of new dynasties are born. I will consider the limit of this economy with $\varepsilon \to 0$. The only reason for introducing the possibility of death is to avoid the case where the supply of labor is exactly equal to the demand for labor for a range of wage rates, which can otherwise arise in some type of equilibrium. In other words, in the economy with $\varepsilon = 0$, there may also exist other equilibria, and in this case, the limit $\varepsilon \to 0$ picks a specific one from the set of equilibria.

The key distinction in this economy is between workers on the one hand and capitalists/entrepreneurs on the other. Each agent can either be employed as a worker or set up a firm to become an entrepreneur.[5] While all agents have the same productivity as workers, their productivity in entrepreneurship differs. In particular, agent j at time t has entrepreneurial talent $a^j_t \in \{A^L, A^H\}$ with $A^L < A^H$. To become an entrepreneur, an agent needs to set up a firm, or alternatively, he could inherit the firm that his father has set up. Setting up a new firm is not technologically costly, but existing entrepreneurs can create entry barriers against the creation of new firms.

Each agent therefore starts period t with a level of bequest (income), b^j_t, entrepreneurial talent $a^j_t \in \{A^H, A^L\}$, and $s^j_t \in \{0, 1\}$ which denotes whether the individual has inherited a firm. I will also refer to an agent with $s^j_t = 1$ as a member of the "elite," since he will have an advantage in becoming an entrepreneur (when there are entry barriers), and in an oligarchic society, he may be politically more influential than other agents in the economy.

Within each period, each agent takes the following decisions: a consumption decision denoted by c^j_t, a bequest decision denoted by b^j_{t+1}, and an occupation choice decision, $i^j_t \in \{0, 1\}$. In addition if $i^j_t = 1$, i.e., if the agent sets up a firm, then he also makes investment, employment, and hiding decisions, e^j_t, l^j_t and z^j_t, where z^j_t denotes whether he decides to hide his output in order to avoid taxation.

Finally, agents contribute to the policy choices. How the preferences of various agents are mapped into policy choices will differ depending on the political regime, which will

[5] See, for example, Banerjee and Newman (1993) for a model of occupational choice of this type.

be discussed in detail below. For now I note that there will be three policy choices: a tax rate τ_t on firms, lump-sum transfers to all agents denoted by T_t, and a cost K_t to set up a new firm. To highlight that the role of entry barriers is not to redistribute income, I assume that K_t is pure waste, and does not generate any tax revenue, thus the lump-sum transfers come only from taxes on entrepreneurial incomes.

An entrepreneur with talent a_t^j can produce the final good with the production function:

$$\frac{1}{1-\alpha}(a_t^j)^\alpha(e_t^j)^{1-\alpha}(l_t^j)^\alpha,$$

where l_t^j is the amount of labor hired by the entrepreneur and $e_t^j \geq 0$ is investment. The cost of investment is also e_t^j. Furthermore, I assume that there is a maximum scale, λ, beyond which the firm cannot operate, so $l_t^j \in [0, \lambda]$. I also assume that the entrepreneur himself can work in his firm as one of the workers, which implies that the opportunity cost of becoming an entrepreneur is 0.

Operating a firm requires a fixed cost, K', and to simplify the expressions below, I write $K' \equiv \kappa\lambda$ (this is a flow cost that a firm incurs every period of operation, as opposed to the cost K_t incurred for entry). Throughout, I assume that both the cost of investment and the cost of operating the firm are non-pecuniary so that agents do not run into credit constraints.

The proceeding description implies that the profit function of an entrepreneur given a tax rate τ_t and a wage rate $w_t \geq 0$ is:

$$\pi\left(\tau_t, l_t^j, e_t^j, a_t^j, w_t\right) = \frac{1-\tau_t}{1-\alpha}(a_t^j)^\alpha(e_t^j)^{1-\alpha}(l_t^j)^\alpha - w_t l_t^j - e_t^j - \kappa\lambda, \tag{3}$$

as long as the entrepreneur does not hide his output, i.e., $z_t^j = 0$. Instead if he hides his output, i.e., $z_t^j = 1$, he obtains:

$$\tilde{\pi}\left(\tau_t, l_t^j, e_t^j, a_t^j, w_t\right) = \frac{1-\delta}{1-\alpha}(a_t^j)^\alpha(e_t^j)^{1-\alpha}(l_t^j)^\alpha - w_t l_t^j - e_t^j - \kappa\lambda.$$

In this case, the entrepreneur avoids the tax by hiding his output, but as a result loses a fraction $\delta < 1$ of his revenues. The comparison of these two expressions immediately implies that if $\tau_t > \delta$, all entrepreneurs will hide their output, and there will be no tax revenue. Therefore, in the remainder, I will limit my attention to

$$\tau_t \leq \delta,$$

and often omit the hiding decisions.

In addition, labor market clearing requires the total demand for labor not to exceed the supply. Since entrepreneurs also work as workers, the supply is equal to 1. I impose:

$$\int_0^1 i_t^j l_t^j dj = \int_{j \in I_t} l_t^j dj \leq 1, \tag{4}$$

where I_t is the set of entrepreneurs at time t.

It is also useful at this point to specify the law of motion of the vector $\left(b_t^j, s_t^j, a_t^j\right)$ which determines the "type" of agent j at time t (in fact, what is important for the purposes here is the subvector $\left(s_t^j, a_t^j\right)$).[6] As already noted, bequests are given by equation (2). The transition rule for s_t^j is straightforward: if agent j at time t sets up a firm, then his offspring inherits a firm at time $t+1$, so

$$s_{t+1}^j = i_t^j, \tag{5}$$

with $s_0^j = 0$ for all j, and also $s_t^j = 0$ if the dynasty j is born at time t. Finally, I assume that there is imperfect correlation between the entrepreneurial talents of different agents within a dynasty, and assume the following Markov structure:

$$a_{t+1}^j = \begin{cases} A^H & \text{with probability } \sigma_H & \text{if } a_t^j = A^H \\ A^H & \text{with probability } \sigma_L & \text{if } a_t^j = A^L \\ A^L & \text{with probability } 1-\sigma_H & \text{if } a_t^j = A^H \\ A^L & \text{with probability } 1-\sigma_L & \text{if } a_t^j = A^L \end{cases}, \tag{6}$$

where $\sigma_H,\ \sigma_L \in (0,1)$. Here σ_H is the probability that an agent has high productivity in entrepreneurship conditional on his father having high productivity, and σ_L is the probability when his father is low productivity. It is natural to suppose that $\sigma_H \geq \sigma_L$, so that an individual is more likely to be high productivity if his parent is so, though this is not necessary for the formal analysis. What is important for the results is the imperfect correlation of entrepreneurial talent within a dynasty, since it implies that the identities of the entrepreneurs necessary to achieve productive efficiency change over time.

It can be verified easily that

$$M \equiv \frac{\sigma_L}{1-\sigma_H+\sigma_L}.$$

[6] Bequests are introduced to create a link between past profits and the incomes of current elites, which plays a role in Section 4. For most of the paper, there is no need to keep track of the distribution of bequests. It is also worth noting that the model could be set up with infinitely-lived agents, with little change in the results, though the analysis becomes somewhat more complicated, because agents would have to take into account the future implications of setting up a firm and becoming part of the elite. Since these issues are not central to the focus here, I opted for the non-overlapping generations setup.

is the fraction of agents with high productivity in the stationary distribution (i.e., $M(1-\sigma_H) = (1-M)\sigma_L$). Since there is a large number of agents, I appeal informally to the weak law of large numbers (ignoring complications related to the fact that there is a continuum of agents), which implies that the fraction of agents with high productivity at any point is M.

Throughout I assume that

$$M\lambda > 1,$$

so that, without entry barriers, high-productivity entrepreneurs generate more than sufficient demand to employ the entire labor supply. Moreover, I think of M as small and λ as large; in particular, I assume $\lambda > 2$, which will ensure that the workers are always in the majority and simplify the political economy discussion below.

In addition, recall that for agents with $s_t^j = 0$, setting up a new firm, i.e. $i_t^j = 1$, may entail an additional cost K_t because of entry barriers, and again for notational simplicity, I write $K_t \equiv k_t\lambda$. Then the net gain to becoming an entrepreneur for an agent of type $\left(s_t^j, a_t^j\right)$ as a function of entry barrier, k_t, the tax rate, τ_t, and the wage rate, w_t, is:

$$\Pi\left(k_t, \tau_t, w_t \mid s_t^j, a_t^j\right) = \max_{l_t^j, e_t^j} \pi\left(\tau_t, l_t^j, e_t^j, a_t^j, w_t\right) - (1-s_t^j)k_t\lambda$$

where the last term indicates that if the agent does not inherit the firm from his father, he will have to pay the additional cost imposed by entry barriers. Note that given the link between lump-sum transfers, T_t, and the tax rate τ_t through the government budget constraint, I summarized the policy choices at time t by the vector (k_t, τ_t). Notice also that Π is the *net gain* to becoming an entrepreneur, since the agent receives the wage rate w_t irrespective (either working for another entrepreneur when he is a worker, or working for himself—thus having to hire one less worker—when he is an entrepreneur). This feature implies that an agent will become an entrepreneur if $\Pi\left(k_t, \tau_t, w_t \mid s_t^j, a_t^j\right) > 0$ (and can become an entrepreneur only if $\Pi\left(k_t, \tau_t, w_t \mid s_t^j, a_t^j\right) \geq 0$).

Finally, the timing of events within every period is:

1. Entrepreneurial talents, $\left[a_t^j\right]$, are realized.

2. The entry barrier for new entrepreneurs k_t is set.

3. Agents make occupational choices, $\left[i_t^j\right]$.

4. Entrepreneurs make investment and employment decisions, $\left[e_t^j, l_t^j\right]$.

5. The labor market clearing wage rate, w_t, is determined.

6. The tax rate on entrepreneurs, τ_t, is set.

7. Entrepreneurs make hiding decisions, $\left[z_t^j\right]$.

8. Consumption and bequest decisions, $\left[c_t^j, b_{t+1}^j\right]$ are made.

Note that here I introduced the notation $\left[a_t^j\right]$ to describe the whole set $\left[a_t^j\right]_{j\in[0,1]}$, or more formally, the mapping $\mathbf{a}_t : [0,1] \to \left\{A^L, A^H\right\}$, which assigns a productivity level to each individual j, and similarly for $\left[i_t^j\right]$ etc.

Entry barriers and taxes will be set by different agents in different political regimes as will be specified below. Notice that taxes are set after the investment decisions, which can be motivated by potential commitment problems whereby entrepreneurs can be "held up" after they make their investments decisions. Once these investments are sunk and employment decisions are made, it is in the interest of the workers to tax entrepreneurial income and profits to transfer to themselves via lump-sum redistribution.[7]

2.2 Analysis

I start with the "economic equilibrium" which is the (subgame perfect) equilibrium of the economy described above given a policy sequence $\{k_t, \tau_t\}_{t=0,1,\ldots}$. To define this equilibrium more formally, let $x_t^j = \left(i_t^j, e_t^j, l_t^j, z_t^j, c_t^j, b_{t+1}^j\right)$ with $e_t^j = l_t^j = z_t^j = 0$ if $i_t^j = 0$ be the vector of choices of agent j at time t.

Definition (Economic Equilibrium) $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,\ldots}$ and a sequence of wage rates $\{\hat{w}_t\}_{t=0,1,\ldots}$ constitute an economic equilibrium if, given his type $\left(b_t^j, s_t^j, a_t^j\right)$, policies k_t, τ_t and the wage rate $\hat{w}_t$, $\hat{x}_t^j$ maximizes the utility of agent j, (1), and $\hat{w}_t$ clears the labor market, i.e., equation (4) holds. The type of each agent in the next period, $\left(b_{t+1}^j, s_{t+1}^j, a_{t+1}^j\right)$, is then given by the equations (2), (5) and (6) from the decisions $\left[x_t^j\right]$.

I now characterize this equilibrium. To simplify the analysis, I take $k_0 = 0$, so in the first period there are no entry barriers.

[7] The qualitative results are not affected if taxes are set before investment decisions, but the analysis is more involved, since voters now recognize the trade-off between redistribution and the disincentive effects of taxation, for example as in Romer (1975), Roberts (1977), and Meltzer and Richard (1981).

The fixed costs of operation and the constant returns to scale technology imply that all entrepreneurs will hire the maximum amount of labor. Thus

$$l_t^j = \lambda. \tag{7}$$

Given this, investments will be:

$$e_t^j = (1 - \tau_t)^{1/\alpha} a_t^j \lambda. \tag{8}$$

(Alternatively, (8) can be written as $e_t^j = (1 - \hat{\tau}_t)^{1/\alpha} a_t^j \lambda$ where $\hat{\tau}_t$ is the tax rate expected at the time of investment; in equilibrium, $\hat{\tau}_t = \tau_t$).

Now using the equilibrium factor demands, (7) and (8), the net gain to entrepreneurship as a function of entry barriers, taxes, equilibrium wages, the status s_t^j of the agent and entrepreneurial talent can be obtained as:

$$\Pi\left(k_t, , \tau_t, w_t \mid s_t^j, a_t^j\right) = \frac{\alpha}{1-\alpha}(1 - \tau_t)^{1/\alpha} a_t^j \lambda - w_t \lambda - \kappa \lambda - (1 - s_t^j) k_t \lambda. \tag{9}$$

Moreover, since $l_t^j = \lambda$ for all j, the labor market clearing condition (4) implies that $\int_{j \in I_t} \lambda dj = 1$, and the total mass of entrepreneurs at any time is:

$$\mathbf{i}_t \equiv \int_{j \in I_t} dj \leq 1/\lambda,$$

where, recall that, I_t is the set of entrepreneurs at time t.

Tax revenues at time t, and therefore from the government budget constraint the per capita lump-sum transfers, are given as:

$$T_t = \tau_t \frac{(1-\tau_t)}{1-\alpha}^{\frac{1-\alpha}{\alpha}} \lambda \sum_{j \in I_t} a_t^j, \tag{10}$$

Who will become an entrepreneur in this economy? Inspection of (9) immediately shows that $\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^H\right) \geq \Pi\left(k_t, \tau_t, w_t \mid \tilde{s}_t^j, \tilde{a}_t^j\right) \geq \Pi\left(k_t, \tau_t, w_t \mid s_t^j = 0, a_t^j = A^L\right)$ for any $\tilde{s}_t^j$ and $\tilde{a}_t^j$, with the first term always strictly greater than the third term. So agents with $a_t^j = A^L$ and $s_t^j = 0$ will choose $i_t^j = 0$, becoming workers. On the other hand, the occupational choice of agents with $a_t^j = A^L$ and $s_t^j = 1$ and of those with $a_t^j = A^H$ and $s_t^j = 0$ will depend on k_t.

We can then define two different types of equilibria:

1. *Entry equilibrium* where all entrepreneurs have $a_t^j = A^H$.

2. *Sclerotic equilibrium* where agents with $s_t^j = 1$ become entrepreneurs irrespective of their productivity.

An entry equilibrium will emerge only if $\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 0, a_t^j = A^H\right) \geq 0$, that is, only if

$$\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^H - \kappa - k_t \geq w_t$$

A sclerotic equilibrium will emerge, on the other hand, only if $\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^L\right) \geq 0$, i.e., only if

$$\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^L - \kappa \geq w_t$$

Comparing these expressions, we see that there will be an entry equilibrium only if

$$\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}\left(A^H - A^L\right) \geq k_t, \tag{11}$$

i.e., only if the net marginal product of labor of a high-productivity non-elite entrepreneur is greater than that of a low-productivity elite. Otherwise there will be a sclerotic equilibrium. Moreover, in an entry equilibrium, i.e., when (11) holds, we have

$$w_t^e = \max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^H - \kappa - k_t; 0\right\}. \tag{12}$$

This follows because, in equilibrium, $\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 0, a_t^j = A^H\right)$ must be equal to zero; if it were strictly positive, or in other words, if the wage were less than w_t^e, all agents with high productivity would enter entrepreneurship. And since $M\lambda > 1$ by assumption, there is "excess demand" for labor, and the wage will be equal to w_t^e. This argument also shows that $\mathbf{i}_t = 1/\lambda$.

Figure 1 illustrates the entry equilibrium diagrammatically by plotting labor demand and supply in this economy. Labor supply is constant at 1, while labor demand is decreasing as a function of the wage rate. This figure is drawn under the assumption that (11) holds, so that there exists an entry equilibrium. The first portion of the labor demand curve shows the demand of high-productivity elites, i.e., agents with $a_t^j = A^H$ and $s_t^j = 1$, and the second portion is for high-productivity non-elites, i.e., those with $a_t^j = A^H$ and $s_t^j = 0$. These two groups together demand $M\lambda > 1$ workers, ensuring that labor demand intersects labor supply at the wage given by (12).

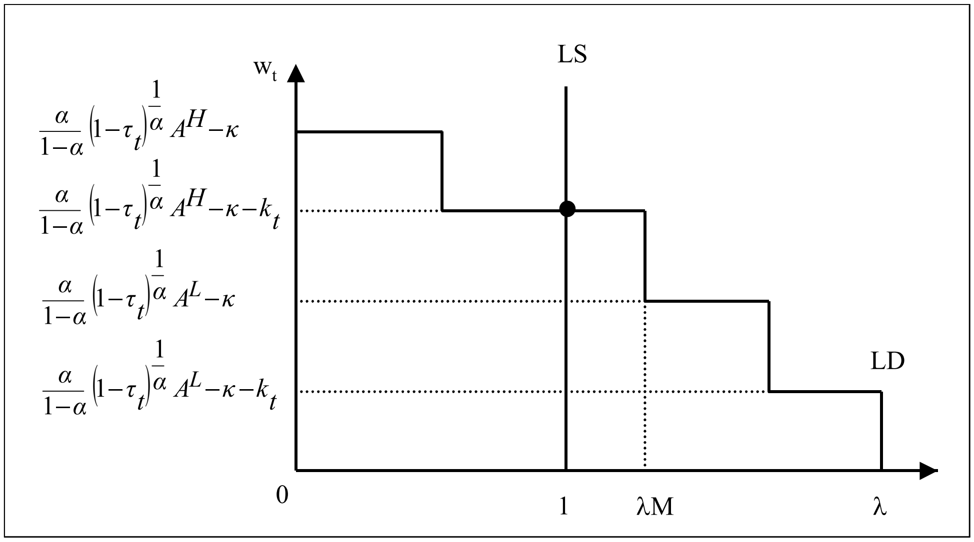

Figure 1: Labor supply and labor demand when (11) holds and there exists an entry equilibrium.

In a sclerotic equilibrium, on the other hand, low-productivity agents who inherited a firm from their parents will remain in entrepreneurship, i.e., $s_t^j = s_{t-1}^j$. If there were no deaths, i.e., with $\varepsilon = 0$, we would have $\mathbf{i}_t = 1/\lambda$ and for a range of wages, in particular, for $w_t \in \left[\max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - \kappa - k_t; 0\right\}, \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^L - \kappa\right]$, labor demand would exactly equal to labor supply ($1/\lambda$ agents demanding exactly λ workers each, and a total supply of 1). Hence, there can be multiple equilibrium wages. In contrast, when $\varepsilon > 0$, the measure of entrepreneurs who could pay a wage of $\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^L - \kappa$ is $\mathbf{i}_t = (1-\varepsilon)\,\mathbf{i}_{t-1}/\lambda < 1/\lambda$ for all $t > 0$, thus there would be excess supply of labor at this wage, or at any wage above the lower support of the above range. This implies that the equilibrium wage would be equal to this lower support, $\max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - \kappa - k_t; 0\right\}$, which is identical to (12). Since at this wage, agents with $a_t^j = A^H$ and $s_t^j = 0$ are indifferent between entrepreneurship and working, I assume, without loss of any generality, that a sufficient number of them do, and $\mathbf{i}_t = 1/\lambda$. In addition, throughout, I focus on the limiting case of this economy where $\varepsilon \to 0$ (but also give the relevant expressions for the case where $\varepsilon > 0$).

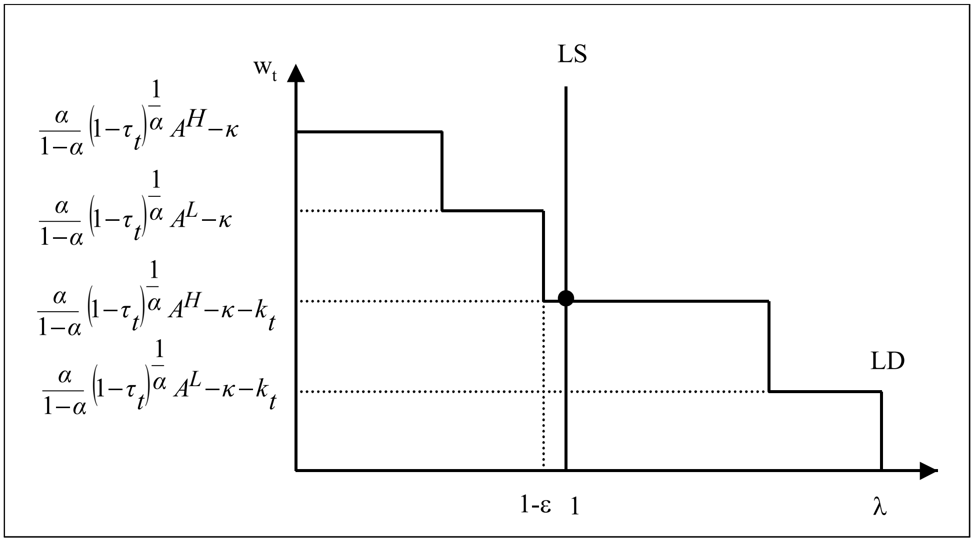

Figure 2: Labor supply and labor demand when (11) does not hold and there exists a sclerotic equilibrium.

Figure 2 illustrates this case diagrammatically. Now because (11) does not hold, the second portion of the labor demand curve is for low-productivity elites, i.e., agents with $a_t^j = A^L$ and $s_t^j = 1$, who, given the entry barriers, have a higher marginal product of labor than high-productivity non-elites. If $\varepsilon = 0$, the labor demand from these two groups would equal exactly 1, and coincide with labor supply. $\varepsilon > 0$ ensures that it falls short of 1, so that the intersection takes place at $\max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - \kappa - k_t; 0\right\}$. $\varepsilon \to 0$ then picks $\max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - \kappa - k_t; 0\right\}$ as the equilibrium wage even when labor supply coincides with labor demand for a range of wages.

Finally, since at time $t = 0$ we have $k_0 = 0$, the initial period equilibrium will feature:

$$w_0 = \max\left\{\frac{\alpha}{1-\alpha}(1-\tau_0)^{1/\alpha}A^H - \kappa; 0\right\}.$$

In the remainder of the paper, I assume that

$$\frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha}A^H > \kappa,$$

so for any tax $\tau \leq \delta$, which is the range of taxes that can arise in equilibrium, the initial wage w_0 is strictly positive

In addition, note that at $t = 0$, all entrepreneurs have high productivity. More specifically, define

$$\mu_t = \Pr\left(a_t^j = A^H \mid i_t^j = 1\right) = \Pr\left(a_t^j = A^H \mid j \in I_t\right)$$

as the fraction of entrepreneurs at time t who are high productivity. In the initial period, the economy starts with $\mu_0 = 1$. The law of motion of μ_t is then given by:[8]

$$\mu_t = \begin{cases} \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1}) & \text{if (11) does not hold} \\ 1 & \text{if (11) holds} \end{cases}. \tag{13}$$

The following proposition summarizes the main results in this subsection:

Proposition 1 Given a policy sequence $\{k_t, \tau_t\}_{t=0,1,\ldots}$, an equilibrium always exists. In equilibrium, there are $\mathbf{i}_t = 1/\lambda$ entrepreneurs and each entrepreneur hires λ workers, and undertakes the investment level given by (8), and the equilibrium wage is given by (12). In addition:

- if (11) holds at t, an individual becomes an entrepreneur only if he has high productivity, i.e., $i_t^j = 1 \Rightarrow a_t^j = A^H$, and the fraction of high-productivity entrepreneurs is $\mu_t = 1$;
- if (11) does not hold at t, the equilibrium has $i_t^j = s_t^j$, the fraction of high-productivity entrepreneurs is $\mu_t = \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1})$;
- if (11) never holds, then the equilibrium has $\mu_t = \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1})$ starting with $\mu_0 = 1$, and satisfies $\lim_{t \to \infty} \mu_t = M < 1$.

3 Political Equilibrium

To obtain a full political equilibrium, we need to determine the policy sequence $\{k_t, \tau_t\}_{t=0,1,\ldots}$. I will take a number of different approaches to this problem. First, I will contrast two extreme cases:

1. Democracy: the policies k_t and τ_t are determined by majoritarian voting, with each agent having one vote.
2. Oligarchy (elite control): the policies k_t and τ_t are determined by majoritarian voting among the elite at time t. I take the elite to be those who have inherited a firm from their parents, or in other words those with $s_t = 1$.

[8] For $\varepsilon > 0$, this equation is modified to:

$$\mu_t = \begin{cases} \varepsilon + (1 - \varepsilon) \left(\sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1}) \right) & \text{if (11) does not hold} \\ 1 & \text{if (11) holds} \end{cases}$$

I will now analyze these two cases separately. In the next section, I will construct a model where the economy endogenously switches between oligarchy and democracy.

3.1 Democracy

In democracy, policy choices are determined by majoritarian voting. Note that given the timing of events, the tax rate at time t, τ_t, is decided after investment decisions at time t, whereas the entry barriers are decided before. Both of these policy decisions are made by majoritarian voting.[9] Recall also that the assumption $\lambda > 2$ above ensures that non-elite agents are always in the majority.

At the time taxes are set, investments are sunk and agents have already made their occupation choices, and now the workers are in the majority. Therefore, taxes will be chosen to maximize per capita transfers. We can use equation (10) to write tax revenues as:

$$T_t\left(k_t, \tau_t\right) = \begin{cases} \tau_t \frac{(1-\hat{\tau}_t)}{1-\alpha}^{\frac{1-\alpha}{\alpha}} \lambda \sum_{j \in I_t} a_t^j & \text{if } \tau_t \leq \delta \\ 0 & \text{if } \tau_t > \delta \end{cases}, \tag{14}$$

where $\hat{\tau}_t$ is the tax rate expected by the entrepreneurs and τ_t is the actual tax rate set by voters. This expression takes into account that if $\tau_t > \delta$ all entrepreneurs will hide their output, and tax revenue will be 0. T_t is written as a function of the entry barrier, k_t, since this can affect the selection of who becomes an entrepreneur, and thus the $\sum_{j \in I_t} a_t^j$ term (recall equation (9)).

At the time the entry barrier, k_t, is set, agents have not made their occupational choices. Low-productivity non-elite agents, i.e., those with $s_t^j = 0$ and $a_t^j = A^L$, know that they will always be workers, and thus would like to choose k_t to maximize the sum of wages and per capita transfers, $w_t^e(k_t) + T_t(k_t, \tau_t)$. High-productivity non-elite agents may become entrepreneurs, but as the above analysis shows, in this case, we would have $\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 0, a_t^j = A^H\right) = 0$, so their utility is also maximized by choosing k_t to achieve the highest $w_t^e(k_t) + T_t(k_t, \tau_t)$. Here, the equilibrium wage $w_t^e(k_t)$ is given by equation (12), but with the anticipated tax rate $\hat{\tau}_t$ replacing the actual tax rate, since the labor market clears before tax decisions, so we need to look at the tax rate choice of the agents given the expectations of entrepreneurs regarding the tax rate fixed at $\hat{\tau}_t$ (with the

[9] That the relevant policy decisions are made sequentially is not important for the results, and is only adopted to simplify the discussion by having the taxation decision after investments are sunk.

equilibrium actually having the feature that $\tau_t = \hat{\tau}_t$). Thus:

$$w_t^e(k_t) = \max\left\{\frac{\alpha}{1-\alpha}(1-\hat{\tau}_t)^{1/\alpha}A^H - \kappa - k_t; 0\right\}. \tag{15}$$

Since the preferences of all non-elite agents are the same and they are in the majority, the democratic equilibrium will maximize these preferences.

This analysis shows that a democratic equilibrium can be defined as:

Definition (Democratic Equilibrium) A democratic equilibrium is a policy sequence $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,\ldots}$ and economic decisions $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,\ldots}$ such that $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,\ldots}$ is an economic equilibrium given $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,\ldots}$ and $\left(\hat{k}_t, \hat{\tau}_t\right)$ maximizes:

$$w_t^e(k_t) + T_t(k_t, \tau_t).$$

Because taxes are imposed after investment decisions, workers prefer as high taxes as possible to redistribute income from the entrepreneurs to themselves, taking into account that a tax rate greater than δ will lead to zero tax revenue, so the democratic equilibrium will involve $\tau_t = \delta$.

The above analysis also shows that wages, tax revenue and output are all maximized when $k_t = 0$, so the democratic equilibrium will not impose any entry barriers. Since there are no entry barriers, only high-productivity agents will become entrepreneurs, or in other words $i_t^j = 1$ only if $a_t^j = A^H$. The following proposition therefore follows immediately:

Proposition 2 A democratic equilibrium always features $\tau_t = \delta$ and $k_t = 0$, and $i_t^j = 1$ if and only if $a_t^j = A^H$, and $\mu_t = 1$. The equilibrium wage rate is given by

$$w_t^D = \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha}A^H - \kappa,$$

and the aggregate (net) output is

$$Y_t^D = Y^D \equiv \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha}A^H - \kappa + \delta\frac{(1-\delta)^{\frac{1-\alpha}{\alpha}}}{1-\alpha}A^H. \tag{16}$$

Notice that the last term in aggregate output is tax revenue at the rate $\tau_t = \delta$. An important feature of this equilibrium is that aggregate output is constant over time, which will contrast with the oligarchic equilibrium.[10]

Finally, note that since

$$\Pi\left(k_t = 0, \tau_t, w_t \mid s_t^j = 0, a_t^j = A^H\right) = \Pi\left(k_t = 0, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^H\right) = 0,$$

there are no profits, and all agents earn the same income (though they may have different consumption levels because of the bequests they have received). Therefore, there is perfect (earnings) equality in the democratic equilibrium.

3.2 Oligarchy

In oligarchy, only existing entrepreneurs, i.e., those with $s_t = 1$, participate in the political process, and I assume that policies are determined by majoritarian voting among this set of agents.

The nature of the oligarchic equilibrium is simplified by the fact that the only dimension of heterogeneity among these agents is whether they are high or low productivity. This implies that majoritarian voting will lead to the policies most preferred by whichever group is in the majority *within* the elite.

To state this formally, let $\bar{\mu}_t$ be the fraction of high-productivity agents among those with $s_t = 1$ (note that this is different from μ_t, since μ_t refers to the entrepreneurs, i.e., those with $i_t = 1$, whereas $\bar{\mu}_t$ refers to the agents in the elite, i.e., those with $s_t = 1$). Notice that if an agent $s_t = 1$ chooses $i_t = 0$ and does not become an entrepreneur, he is still in the elite at time t, and thus takes part in the determination of the tax rate, though his offspring will not be in the elite.[11]

Then let us define:

Definition (Oligarchic Equilibrium) An oligarchic equilibrium is a policy sequence $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,\dots}$ and economic decisions $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,\dots}$ such that $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,\dots}$ is an

[10]The expression above refers to net output, after the costs of investment and operation have been subtracted. Output gross of these costs is given by $\frac{1}{1-\alpha}(1-\delta)^{1/\alpha}A^H + \delta\frac{(1-\delta)}{1-\alpha}^{\frac{1-\alpha}{\alpha}}A^H$. I will often refer to Y_t^D as aggregate output, even though it may be more appropriate to refer to it explicitly as aggregate net output.

[11]The alternative would have been to limit the decision on the tax rate only to agents with $i_t = 1$. I do not discuss this case to save space. It can be noted that the equilibrium in this case is similar to that where condition (18) always holds.

economic equilibrium given $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,...}$ and $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,...}$ is determined as follows:

- if $\bar{\mu}_t \geq 1/2$, then $\left(\hat{k}_t, \hat{\tau}_t\right)$ maximizes the utility of a high-productivity elite,

$$\max\left\{\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^H\right); 0\right\} + w_t^e\left(k_t\right) + T_t\left(k_t, \tau_t\right);$$

- if $\bar{\mu}_t < 1/2$, then $\left(\hat{k}_t, \hat{\tau}_t\right)$ maximizes the utility of a low-productivity elite,

$$\max\left\{\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^L\right); 0\right\} + w_t^e\left(k_t\right) + T_t\left(k_t, \tau_t\right),$$

  where $T_t\left(k_t, \tau_t\right)$ is given by (14) and $w_t^e\left(k_t\right)$ is given by (15).

Note that these utilities take into account that an individual will only work as an entrepreneur if this generates positive revenues, and in either case, he will also receive the wage and the per capita transfers.

The oligarchic equilibrium can be characterized in a straightforward way by looking at the policy preferences of the elite (agents with $s_t^j = 1$ at the beginning of period t). First, let us keep the level of taxes fixed at τ_t and consider an agent with $s_t^j = 1$ and $a_t^j = A^H$. What is his most preferred level of entry barriers? Since this agent will remain as an entrepreneur, he would like wages to be as low as possible. Recall that wages are given by (15) in the previous subsection, so the equilibrium wage will be minimized at 0, by choosing $k_t \in \left[\frac{\alpha}{1-\alpha}(1-\hat{\tau}_t)^{1/\alpha}A^H - \kappa, \infty\right)$. Without loss of any generality, I assume that he will simply choose the lower support of this set,

$$k_t = k^E \equiv \frac{\alpha}{1-\alpha}(1-\hat{\tau}_t)^{1/\alpha}A^H - \kappa, \tag{17}$$

where, as before, $\hat{\tau}_t$ is the tax rate that entrepreneurs expect at the time of investment.

Next consider the policy preference of a low-productivity elite, i.e., an agent with $s_t^j = 1$ and $a_t^j = A^L$. This agent may remain an entrepreneur or become a worker, depending on which one gives greater returns. Therefore, his payoff is:

$$\max\left\{\Pi\left(k_t, \tau_t, w_t \mid s_t^j = 1, a_t^j = A^L\right); 0\right\} + w_t^e\left(k_t\right) + T_t\left(k_t, \tau_t\right),$$

which takes into account that he will remain in entrepreneurship if this provides positive returns. This expression is maximized either by $k_t = k^E$ and $\tau_t = 0$, when he decides to remain an entrepreneur, and makes profits equal to $\left(\frac{\alpha}{1-\alpha}A^L - \kappa\right)\lambda$ (plus 0 wage and

0 redistribution). Or it is maximized by $k_t = 0$ and $\tau_t = \delta$, when he becomes a worker receiving the wage $w_t^e = \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H - \kappa$, plus the redistribution in this case, $\frac{\delta}{1-\alpha}(1-\delta)^{(1-\alpha)/\alpha} A^H$. As long as λ is sufficiently larger than 1, profits from entrepreneurship are always greater and this agent prefers the first option. The necessary and sufficient condition for this is

$$\lambda > \frac{\frac{1}{1-\alpha}\left[\alpha(1-\delta)^{1/\alpha} + \delta(1-\delta)^{(1-\alpha)/\alpha}\right] A^H - \kappa}{\frac{\alpha}{1-\alpha} A^L - \kappa}. \tag{18}$$

Therefore, when (18) holds, both low-productivity and high-productivity elites have the same preferences over policies, and will both vote for $k_t = k^E$ and $\tau_t = 0$. This combination will then be the oligarchic equilibrium.

In this equilibrium, since taxes are equal to 0, aggregate (net) output can also be calculated as:

$$Y_t^E = \mu_t \frac{\alpha}{1-\alpha} A^H + (1-\mu_t)\frac{\alpha}{1-\alpha} A^L - \kappa \tag{19}$$

where

$$\mu_t = \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1})$$

as given by (13), with $\mu_0 = 1$. Since μ_t is a decreasing sequence converging to M, aggregate output Y_t^E is also decreasing over time with:[12]

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{\alpha}{1-\alpha}\left(A^L + M(A^H - A^L)\right) - \kappa. \tag{20}$$

The reason for this is that as time goes by, the comparative advantage of the members of the elite in entrepreneurship gradually disappears because of the imperfect correlation between parents' and children's talents.[13]

[12] For the case where $\varepsilon > 0$, we have $\mu_t = \varepsilon + (1-\varepsilon)\left(\sigma_H \mu_{t-1} + \sigma_L(1-\mu_{t-1})\right)$ and $Y_t^E = \mu_t \frac{\alpha}{1-\alpha} A^H + (1-\mu_t)\frac{\alpha}{1-\alpha} A^L - \kappa - \varepsilon k^E$ and $Y_\infty^E \equiv \frac{\alpha}{1-\alpha}\left(A^L + \frac{\varepsilon + (1-\varepsilon)\sigma_L}{1-(1-\varepsilon)(\sigma_H - \sigma_L)}(A^H - A^L)\right) - \kappa - \varepsilon k^E$ with k^E given by (17). Also note that output gross of investment and operation costs in the sclerotic equilibrium would be: $\mu_t \frac{1}{1-\alpha} A^H + (1-\mu_t)\frac{1}{1-\alpha} A^L$.

[13] Notice the important role played by an implicit assumption here: agents cannot sell their firms, and therefore their elites status. If they could, low-productivity elites would sell their firms to high-productivity agents for a price slightly less than k_t, and this "secondary market" in firms would ensure that high-productivity agents became the entrepreneurs. Absence of such markets that circumvent the inefficiencies from entry barriers seems plausible in practice.

Another important feature of this equilibrium is that there is a high degree of (earnings) inequality. Wages are equal to 0, while there are positive profits. This contrasts with the equality in the democratic equilibrium.

In contrast, when (18) does not hold, low-productivity elites have preferences different from high-productivity elites. Therefore, the equilibrium depends on the ratio of high-productivity vs. low-productivity entrepreneurs, i.e., on $\bar{\mu}_t$. When $\bar{\mu}_t \geq 1/2$, the above characterization applies. When $\bar{\mu}_t < 1/2$, equilibrium policy will be $k_t = 0$ and $\tau_t = \delta$, and at this point, the equilibrium will be identical to the democratic equilibrium. However, this implies that we will have $\mu_t = 1$, so at time t, all entrepreneurs are high productivity. If $\sigma_H > 1/2$, then high-productivity elites will be in the majority again at time $t+1$, and the equilibrium will revert back to the sclerotic one with entry barriers and 0 taxes. Therefore, when (18) does not hold, the equilibrium will be cyclic with periodicity $\hat{t}$ satisfying $\hat{t} = \min t \in \mathbb{N} : \bar{\mu}_t < 1/2$. Alternatively, using the fact that $\bar{\mu}_t = \mu_t$ for all $t < \hat{t}$, $\hat{t}$ can be defined as $\hat{t} = \min t \in \mathbb{N} : \mu_{t-1} < \frac{1/2 - \sigma_L}{\sigma_H - \sigma_L}$.[14] If, on the other hand, $\sigma_H \leq 1/2$, then even at $t+1$, low-productivity agents will be the majority within the elite, and will prefer $k_t = 0$ and $\tau_t = \delta$, so the oligarchic equilibrium will be identical to the democratic one.

Therefore, we have the following proposition:

Proposition 3 If (18) holds, then the oligarchic equilibrium has $\tau_t = 0$ and $k_t = k^E$ as given by (17), and the equilibrium is always sclerotic. Aggregate output is given by (19) and decreases over time starting at $Y_0^E = \frac{\alpha}{1-\alpha} A^H - \kappa$ with $\lim_{t\to\infty} Y_t^E = Y_\infty^E$ as given by (20).

If (18) does not hold and $\sigma_H > 1/2$, then the oligarchic equilibrium control is cyclic. The economy starts with $\mu_0 = 1$, and μ_t satisfies the law of motion $\mu_t = \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1})$ until $t = \hat{t}$ where $\hat{t}$ is defined as $\hat{t} = \min t \in \mathbb{N} : \mu_{t-1} < \frac{1/2 - \sigma_L}{\sigma_H - \sigma_L}$. The equilibrium has $\tau_t = 0$ and $k_t = k^E$ as given by (17) if $t \neq n\hat{t}$ for some $n \in \mathbb{N}$, and $\tau_t = \delta$ and $k_t = 0$ if $t = n\hat{t}$ for some $n \in \mathbb{N}$. Aggregate output is given by (19) with $\mu_t = \sigma_H \mu_{t-1} + \sigma_L (1 - \mu_{t-1})$ if $t \neq n\hat{t}$ for some $n \in \mathbb{N}$, and $\mu_t = 1$ if $t = n\hat{t}$ for some $n \in \mathbb{N}$, so it declines during all periods $t \neq n\hat{t}$, and jumps up to $\frac{\alpha}{1-\alpha} A^H - \kappa$ when $t = n\hat{t}$ for some $n \in \mathbb{N}$.

[14] In other words, this is the level of μ_{t-1} such that were the equilibrium to remain sclerotic, μ_t would be less than $1/2$ for the first time at $t = \hat{t}$. But because the equilibrium switches to the entry equilibrium, we have $\mu_{\hat{t}} = 1$ while $\bar{\mu}_{\hat{t}} < 1/2$.

Note also that if $\sigma_H < 1/2$, the equilibrium when condition (18) does not hold would have a majority of the elite low-productivity in every period, so would be identical to the democratic equilibrium.

If If (18) does not hold and $\sigma_H \leq 1/2$, than the oligarchic equilibrium is identical to the democratic equilibrium in Proposition 2.

3.3 Comparison Between Democracy and Oligarchy

The last two subsections highlighted a number of differences between democratic and oligarchic equilibria. The most important is that the degree of efficiency and aggregate output differ between the two equilibria. In addition, the level of (earnings) inequality is substantially higher in oligarchy than in democracy. This is because when the elites have the political power, they can erect entry barriers to increase profits, creating greater inequality between themselves and workers. This subsection compares (net) output and its dynamics in the democratic and oligarchic equilibria. To simplify the discussion, I focus on the case where (18) holds, so that the oligarchic equilibrium does not have cycles.

It is straightforward to verify that aggregate (net) output in the first period of the oligarchic equilibrium, i.e., Y_0^E, is greater than the constant level of output in the democratic equilibrium, Y_t^D. In other words,

$$Y^D = \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H - \kappa + \delta \frac{(1-\delta)}{1-\alpha}^{\frac{1-\alpha}{\alpha}} A^H < Y_0^E = \frac{\alpha}{1-\alpha} A^H - \kappa.$$

This can be verified by noting that Y^D is in fact maximized when $\delta = 0$, and at $\delta = 0$, it is exactly equal to Y_0^E. Therefore, for all $\delta > 0$, the democratic equilibrium generates lower output than the oligarchic equilibrium at $t = 0$.[15] To draw the implications of this result, consider two otherwise identical economies, one with a democratic political system, and the other with oligarchy. The oligarchy will then perform better at the beginning because it is protecting the property rights of the producers.

However, the analysis shows that while Y_t^E declines over time, Y_t^D is constant. Consequently, after a while, the oligarchic economy may start underperforming relative to the democratic society. Whether it does so or not depends on whether Y_t^D is greater than Y_∞^E as given by (20), i.e., on whether

$$\frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H - \kappa + \delta \frac{(1-\delta)}{1-\alpha}^{\frac{1-\alpha}{\alpha}} A^H > \frac{\alpha}{1-\alpha}\left(A^L + M(A^H - A^L)\right) - \kappa. \tag{21}$$

[15] The result that the oligarchic equilibrium always generates greater output than the democratic equilibrium at time $t = 0$ is a consequence of the assumption that the only distortion that an oligarchic society creates is via entry barriers. In practice, an oligarchic society could pursue other distortionary policies to reduce wages and increase profits, in which case it might generate lower output than a democratic society even at time $t = 0$.

If condition (21) holds, then at some point the democratic society will overtake the oligarchic society—thus there will be leapfrogging. (21) is less likely to hold when δ is high and when A^L is high (or when $A^H - A^L$ is low). In other words, if democracy will pursue highly "populist" policies imposing high taxes on businesses in order to redistribute income to the poor segments of the society and if the cost of misallocation of talent in the economy is low because the gap between the high- and low-productivity entrepreneurs is small, the oligarchic equilibrium always generates greater output. On the other hand, if the extent of taxation in democracy is limited and the productivity gap is large, then after a while oligarchy will become more costly, and societies stuck in oligarchy will fall behind democratic societies.[16]

Figure 3 illustrates both of these possibilities diagrammatically. The thick flat line shows the level of net output in democracy, Y^D. The other two curves depict the level of output in oligarchy, Y_t^E, as a function of time for the two cases, depending on whether (21) holds or not. Both of these curves asymptote to Y_∞^E, but this value may or may not lie below Y^D. The dashed curve shows the case where (21) holds, so after a while (in the figure after date t'), oligarchy generates less output than democracy. When (21) does not hold, the solid curve applies, and aggregate output in oligarchy asymptotes to a level higher than Y^D.

What about the preferences of different groups over regimes? Recall that all agents have the same indirect utility function, equal to their income. The above analysis shows that, since there is no earnings inequality in democracy, an agent born with bequest b_t^j will have utility

$$b_t^j + Y^D,$$

with Y^D given by democratic output in (16). In contrast, in an oligarchic equilibrium, an agent born with bequest b_t^j will have utility equal to b_t^j if he is not a member of the elite, since wages are equal to zero and there is no redistribution. On the other hand, members of the elite receive utility equal to $b_t^j + \lambda Y_t^E$, where Y_t^E is given by (19). Since $Y_t^D > 0$, non-elites always prefer democracy, while, by construction, elites always prefer oligarchy.

[16] Notice that if (18) does not hold and the oligarchic equilibrium is cyclic, then it generates greater income than the case discussed in the text. More formally, let Y_t^E be the aggregate equilibrium output in the non-cyclic oligarchic equilibrium at time t, and $\tilde{Y}_t^E$ be the aggregate equilibrium output in the cyclic oligarchic equilibrium. Suppose that condition (18) holds as an equality, so that both the non-cyclic and the cyclic equilibria exist. Then, we have that $\tilde{Y}_t^E = Y_t^E$ for all $t < \hat{t}$ and $\tilde{Y}_t^E > Y_t^E$ for all $t \geq \hat{t}$. Nevertheless, democracy may still generate greater aggregate output then the cyclic oligarchic equilibrium. In other words, $\tilde{Y}_t^E < Y^D$ is still possible, though more difficult, and naturally, this will only be the case if $\tilde{Y}_{\hat{t}-1}^E < Y^D$.

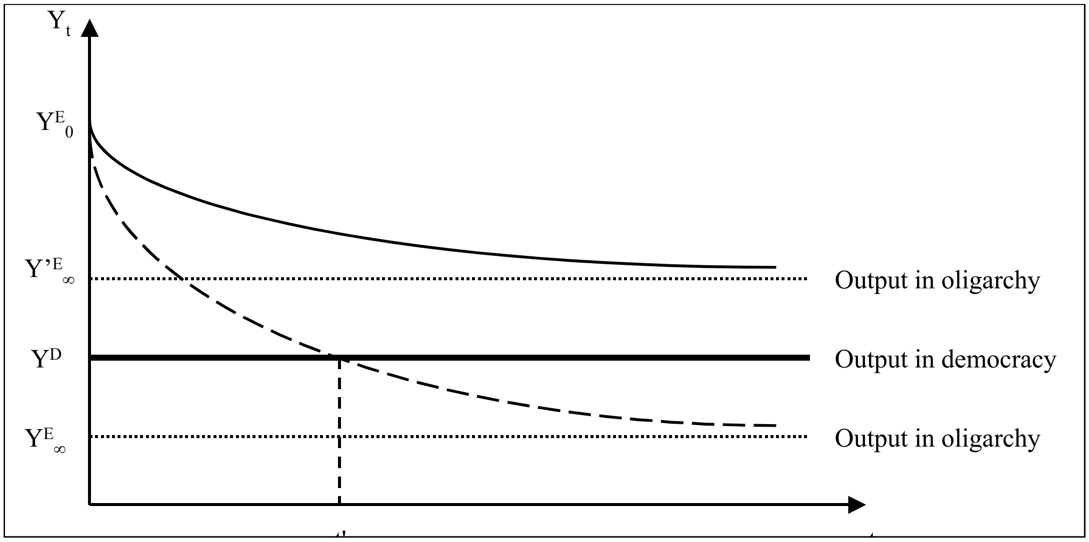

Figure 3: Comparison of aggregate net output in democracy and oligarchy. The dashed curve depicts output in oligarchy when (21) holds, and the solid line when it does not.

3.4 New Technologies

The introduction discussed the possibility of a more democratic society like that in the United States at the end of the eighteenth century adapting better to the arrival of new investment opportunities or to the introduction of new technology than oligarchic societies like those in the Caribbean. The model here provides a potential explanation for this pattern as well.

Suppose that at some date $t' > 0$ a new technology arrives. Let us think of this new technology as a new production method. If this production method is used, the productivity of entrepreneur j is

$$\frac{1}{1-\alpha}(\psi \hat{a}_t^j)^\alpha (e_t^j)^{1-\alpha} (l_t^j)^\alpha,$$

where $\psi > 1$ and $\hat{a}_t^j$ is the talent of this entrepreneur with the new technology. Therefore, the productivity of entrepreneur j can be written as

$$\max\left\{\frac{1}{1-\alpha}(\psi \hat{a}_t^j)^\alpha (e_t^j)^{1-\alpha} (l_t^j)^\alpha, \frac{1}{1-\alpha}(a_t^j)^\alpha (e_t^j)^{1-\alpha} (l_t^j)^\alpha\right\},$$

where the first term refers to his productivity with the new technology, and the second with the old technology. The cost of operating this technology is assumed to be the same as the old technology, $\kappa\lambda$.

Also assume that the law of motion of $\hat{a}_t^j$ is similar to that of a_t^j, given by

$$\hat{a}_{t+1}^j = \begin{cases} A^H & \text{with probability } \sigma_H & \text{if } a_t^j = A^H \\ A^H & \text{with probability } \sigma_L & \text{if } a_t^j = A^L \\ A^L & \text{with probability } 1-\sigma_H & \text{if } a_t^j = A^H \\ A^L & \text{with probability } 1-\sigma_L & \text{if } a_t^j = A^L \end{cases}, \tag{22}$$

for all $t > t'$ and $Pr\left(\hat{a}_t^j = A^H \mid a_{\tilde{t}}^j\right) = M$ for any $t, \tilde{t}$ and $a_{\tilde{t}}^j$. In other words, $\hat{a}_t^j$, and in particular $\hat{a}_{t'}^j$, is independent of past and future a_t^j's. This last assumption implies that $\hat{a}_{t'}^j = A^H$ with probability M and $\hat{a}_{t'}^j = A^L$ with probability $1-M$ irrespective of the talent of the individual with the old technology, which is reasonable since new technologies exploit different skills and create different types of comparative advantages than the old ones.

Given these assumptions, it is straightforward to see that the structure of the democratic equilibrium is not affected, and at the time t', agents with comparative advantage for the new technology become the entrepreneurs, so aggregate output jumps from Y^D is given by (16) to

$$\hat{Y}^D \equiv \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha}\psi A^H - \kappa + \delta\frac{(1-\delta)^{\frac{1-\alpha}{\alpha}}}{1-\alpha}\psi A^H.$$

In contrast, in oligarchy, the elites are in power at time t', and they would like to remain the entrepreneurs as long as a modified form of condition (18) is satisfied, even if they do not have comparative advantage for working with the new technology. This modified condition is:

$$\lambda > \frac{\frac{1}{1-\alpha}\left[\alpha(1-\delta)^{1/\alpha} + \delta(1-\delta)^{(1-\alpha)/\alpha}\right]\psi A^H - \kappa}{\frac{\alpha}{1-\alpha}\max\left\{\psi A^L, A^H\right\} - \kappa}. \tag{23}$$

This condition states that remaining a low-productivity entrepreneur with the new technology, with productivity ψA^L, or a high-productivity entrepreneur with the old technology, with productivity A^H, protected by maximum entry barriers is preferable to working at the competitive wage in the entry equilibrium (with the same reasoning as before, this wage is equal to $\frac{1}{1-\alpha}\left[\alpha(1-\delta)^{1/\alpha} + \delta(1-\delta)^{(1-\alpha)/\alpha}\right]\psi A^H - \kappa$). As long as (23) is satisfied, the oligarchic equilibrium will remain sclerotic even after the arrival of the new technology. How aggregate output in the oligarchic equilibrium changes after date t' then depends on whether $\psi A^L > A^H$ or not. If it is, aggregate output in the oligarchic equilibrium at date t' jumps up to

$$\hat{Y}^E \equiv \frac{\alpha}{1-\alpha}\left(\psi A^L + M(\psi A^H - \psi A^L)\right) - \kappa,$$

and remains at this level thereafter. This is because $\hat{a}_t^j$ and a_t^j are independent, so applying the weak law of large numbers, exactly a fraction M of the elite have high productivity with the new technology, and the remainder have low productivity.

If, on the other hand, $\psi A^L < A^H$, then those elites who were high productivity with the old technology but turn out to be low-productivity with the new technology prefer to use the old technology, and aggregate output after date t' follows the law of motion

$$\tilde{Y}_t^E = \frac{\alpha}{1-\alpha}\left(M\psi A^H\right) + \mu_t (1-M) \frac{\alpha}{1-\alpha} A^H + (1-\mu_t)(1-M)\frac{\alpha}{1-\alpha}\psi A^L - \kappa,$$

with μ_t given by the same process as before, (13). Intuitively, now the members of the elite who have high productivity with the new technology and those who have low productivity with the old technology switch to the new technology, while those with high productivity with the old and low productivity with the new remain with the old technology, and switch to new technology only when they lose their high productivity status with the old technology. As a result, we have that $\tilde{Y}_t^E$, just like Y_t^E before, is decreasing over time, and satisfies $\lim_{t\to\infty} \tilde{Y}_t^E = Y_\infty^E$ with Y_∞^E given by (20).

More important for the focus here, it is easy to verify that, as long as $Y_\infty^E < Y^D$, the gap $\hat{Y}^D - \hat{Y}^E$ or $\hat{Y}^D - \tilde{Y}_t^E$ (or whichever is relevant) is always greater than the output gap before the arrival of the new technology, $Y^D - Y_t^E$ (for $t > t$). In other words, the arrival of the new technology creates a further advantage for the democratic society. In fact, it may have been the case that $Y^D - Y_t^E < 0$, i.e., before the arrival of the new technology, the oligarchic society was performing better at the aggregate than the democratic society, but the ranking is reversed after the arrival of the new technology at date t'. Intuitively, this is because the democratic society immediately makes full use of the new technology by allowing those who have a comparative advantage with a new technology to enter into entrepreneurship, while the oligarchic society typically fails to do so, and therefore has greater difficulty adapting to technological change.[17]

[17] In addition, in practice it may be the case that entrepreneurial talent matters more for new technologies than for old technologies, creating yet another reason for democratic societies to take better advantage of new technologies. Acemoglu, Johnson and Robinson (2002) suggested an explanation along these lines for the success of the United States and other settler colonies to take advantage of the opportunity to industrialize in the nineteenth century, while oligarchic societies like the Caribbean or other extractive colonies failed to do so.

4 Regime Changes

The previous section characterized the political equilibrium under two distinct scenarios; democracy and oligarchy. Which political system prevails in a given society was treated as exogenous. Why are certain societies democratic, while others are more oligarchic, with the elite in control of political power? One possibility at this point is to appeal to historical accident, while another is to construct a "behind the veil" argument, whereby whichever political system leads to greater efficiency or ex ante utility would prevail. Neither of these two approaches are entirely satisfactory, however. First, since the prevailing political regime influences economic outcomes, rational agents should have preferences over these regimes as well, thus boding against a view which treats differences in regimes as exogenous. Second, political regimes matter precisely because they regulate the conflict of interest between different groups (in this context, between workers and entrepreneurs). The behind the veil argument is unsatisfactory, since it recognizes and models this conflict to determine the equilibrium within a particular regime, but then totally ignores it when there is a choice of regime. Finally, neither of these two approaches provide a framework for analyzing changes in regimes, which are ubiquitous. The more satisfactory approach would be to let the same trade-offs emphasized above also affect which regimes will emerge and persist in equilibrium. In this section, I make a preliminary attempt in this direction.[18]

I envisage an economy that starts as an oligarchy, but recognize that non-elites would like the society to switch to a democracy, which will give them greater utility. In contrast, elites would like to preserve the existing system. How will these conflicting interests be mediated? The obvious answer is that there is no easy compromise,[19] and whichever group is politically or militarily more powerful will prevail. This is the perspective adopted in this section, and the political or military power of a group is linked to their economic power. In other words, in the conflict between the elites and the non-elites, the likelihood that the elite will prevail is increasing in their relative economic strength or in their relative wealth. This assumption is plausible: a non-democratic regime often transforms

[18] See Acemoglu and Robinson (2000, 2003) for more detailed models of changes in political institutions, with an emphasis on shifts and political power between poorer and richer segments of the society.

[19] It may be argued that there should be room for compromise, since one of the regimes generates greater aggregate income (efficiency), and this income can be redistricted in a way to make all parties better off. This type of argument ignores the constraints that political regimes place on feasible redistributions and the difficulty of committing to certain allocations. See Acemoglu (2003) for a detailed discussion.

itself into a more democratic one in the face of threats or unrest, and the degree to which the regime will be able to protect itself will depend on the resources available to it (see, for example, the discussion in Acemoglu and Robinson, 2003). Even if the society is semi-democratic, groups that are wealthier and economically more powerful will be able to have a disproportionate effect on political outcomes by lobbying or bribery (see Dahl, 1961, for an interesting discussion).

4.1 Basic Model

I start with the case where the society starts as an oligarchy, and if it switches to democracy, it remains democratic thereafter. I model the effect of economic power on political power in a reduced form way, and assume that the probability that an oligarchy switches to democracy is

$$p_t = p(\Delta B_t)$$

where

$$\Delta B_t \equiv B_t^E - B_t^W = \frac{\int_{j \in I_t} b_t^j dj}{\int_{j \in I_t} dj} - \frac{\int_{j \notin I_t} b_t^j dj}{\int_{j \notin I_t} dj}$$

is the per capita wealth difference between the elites and the non-elites (workers) at the beginning of period t. I assume that regime change takes place immediately at the beginning of the period. Moreover, I use $D_t = 0$ to denote oligarchy and $D_t = 1$ to denote democracy. Therefore, the assumptions above imply the following law of motion for D_t:

$$D_t = \begin{cases} 0 & \text{with probability } 1 - p(\Delta B_t) & \text{if } D_{t-1} = 0 \\ 1 & \text{with probability } p(\Delta B_t) & \text{if } D_{t-1} = 0 \\ 1 & & \text{if } D_{t-1} = 1 \end{cases} \tag{24}$$

The assumption that economic power buys political power is equivalent to $p(\cdot)$ being (strictly) decreasing. In the analysis below, I allow $p(\cdot)$ to be weakly decreasing.

Definition (Equilibrium With Regime Changes) An equilibrium with regime changes is a policy sequence $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,...}$ and economic decisions $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,...}$ such that $\left\{\left[\hat{x}_t^j\right]\right\}_{t=0,1,...}$ is an economic equilibrium given $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,...}$ and $\left\{\hat{k}_t, \hat{\tau}_t\right\}_{t=0,1,...}$ is determined as follows:

- if $D_t = 0$, then $\left(\hat{k}_t, \hat{\tau}_t\right)$ is the oligarchic equilibrium policy sequence, and

- if $D_t = 1$, then $\left(\hat{k}_t, \hat{\tau}_t\right)$ is the democratic equilibrium policy sequence, where D_t is given by (24) with $D_0 = 0$ and

$$\Delta B_t = \beta \left(\Delta B_{t-1} + \lambda Y_{t-1}^E\right)$$

and Y_{t-1}^E is given by (19).

This definition makes use of the fact that since $D_t = 0$ and $b_0^j = 0$ for all j and $w_t^e = 0$ in an oligarchic equilibrium, $B_t^W = 0$, thus $\Delta B_t = B_t^E$. It then uses the savings rule in (2) and the fact that each member of the the elite earns an income of λY_t^E at time t in an oligarchic society.

Now imagine the equilibrium path of this economy starting at $t = 0$. To simplify the discussion, suppose that condition (18) is satisfied, so that the oligarchic equilibrium is not cyclic. Since each agent is imperfectly altruistic and one-period lived, the possibility of regime change in the future does not affect behavior, so the equilibria characterized above as a function of the political regime continue to apply. Therefore, at $t = 0$, we will have the oligarchic equilibrium, with no redistribution and 0 wages, and so $y_0^E = \lambda Y_0^E$ and $y_0^W = 0$, where y_0^E and y_0^W denote the per capita incomes of elites and non-elites respectively, and Y_0^E is given by (19). Given the savings rule implied by (2), we therefore have

$$B_1^E = \Delta B_1 = \beta \lambda Y_0^E.$$

With the same argument, if the society remains as an oligarchy, we have

$$B_2^E = \Delta B_2 = \beta \lambda Y_1^E + \beta^2 \lambda Y_0^E,$$

or more generally,

$$B_t^W = 0 \text{ and } B_t^E = \Delta B_t = \lambda \sum_{n=1}^{t} \beta^n Y_{t-n}^E. \tag{25}$$

It is clear that ΔB_t is a strictly increasing sequence, and so p_t will be a weakly decreasing sequence. Therefore, the longer the society remains as an oligarchy, the bigger will be the wealth gap between the elite and the non-elites, and the more difficult for the society to transition to democracy.

Moreover, note that

$$\lim_{t \to \infty} \Delta B_t = \Delta B_\infty \equiv \frac{\lambda Y_\infty^E}{1 - \beta}, \tag{26}$$

where Y_∞^E is given by (20). Now two interesting cases can be distinguished:[20]

1. There exists $\Delta\bar{B} < \Delta B_\infty$ such that $p\left(\Delta\bar{B}\right) = 0$.

2. $p\left(\Delta B_\infty\right) > 0$.

In the former case, there will therefore also exist $\bar{t}$ such that $\bar{t} = \min t \in \mathbb{N} : \Delta B_{\bar{t}} \geq \Delta\bar{B}$, so if the economy does not switch to democracy before $\bar{t}$, it will be permanently stuck in oligarchy. In the second case, as time passes, the economy will switch out of oligarchy into democracy with probability 1.

The next proposition summarizes the equilibrium path with potential regime changes:

Proposition 4 Consider the economy described above: the equilibrium with regime change is as follows. The economy starts with $D_0 = 0$ and the oligarchic equilibrium, and transitions to the democratic equilibrium according to the law motion as given by (24) with $\Delta B_t = \lambda \sum_{n=1}^{t} \beta^n Y_{t-n}^E$, and remains democratic thereafter. In addition:

- suppose that there exists $\Delta\bar{B} < \Delta B_\infty$ such that $p\left(\Delta\bar{B}\right) = 0$ where ΔB_∞ is given by (20), and let $\bar{t}$ such that $\bar{t} = \min t \in \mathbb{N} : \Delta B_{\bar{t}} \geq \Delta\bar{B}$. If the economy remains oligarchic until $\bar{t}$, then it will always remain oligarchic., i.e., if $D_{\bar{t}} = 0$, then $D_t = 0$ for all $t > \bar{t}$;

- suppose that $p\left(\Delta B_\infty\right) > 0$, then the society will become democratic at some point, i.e., $\Pr\left(\lim_{t\to\infty} D_t = 1\right) = 1$.

4.2 Crises and Regime Change

A well-documented pattern is that regime transitions are more likely in times of economic crises. For example, in the context of transition from autocratic rule to democracy, Haggard and Kaufman write: "in Argentina, Bolivia, Brazil, Peru, Uruguay and the Philippines, democratic transitions occurred in the context of severe economic difficulties that contributed to opposition movements" (1995, pp. 45). There are many potential explanations for this pattern, for example, the fact that an economic crisis may constitute a strong signal that existing policies are not working. Another alternative is that economic

[20] A third case is $\lim_{t\to\infty} p\left(\Delta B_t\right) = 0$, in which case the nature of the limiting equilibrium depends on the rate at which $p\left(\Delta B_t\right)$ converge to 0.

crises weaken the power of those in favor of the existing regime. The current model provides a simple formalization of this idea.

Imagine that an economic crisis destroys a fraction χ of the wealth in the economy. If the economy is oligarchic, this implies a fraction χ of the wealth of the elites is destroyed, thus the wealth gap between the elite and the workers, ΔB_t, shrinks by a fraction χ. As a result, p_t will increase, and a regime change becomes more likely.

More formally, let $C_t = 1$ denote a crisis, and assume that in every period, there is an independent probability v that there will be a crisis. It is then straightforward to see that regime dynamics are given by (24), but with ΔB_t given by the stochastic process:

$$\Delta B_t = \beta \left(1 - \chi C_{t-1}\right) \left(\Delta B_{t-1} + \lambda Y_{t-1}^E\right).$$

As a result, if there is a crisis at time t, i.e., if $C_t = 1$, then the probability of a switch to democracy increases in all future periods, and furthermore, the increase is largest in period $t+1$. The rest of the analysis is unaffected.

Therefore, this model provides a simple explanation for why a large economic shock may make regime change more likely.

4.3 Path Dependence and Instability

Finally, consider a generalization of the above framework where democratic societies can switch back to oligarchy. In particular, assume that when democratic, a society may become oligarchic with probability

$$q_t = q\left(\Delta B_t\right)$$

where now $q(\cdot)$ is weakly increasing, and $q(0) = 0$. I also assume that if there is a switch to oligarchy, the agents with $s_1 = 1$ (i.e., those who were in the elite to start with) become the elite.[21]

Similar arguments to before establish that

$$D_t = \begin{cases} 0 & \text{with probability } 1 - p\left(\Delta B_t\right) & \text{if } D_{t-1} = 0 \\ 1 & \text{with probability } p\left(\Delta B_t\right) & \text{if } D_{t-1} = 0 \\ 0 & \text{with probability } q\left(\Delta B_t\right) & \text{if } D_{t-1} = 1 \\ 1 & \text{with probability } 1 - q\left(\Delta B_t\right) & \text{if } D_{t-1} = 1 \end{cases}, \tag{27}$$

[21] The alternative would be for the agents who currently have $s_t = 1$ to become the elite. This does not affect the results I would like to highlight in this subsection, but introduces additional notational complexity.

In addition, the law of motion of ΔB_t is given by:

$$\Delta B_t = \begin{cases} \beta\left(\Delta B_{t-1} + \lambda Y_{t-1}^E\right) & \text{if } D_{t-1} = 0 \\ \beta \Delta B_{t-1} & \text{if } D_{t-1} = 1 \end{cases}, \tag{28}$$

which exploits the fact that in a democracy, all agents earn in the same income, Y^D, thus the only source of wealth differences among individuals is differences in their bequests, i.e., in "initial" conditions.

The definition of an equilibrium with regime change is modified in a straightforward way by replacing (24) with (27). In addition, I now allow the society to start democratic, i.e., with $D_0 = 1$ in order to provide a simple example of path dependence.

Rather than providing a full description of all potential types of equilibria, here I focus on certain cases of interest, which are summarized in the following proposition:

Proposition 5 Suppose there exists $\Delta\bar{B} < \Delta B_\infty$ such that $p\left(\Delta\bar{B}\right) = 0$ where ΔB_∞ is given by (26) and let $\bar{t}$ such that $\bar{t} = \min t \in \mathbb{N} : \Delta B_{\bar{t}} \geq \Delta\bar{B}$ with ΔB_t given by (25), and that there exists $\Delta\tilde{B} > 0$ such that $q\left(\Delta\tilde{B}\right) = 0$, and let $\tilde{t}\left(t'\right) = \min t \in \mathbb{N} : \Delta B_{\tilde{t}} \leq \Delta\tilde{B}$ where ΔB_t is given by (28) starting at $t = t'$ with $\Delta B_{t'}$ given by (25). Then:

- If $D_0 = 1$, then $D_t = 1$ for all t; i.e., if a society starts democratic, it will remain democratic thereafter.

- If $D_0 = 0$ and $D_{t'} = 1$ for the first time in t', and $D_t = 1$ for all $t \in \left[t', t' + \tilde{t}\left(t'\right)\right]$, then $D_t = 1$ for all $t \geq t'$; i.e., if a society becomes democratic at t' and remains democratic for $\tilde{t}\left(t'\right)$ periods, it will remain main democratic thereafter.

- If $D_0 = 0$ and $D_t = 0$ for all $t \leq \bar{t}$, then $D_t = 0$ for all t; i.e., if a society starts oligarchic and remains oligarchic until $\bar{t}$, then it will always remain oligarchic.

- If $D_0 = 0$ and $D_{t'} = 1$, then the probability of switching back to oligarchy for the first time at time $t > t'$ after the switch to democracy at t', $Q_{t|t'}$ is decreasing in t and increasing in t', with $\lim_{t\to\infty} Q_{t|t'} = 0$, i.e., a society faces the highest probability of switching back to oligarchy immediately after the switch from oligarchy to democracy, and this probability is higher if it has spent a longer time in oligarchy.

The first three parts of the proposition follow from the preceding discussion. To see why the last part is correct, note that as $t - t' \to \infty$, equation (28) implies that $\Delta B_t \to 0$, so $q\left(\Delta B_t\right) \to 0$.

There are two interesting results contained in this proposition. The first is the possibility of path dependence. Of two identical societies, if one starts oligarchic and the other as democratic, they can follow very different political and economic trajectories. With the assumption that $q(0) = 0$, the initial democracy will always remain democratic, generate an income level Y^D and an equal distribution of income, which will ensure that $\Delta B_t = 0$ and therefore $q(0) = 0$. On the other hand, if it starts oligarchic, it will follow the oligarchic equilibrium, with an unequal distribution of income. The greater income of the elites will enable them to have the power to sustain the oligarchic equilibrium, and if there is no transition to democracy until some point, date $\bar{t}$, they will be so much richer than the workers that they will be able to secure oligarchy forever. This type of path dependence provides a potential explanation for the different paths of development in the Americas suggested by Engerman and Sokoloff (1997) and Acemoglu, Johnson and Robinson (2002). Similar path dependence will also result if a society starts oligarchic, but then switches to democracy and remains democratic for a sufficiently long period of time, so that the initial inequality created during the oligarchic phase diminishes enough that democracy becomes consolidated.[22]

The other interesting result is that a democracy is found to be most susceptible to collapse right after transition from oligarchy to democracy. This is because at this point, the elites still are substantially richer than the workers. Since earnings are more equal in democracy, as time goes by the wealth gap between the previous rich elite and the workers declines, and democracy becomes more stable. Moreover, the longer lived is oligarchy before the switch to democracy, the larger is the wealth gap between the elites and the workers, and the less stable is democracy.

5 Conclusion

There is now a general consensus that "institutions" have a first-order effect on economic development. But, we are far from an understanding of what the most important components of this broadly-construed set of institutions are. Many economists and political scientists believe that the extent of property rights enforcement is an important element of the set of institutions that exert a major influence on economic outcomes. Neverthe-

[22] See also Benabou (2000) for a model with multiple steady-state equilibria, one with high inequality and policies that are more favorable to the rich, and another lower inequality and greater redistribution towards the poor.

less, even here there is much to investigate. Whose property rights should be protected? This question becomes especially pertinent when there is a conflict between protecting the property rights of various different groups.

This paper formulates and poses the question of "what type of institutions create incentives for growth". It advances the argument that protecting the property rights of current producers often comes at the cost of weakening the property rights of future producers. This is because the property rights of current producers will be protected effectively when they have the political power to do so, or in other words, when the society is oligarchic, with much of the political power vested in a small number of major producers. But then they can use this political power to erect entry barriers, violating the property rights of future producers, and creating a significant misallocation of resources. This pattern of well-enforced property rights for current producers and monopoly-creating entry barriers in an oligarchic society contrasts with relatively high taxes on current producers but low entry barriers in a democratic society.

I develop a simple framework to analyze the trade-off between these two different forms of property rights enforcement. I show that an oligarchic society first generates greater efficiency, because agents who are selected into entrepreneurship are often those with a comparative advantage in that sector. But, as time goes by and comparative advantage in entrepreneurship shifts away from the incumbents to new agents, the allocation of resources in the oligarchic society worsens. Contrasting with this, a democratic society creates distortions because of the disincentive effects of taxation, but these distortions do not worsen over time. Therefore, a possible path of development for an oligarchic society is to first rise and then fall relative to a more democratic/open society.

This model provides a potential explanation for relatively high growth rates of many oligarchic societies both in history and during the postwar era, but also suggest why such oligarchic societies will often run into significant growth slowdowns. It also predicts that these oligarchic societies will be unable to take advantage of new growth opportunities, as was the case with the highly oligarchic and relatively prosperous Caribbean plantation economies during the eighteenth century, which failed to take advantage of industrialization and commerce, while the initially-less-prosperous North American colonies did so.

I also use this framework to discuss endogenous regime transitions, to highlight how economic crises can lead to regime change by weakening the groups supporting the current regime, and the possibility of path dependence. Path dependence arises because oligarchic societies create greater inequality, and with their significant resources the elites can sustain the system that serves their interests. As a result, two otherwise-identical societies that start with different regimes political regimes may generate significantly different income distributions, which in turn sustain these different political regimes and economic outcomes.

This paper also suggests a number of areas for future research. First, more work on the nature of the set of institutions necessary for successful economic growth are necessary. Second, if the distinction between democratic and oligarchic society in this paper is important, then empirical work needs to move beyond classifying institutions into "good" versus "bad", and find a way of investigating the costs and benefits of protecting the property rights of incumbent producers and elites at the expense of creating entry barriers and monopoly positions. Finally, work on the interaction between economic equilibria and regime changes is only at its infancy. The current paper took a very reduced-form approach, and more detailed analyses of how economic power affects political power is necessary.

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