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 between the enforcement of the property rights of different groups. An "oligarchic" society, where political power is in the hands of major producers, protects their property rights, but also tends to erect significant entry barriers, violating the property rights of future producers. Democracy, where political power is more widely diffused, 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. Nevertheless, because comparative advantage in entrepreneurship shifts away from the incumbents, the inefficiency created by entry barriers in oligarchy deteriorates over time. The typical pattern is therefore one of the rise and decline of oligarchic societies: of two otherwise identical societies, the one with an oligarchic organization will first become richer, but later fall behind the democratic society. I also discuss how democratic societies may be better able to take advantage of new technologies, how an oligarchic society might transition to democracy because of within-elite conflict, and how the unequal distribution of income in oligarchy supports the oligarchic institutions and may keep them in place even when they become significantly costly to society.

Keywords: democracy, economic growth, entry barriers, oligarchy, political economy, redistribution, sclerosis.

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1 Introduction

There is now a growing consensus that institutions protecting the property rights of producers are essential for successful long-run economic performance.[1] There is no agreement, however, on what constitutes "protecting the property rights of producers" or on the costs and benefits of 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.[2] This type of organization not only ensures that major producers do not fear expropriation or high rates of taxation, but also enables them to create a non-level playing field and a monopoly position for themselves, in essence violating the property rights of future potential producers (i.e., preventing them from taking advantage of profit opportunities). The alternative is *democracy*, 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, incumbent producers will be unable to create significant entry barriers against entrants.

This paper constructs a simple model to analyze the trade-off between oligarchic and democratic societies. The model features two policy distortions: taxation and entry barriers. Taxes, which redistribute income from entrepreneurs to workers, are distortionary because they discourage entrepreneurial investment. Entry barriers, which redistribute income towards the entrepreneurs by reducing labor demand and wages, distort the allocation of resources because they prevent the entry of more productive agents into entrepreneurship.[3]

[1] See North (1981) for the emphasis on property rights, and also the related discussions in Jones (1981) and Olson (1982). For the empirical evidence, see, among others, De Long and Shleifer (1993), Knack and Keefer (1995), Barro (1999), Hall and Jones (1999), and Acemoglu, Johnson and Robinson (2001, 2002).

[2] This definition of oligarchy goes back to Aristotle, who wrote "oligarchy is when men of property have the government in their hands; democracy, the opposite, where the indigent, and not the men of property are the rulers ... Whenever men rule by reason of their wealth ... that is an oligarchy, and where the poor rule, that is democracy" (1996, p. 72).

In some contexts, it would also be useful to distinguish between oligarchy and dictatorship. While some dictatorships correspond to the rule by the economic elite, some electoral democracies may also be "oligarchic" because the elite controls the parties or the electoral agenda. Other dictatorships are more appropriately classified as "kleptocracies," highly predatory states, controlled either by an individual or the political elite, best exemplified by Zaire under Mobutu. A full taxonomy of regimes distinguishing these various types is not my objective here.

[3] Entry barriers may take the form of direct regulation, or of policies that reduce the costs of inputs, especially of capital, for the incumbents, while raising them for potential rivals. Cheap loans and subsidies to the chaebol appear to have been a major entry barrier for new 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

The trade-off between these two different types of distortions determines whether an oligarchic or a democratic society generates greater aggregate output. Oligarchy avoids the disincentive effects of taxation, but suffers from the distortions introduced by entry barriers. Democracy imposes higher redistributive taxes, but also tends to create a relatively level playing field. When the taxes that a democratic society will impose are high and the distortions caused by entry barriers are low, oligarchy 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.[4] In addition, a democratic society generates a more equal distribution of income than an oligarchic society, because it redistributes income from entrepreneurs to workers, while an oligarchic society adopts policies that reduce labor demand, depress wages and increase the profits of entrepreneurs.

More interesting are the dynamic trade-offs between these political regimes. 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 changes over time, it will eventually shift away from the incumbents, and the entry barriers erected in oligarchy will become increasingly costly. A typical pattern is therefore one where, of two otherwise identical societies, the oligarchy will first become richer, but later fall behind the democratic society. The model therefore suggests that, at least under some parameter configurations, despite its potential economic distortions, democracy is better for long-run economic performance than the alternative.

I also show that democracies may be able to take better advantage of new technologies than oligarchic societies. This is because democracy allows agents with comparative advantage in the new technology to enter entrepreneurship, while oligarchy typically blocks new entry.

The above discussion takes the political regime and the distribution of political power, in particular whether the society is oligarchic or democratic, as given. A major area of research in political economy is the determination of equilibrium political institutions. Could a society remain oligarchic even when this becomes increasingly costly? I analyze this question by embedding the basic setup in a simple (and reduced-form) model of

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 resulting lack of loans for new entrants enabled the elite to maintain a monopoly position in other sectors. See Haber (1991, 2002) and Haber, Razo and Maurer (2003)

[4]The economic costs of both democratic and oligarchic regimes may also help to explain the finding in Barro (1999) that democracies do not seem to grow faster than dictatorships in the postwar era.

regime change where groups with greater economic power are also more likely to prevail politically. Social groups that become substantially richer in a given political regime may be able to successfully sustain that regime and protect their privileged position. In oligarchy, incumbents have the political power to erect entry barriers to raise their profits. These greater profits, in turn, increase their political power, making a switch from oligarchy to democracy more difficult, even when entry barriers become significantly costly. I also discuss an extension where an oligarchic societic might disband itself because low-skill elites prefer democracy to oligarchy.

Although the model economy analyzed in this paper is abstract, in the last section, I argue that it nonetheless sheds light on a number of interesting questions. The first set of issues is the relative economic performance of democratic and oligarchic societies. In practice, there are examples of both democratic and oligarchic societies that have achieved high rates of economic growth. For example, the United States and much of Western Europe during the postwar era illustrate the potential economic success of democratic societies. In contrast, both prewar and postwar Japan as well as postwar South Korea, Taiwan, and Singapore, which approximate oligarchic societies, have pursued pro-business policies and achieved successful economic performance. The development experiences of Brazil and Mexico, on the other hand, illustrate both the potential gains and significant costs of oligarchic regimes. Haber (2003), for example, explains how import-substitution policies in these countries were adopted to protect the businesses of the rich elite aligned with the government. He further documents how these import-substitution policies enabled rapid industrialization both before and after World War II, but also created significant distortions and economic problems.

The second set of questions that the model might shed some light on relates to the rise and decline of nations. A common conjecture in social sciences is that economic success also lays the seeds of future failures (e.g., Kennedy, 1987, Olson, 1982). The analysis in this paper suggests a specific mechanism that formalizes this conjecture: early success might often come from providing security to major producers, who then use their political power to prevent entry by new groups, creating dynamic distortions. Consequently, the most interesting configuration in the model is one where an oligarchic society first prospers, but then falls behind a similar society with more democratic institutions. This possibility is illustrated by the contrast between the economic histories of the Northeastern United States and the Caribbean during the 17th, 18th, and 19th centuries.

The Northeastern United States developed as a typical settler colony, approximat-

ing a democratic society with significant political power in the hands of smallholders. In contrast, the Caribbean colonies were highly oligarchic, with political power in the monopoly of plantation owners, and few rights for the slaves that made up the majority of the population. In both the 17th and 18th centuries, the Caribbean societies were among the richest places in the world (see, e.g., Coatsworth, 1993, Eltis, 1995, Engerman, 1981). Caribbean societies were able to achieve these levels of productivity because the planters had every incentive to invest in the production, processing and export of sugar. But starting in the late 18th century, the Caribbean economies lagged behind the United States and many other more democratic societies, which took advantage of new investment opportunities, particularly in industry and commerce (e.g., Engerman and Sokoloff, 1997, Acemoglu, Johnson and Robinson, 2002). While new entrepreneurs in the United States and Western Europe invested in these areas, power in the Caribbean remained in the hands of the planters, who had no interest in encouraging entry by new groups. In the last section, I also discuss how similar ideas can be useful in thinking about the rise and decline of the Venetian Republic and the Dutch Republic.

Many studies on economic growth and the political economy of development have pointed out the costs of entry barriers, while others have emphasized the disincentive effects of redistributive taxation. For example, 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), and in the recent book by Rajan and Zingales (2003). An even larger literature focuses on the cost of redistribution. For example, Romer (1975), Roberts (1977), Meltzer and Richard (1981), Persson and Tabellini (1994), and Alesina and Rodrik (1994) construct models in which the median voter chooses high levels of redistributive taxation, distorting saving, investment or labor supply decisions. Barro, for example, summarizes the 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) in order to explain why democracies do not seem to grow faster than dictatorships. Despite these works, I am not aware of any analysis that relates the distortions created by redistributive democracy and those caused by entry barriers in oligarchy as the two sides of the trade-off

over the "form of property rights", nor any analysis of the dynamic costs of oligarchy.

Other related papers include Krusell and Rios-Rull (1996), Leamer (1998), Bourguinon and Verdier (2000), Robinson and Nugent (2001), Acemoglu, Aghion and Zilibotti (2003), Caselli and Gennaioli (2003), Galor, Moav and Vollrath (2003), and Sonin (2003). Krusell and Rios-Rull (1996), Bourguinon and Verdier (2000) and Sonin (2003) analyze models with vested interests potentially opposed to economic development. Acemoglu, Aghion and Zilibotti (2003) develop a theory where protecting large firms at the early stages of development is beneficial because it relaxes potential credit constraints, but such protection becomes progressively more costly as the economy approaches the world technology frontier and selecting the right entrepreneurs becomes more important. Leamer (1998), Robinson and Nugent (2001) and Galor, Moav and Vollrath (2003) discuss the potential opposition of landowners to investment in human capital. For example, Galor et al. emphasize how land abundance may initially lead to greater income per capita, but later retard human capital accumulation and economic development. Finally, recent independent work by Caselli and Gennaioli (2003) constructs a model of dynastic management, where credit constraints keep firms in the hands of low-skill offsprings of high-skill entrepreneurs, which is similar to the inefficiencies created by oligarchies in this model. None of these papers contrasts the trade-offs between democracy and oligarchy or identifies the dynamic costs of oligarchy.

The rest of the paper is organized as follows. Section 2 describes the economic environment, and characterizes the equilibrium for a given sequence of policies. Section 3 analyzes the political equilibrium in democracy and oligarchy, and compares the outcomes. Section 4 discusses regime changes. Section 5 briefly discusses potential extensions and historical applications, and concludes.

2 The Model

2.1 The Environment

I consider an infinite horizon economy populated by a continuum 1 of risk neutral agents, with discount factor equal to $\beta < 1$. There is a unique non-storable final good denoted by y. The expected utility of agent j at time 0 is given by:

$$U_0^j = E_0 \sum_{t=0}^{\infty} \beta^t c_t^j, \tag{1}$$

where $c_t^j \in \mathbb{R}$ denotes the consumption of agent j at time t and E_t is the expectations operator conditional on information available at time t.

I assume that each individual dies with a small probability ε in every period, and a mass ε of new individuals are born (with the convention that after death there is zero utility and β is the discount factor inclusive of the probability of death). I will consider the limit of this economy with $\varepsilon \to 0$. The 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 the oligarchic 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 production 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. While all agents have the same productivity as workers, their productivity in entrepreneurship differs. In particular, agent j at time t has entrepreneurial talent/skills $a_t^j \in \{A^L, A^H\}$ with $A^L < A^H$. To become an entrepreneur, an agent needs to set up a firm, if he does not have an active firm already. Setting up a new firm may be costly because of entry barriers created by existing entrepreneurs.

Each agent therefore starts period t with skill level $a_t^j \in \{A^H, A^L\}$ and $s_t^j \in \{0, 1\}$ which denotes whether the individual has an active firm. I refer to an agent with $s_t^j = 1$ as an "incumbent" or 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 non-elite agents).

Within each period, each agent makes the following decisions: an occupation choice $e_t^j \in \{0, 1\}$, and in addition if $e_t^j = 1$, i.e., if he becomes an entrepreneur, he also makes investment, employment, and hiding decisions, k_t^j, l_t^j and h_t^j, where h_t^j denotes whether he decides to hide his output in order to avoid taxation (since the final good is not storable, the consumption decision is simply given by the budget constraint).

Agents also make the policy choices in this society. How the preferences of various agents map into policies differs depending on the political regime, which is discussed in detail below. For now I note that there are three policy choices: a tax rate $\tau_t \in [0, 1]$ on output (the results are identical if τ_t is a tax on earned income, see footnote 15), lump-sum transfers to all agents denoted by $T_t \in [0, \infty)$, and a cost $B_t \in [0, \infty)$ to set up a new firm. I assume that the entry barrier B_t is pure waste, for example corresponding to the bureaucratic procedures that individuals have to go through to open a new business

(see, e.g., De Soto, 1989, or Djankov et al., 2002). As a result, lump-sum transfers are financed only from taxes.

An entrepreneur with skill level a_t^j can produce

$$y_t^j = \frac{1}{1-\alpha}(a_t^j)^{\alpha}(k_t^j)^{1-\alpha}(l_t^j)^{\alpha} \tag{2}$$

units of the final good, where l_t^j is the amount of labor hired by the entrepreneur and $k_t^j \geq 0$ is the capital stock of the entrepreneur. I assume that there is full depreciation of the capital at the end of the period, so k_t^j is also the level of investment of entrepreneur j at time t. To simplify the analysis I also assume that all firms have to operate at the same size, λ, so $l_t^j = \lambda$.[5] Finally, I adopt the convention 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.[6]

To simplify the expressions below, I define $b_t \equiv B_t/\lambda$. Profits (the returns to entrepreneur j gross of the cost of entry barriers) are then equal to $\pi_t^j = (1-\tau_t)\, y_t^j - w_t l_t^j - k_t^j$. Intuitively, the entrepreneur produces y_t^j, pays a fraction τ_t of this in taxes, pays a total wage bill of $w_t l_t^j$, and incurs an investment cost of k_t^j. Given a tax rate τ_t and a wage rate $w_t \geq 0$ and using the fact that $l_t^j = \lambda$, the net profits of an entrepreneur with talent a_t^j at time t are:

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

as long as the entrepreneur chooses $h_t^j = 0$. If he instead hides his output ($h_t^j = 1$), he avoids the tax, but loses a fraction $0 < \delta < 1$ of his revenues, so his profits are:

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

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, the relevant

[5] It is essential to have a maximum size or some decreasing returns; otherwise one of the more productive entrepreneurs would employ all workers, and issues of allocation of talent would not arise. It is also important to have a minimum size, since otherwise all entrepreneurs would remain active by employing an infinitesimal workforce (and working for other firms themselves), so as not to lose their license and have the option to reenter without incurring the entry cost. Setting the minimum and maximum sizes equal to each other is only a simplification.

[6] Throughout I assume that each entrepreneur has to run the firm himself, so it is his productivity, a_t^j, that matters for output. An alternative would be to allow costly delegation of managerial positions to other, more productive agents. In this case, low-productivity entrepreneurs may prefer to hire more productive managers. I discuss the implications of such a generalization in the conclusion.

range of taxes will be

$$0 \leq \tau_t \leq \delta.$$

The (instantaneous) gain from entrepreneurship for an agent of talent $z \in \{L, H\}$ as a function of the tax rate τ_t, and the wage rate, w_t, is:

$$\Pi^z(\tau_t, w_t) = \max_{k_t^j} \pi\left(k_t^j \mid a_t^j = A^z, w_t, \tau_t\right). \tag{4}$$

Note that this is the *net gain* to entrepreneurship 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). More importantly, the gain to becoming an entrepreneur for an agent with $s_t^j = 0$ and ability $a_t^j = A^z$ is $\Pi^z(\tau_t, w_t) - B_t = \Pi^z(\tau_t, w_t) - \lambda b_t$, since this agent will have to pay the additional cost imposed by the entry barriers.[7]

With this notation we can also define the budget constraint of workers as $c_t^j \leq w_t + T_t$ and that for an entrepreneur of ability A^z as $c_t^j \leq w_t + T_t + \Pi^z(\tau_t, w_t)$, where T_t is the level of lump-sum transfer.

Labor market clearing requires the total demand for labor not to exceed the supply. Since entrepreneurs also work as production workers, the supply is equal to 1, so:

$$\int_0^1 e_t^j l_t^j dj = \int_{j \in \mathbf{S}_t^E} \lambda dj \leq 1, \tag{5}$$

where $\mathbf{S}_t^E$ is the set of entrepreneurs at time t.

It is also useful at this point to specify the law of motion of the vector $\left(s_t^j, a_t^j\right)$ which determines the "type" of agent j at time t. 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

$$s_{t+1}^j = e_t^j, \tag{6}$$

with $s_0^j = 0$ for all j, and also $s_t^j = 0$ if an individual j is born at time t. The important assumption here is that if an individual does not operate his firm, he loses "the license", so

[7] Private sales of firms from agents with $s_t^j = 1$ to those with $s_t^j = 0$ are not allowed (or they are equivalently assumed to be subject to the entry cost B_t). In a model with savings, this could be motivated by credit constraints, especially since entry barriers exist only in the oligarchic equilibrium, where the equilibrium wage is zero and agents with $s_t^j = 0$ do not have the funds to finance the purchase of existing firms from the incumbents.

Note also that private sales of firms without any entry barrier-related costs would circumvent the inefficiencies from entry barriers. The absence of such sales, and consequently the existence of real effects of entry barriers, seems plausible in practice (see, for example, Djankov et al., 2002, on the relationship between entry barriers and various economic outcomes). Private sales of firms and the possibility of imposing monetary entry barriers are further discussed in the last section.

next time he wants to set up a firm, he needs to incur the entry cost (and the assumption that $l_t^j = \lambda$ rules out the possibility of operating the firm at a much smaller scale).

Finally, I assume that there is imperfect correlation between the entrepreneurial skill over time with the following Markov structure:

$$a_{t+1}^j = \begin{cases} A^H & \text{with probability} \quad \sigma^H & \text{if } a_t^j = A^H \\ A^H & \text{with probability} \quad \sigma^L & \text{if } a_t^j = A^L \\ A^L & \text{with probability } 1-\sigma^H & \text{if } a_t^j = A^H \\ A^L & \text{with probability } 1-\sigma^L & \text{if } a_t^j = A^L \end{cases}, \tag{7}$$

where σ^H, $\sigma^L \in (0,1)$. Here σ^H is the probability that an agent has high skill in entrepreneurship conditional on being high skill in the previous period, and σ^L is the probability transitioning from low skill to high skill. It is natural to suppose that $\sigma^H \geq \sigma^L > 0$, so that skills are persistent and low skill is not an absorbing state. What is essential for the results is imperfect correlation of entrepreneurial talent over time, i.e., $\sigma^H < 1$, so that the identities of the entrepreneurs necessary to achieve productive efficiency change over time.

It can be verified easily that

$$M \equiv \frac{\sigma^L}{1-\sigma^H+\sigma^L} \in (0,1)$$

is the fraction of agents with high skill in the stationary distribution (i.e., $M\left(1-\sigma^H\right) = (1-M)\,\sigma^L$). Since there is a large number (continuum) of agents, the fraction of agents with high skill at any point is M. Throughout I assume that

$$M\lambda > 1,$$

so that, without entry barriers, high-skill 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 ensures that the workers are always in the majority and simplifies the political economy discussion below.

Finally, the timing of events within every period is:

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

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

3. Agents make occupational choices, $\left[e_t^j\right]$, and entrepreneurs make investment decisions, $\left[k_t^j\right]$.

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

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

6. Entrepreneurs make hiding decisions, $\left[h_t^j\right]$.

Note that I used 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 $\left[e_t^j\right]$, 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 decision. Once these investments are sunk, it is in the interest of the workers to tax and redistribute entrepreneurial income.[8]

2.2 Analysis

Throughout the analysis I focus on the Markov Perfect Equilibrium (MPE), where strategies are only a function of the payoff relevant states. For individual j the payoff relevant state at time t includes his own state $\left(s_t^j, a_t^j\right)$, and potentially the fraction of entrepreneurs that are high skill, denoted by μ_t, and defined as

$$\mu_t = \Pr\left(a_t^j = A^H \mid e_t^j = 1\right) = \Pr\left(a_t^j = A^H \mid j \in \mathbf{S}_t^E\right).$$

The MPE can be characterized by considering the appropriate Bellman equations, and characterizing the optimal strategies within each time period by backward induction. I start with the "economic equilibrium," which is the equilibrium of the economy described above given a policy sequence $\{b_t, \tau_t\}_{t=0,1,...}$.[9] Let $x_t^j = \left(e_t^j, k_t^j, , h_t^j\right)$ be the vector of choices of agent j at time t, $x_t = \left[x_t^j\right]_{j\in[0,1]}$ denote the choices for all agents, and $p_t = (b_t, \tau_t)$

[8] This timing of events is adopted to simplify the exposition. Because there are only two types of entrepreneurs, it turns out that if workers choose the tax rate before investment decisions, they will set $\tau_t = 0$ (see Appendix B). The timing of events here implies that they cannot commit to this tax rate, and consequently ensures a positive level of redistribution. In Appendix B, I show that the main results generalize to an environment where there are more than two levels of entrepreneurial productivity and where voters set taxes τ_t at the same time as b_t, i.e., before investment decisions. In this case, voters choose $\tau_t > 0$, trading off redistribution and the disincentive effects of taxation, as in, among others, the models by Romer (1975), Roberts (1977), and Meltzer and Richard (1981).

[9] For the economic equilibrium (given the policy sequence), there is no difference between subgame perfect equilibria and MPE, since each agent is infinitesimal and would thus ignore his effect on equilibrium prices and policies.

denote the vector of policies at time t. Moreover, let $\mathbf{p}^t = \{p_n\}_{n=t}^{\infty}$ denote the infinite sequence of policies from time t onwards, and similarly $\mathbf{w}^t$ and $\mathbf{x}^t$ denote the sequences of wages and choices from t onwards. Then $\hat{\mathbf{x}}^t$ and a sequence of wage rates $\hat{\mathbf{w}}^t$ constitute an economic equilibrium given a policy sequence $\mathbf{p}^t$ if, given $\hat{\mathbf{w}}^t$ and $\mathbf{p}^t$ and his state $\left(s_t^j, a_t^j\right)$, $\hat{x}_t^j$ maximizes the utility of agent j, (1), and $\hat{w}_t$ clears the labor market at time t, i.e., equation (5) holds. Each agent's type in the next period, $\left(s_{t+1}^j, a_{t+1}^j\right)$, then follows from equations (6) and (7) given $\mathbf{x}^t$.

I now characterize this equilibrium. Since $l_t^j = \lambda$ for all $j \in \mathbf{S}_t^E$ (where, recall that, $\mathbf{S}_t^E$ is the set of entrepreneurs at time t), profit-maximizing investments are given by:

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

so that the level of investment is increasing in the skill level of the entrepreneur, a_t^j, and the level of employment, λ, and decreasing in the tax rate, τ_t. (Alternatively, (8) can be written as $k_t^j = (1-\hat{\tau}_t)^{1/\alpha} a_t^j \lambda$ where $\hat{\tau}_t$ is the tax rate expected at the time of investment; in equilibrium, $\hat{\tau}_t = \tau_t$).

Now using (8), the net current gain to entrepreneurship, as a function of entry barriers, taxes, equilibrium wages, for an agent of type $z \in \{L, H\}$ (i.e., of skill level A^L or A^H) can be obtained as:

$$\Pi^z(\tau_t, w_t) = \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^z \lambda - w_t \lambda. \tag{9}$$

Moreover, the labor market clearing condition (5) implies that the total mass of entrepreneurs at any time is $\mathbf{e}_t \equiv \int_{j \in \mathbf{S}_t^E} dj = 1/\lambda$. Tax revenues at time t and the per capita lump-sum transfers are given as:

$$T_t = \sum_{j \in \mathbf{S}_t^E} \tau_t y_t^j = \frac{1}{1-\alpha} \tau_t (1-\tau_t)^{\frac{1-\alpha}{\alpha}} \lambda \sum_{j \in \mathbf{S}_t^E} a_t^j. \tag{10}$$

Let us now denote the value of an entrepreneur with skill level $z \in \{L, H\}$ as a function of the sequence of future policies and equilibrium wages, $(\mathbf{p}^t, \mathbf{w}^t)$, by $V^z(\mathbf{p}^t, \mathbf{w}^t)$, and the value of a worker of type z in the same situation by $W^z(\mathbf{p}^t, \mathbf{w}^t)$.[10] We have

$$W^z\left(\mathbf{p}^t, \mathbf{w}^t\right) = w_t + T_t + \beta C W^z\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right), \tag{11}$$

[10] The value functions $W^z(\mathbf{p}^t, \mathbf{w}^t)$ and $V^z(\mathbf{p}^t, \mathbf{w}^t)$ should also be conditioned on the sequence of μ_t's, but because this does not play an important role in the text and does not affect any of the key decisions or analysis (only influences the level of transfers, which are additive), I suppress this dependence until Appendix A.

where $CW^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$ is the continuation value for a worker of type z from time $t+1$ onwards, given by

$$\begin{aligned} CW^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) &= \sigma^z \max\left\{W^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - \lambda b_{t+1}\right\} \\ &+ (1-\sigma^z)\max\left\{W^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - \lambda b_{t+1}\right\}. \end{aligned} \tag{12}$$

The expressions for both (11) and (12) are intuitive. A worker of type $z \in \{L, H\}$ receives a wage income of w_t (independent of his skill), a transfer of T_t, and the continuation value $CW^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$. To understand this continuation value, note that the worker will be high skill with probability σ^z, and in this case, he can either choose to remain a worker, receiving value $W^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$, or decide to become an entrepreneur by incurring the entry cost λb_{t+1}, receiving the value of a high-skill entrepreneur, $V^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$. The max operator makes sure that he chooses whichever option gives higher value. With probability $1-\sigma^z$, he will be low skill, and receives the corresponding values.

Similarly, the value functions for entrepreneurs are given by:

$$V^z\left(\mathbf{p}^t,\mathbf{w}^t\right) = w_t + T_t + \Pi^z\left(\tau_t, w_t\right) + \beta CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), \tag{13}$$

where Π^z is given by (9) and now crucially depends on the skill level of the agent, and $CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$ is the continuation value for an entrepreneur of type z:

$$\begin{aligned} CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) &= \sigma^z \max\left\{W^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right\} \\ &+ (1-\sigma^z)\max\left\{W^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right\}, \end{aligned} \tag{14}$$

An entrepreneur of ability A^z also receives the wage w_t (working for his own firm) and the transfer T_t, and in addition makes profits equal to $\Pi^z\left(\tau_t, w_t\right)$. The following period, this entrepreneur has high skill with probability σ^z and low skill with probability $1-\sigma^z$, and conditional on the realization of this event, he decides whether to remain an entrepreneur or become a worker. Two points are noteworthy here. First, in contrast to the expressions in (11), there is no additional cost of becoming an entrepreneur since this individual already owns a firm. Second, if he decides to become a worker, he obtains the value as given by the expressions in (11) so that the next time he wishes to operate a firm, he has to incur the cost of doing so.

Inspection of (12) and (14) reveals that the occupational choices of individuals will depend on the *net value* of entrepreneurship,

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^z, s_t^j = s\right) = V^z\left(\mathbf{p}^t,\mathbf{w}^t\right) - W^z\left(\mathbf{p}^t,\mathbf{w}^t\right) - (1-s)\lambda b_t,$$

which is defined as a function of an individual's skill a and ownership status, s. The last term is the entry cost incurred by agents with $s = 0$. The max operators in (12) and (14) imply that if $NV > 0$ for an agent, then he prefers to become an entrepreneur.

Who will become an entrepreneur in this economy? The answer depends on the NV's. Standard arguments (combined with the fact that instantaneous payoffs are strictly monotonic, see, for example, Stokey, Lucas and Prescott, 1989) immediately imply that $V^z(\mathbf{p}^t,\mathbf{w}^t)$ is strictly monotonic in w_t, T_t and $\Pi^z(\tau_t, w_t)$, so that $V^H(\mathbf{p}^t,\mathbf{w}^t) > V^L(\mathbf{p}^t,\mathbf{w}^t)$. By the same arguments, $NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^z, s_t^j = s\right)$ is also increasing in $\Pi^z(\tau_t, w_t)$. This in turn implies that for all a and s,

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 1\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j, s_t^j = s\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 0\right).$$

In other words, the net value of entrepreneurship is highest for high-skill existing entrepreneurs, and lowest for low-skill workers. However, it is unclear ex ante whether $NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right)$ or $NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 1\right)$ is greater, that is, whether entrepreneurship is more profitable for incumbents with low skill or for outsiders with high skill, who will have to pay the entry cost.

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 $s_t^j = 1$ remain entrepreneurs irrespective of their productivity.

An entry equilibrium requires the net value of entrepreneurship to be greater for a non-elite high skill agent than for a low-skill elite, i.e., $NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 1\right)$. Define w_t^H such that at this wage rate, $NV\left(\mathbf{p}^t, \left[w_t^H, \mathbf{w}^{t+1}\right] \mid a_t^j = A^H, s_t^j = 0\right) = 0$, where $\mathbf{w}^t \equiv [w_t, \mathbf{w}^{t+1}]$. Using (11) and (13), we have:[11]

$$w_t^H \equiv \max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - b_t + \frac{\beta\left(CV^H(\mathbf{p}^{t+1},\mathbf{w}^{t+1}) - CW^H(\mathbf{p}^{t+1},\mathbf{w}^{t+1})\right)}{\lambda}; 0\right\}, \tag{15}$$

[11] To obtain these expressions, note that

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid A^L, 1\right) = \lambda\left(\alpha(1-\tau_t)^{1/\alpha}A^L/(1-\alpha) - w_t\right) + \beta\left(CV^L(\mathbf{p}^{t+1},\mathbf{w}^{t+1}) - CW^L(\mathbf{p}^{t+1},\mathbf{w}^{t+1})\right),$$

and

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid A^H, 0\right) = \lambda\left(\alpha(1-\tau_t)^{1/\alpha}A^H/(1-\alpha) - w_t - b_t\right) + \beta\left(CV^H(\mathbf{p}^{t+1},\mathbf{w}^{t+1}) - CW^H(\mathbf{p}^{t+1},\mathbf{w}^{t+1})\right).$$

and similarly, let w_t^L be such that $NV\left(\mathbf{p}^t, \left[w_t^L, \mathbf{w}^{t+1}\right] \mid a_t^j = A^L, s_t^j = 1\right) = 0$,

$$w_t^L \equiv \max\left\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^L + \frac{\beta\left(CV^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right)}{\lambda}; 0\right\}. \quad (16)$$

Both expressions are intuitive. For example, in (15), the term $\alpha(1-\tau_t)^{1/\alpha}A^H/(1-\alpha)$is the per worker profits that a high-skill entrepreneur will make before labor costs. b_t is the per worker entry cost (λb_t divided by λ). Finally, the term
$\beta\left(CV^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right)$ is the indirect (dynamic) benefit, the additional gain from changing status from a worker to a member of the elite for a high-skill agent. Naturally, this benefit will depend on the sequence of policies, for example, it will be larger when there are greater entry barriers in the future. Consequently, if $w_t < w_t^H$, the total benefit of becoming an entrepreneur for a non-elite high-skill agent exceeds the cost. Equation (16) is explained similarly. Evidently, a wage rate lower than both w_t^H and w_t^L would lead to excess demand for labor and could not be an equilibrium. Consequently, the condition for an entry equilibrium to exist at time t can simply be written as

$$w_t^H \geq w_t^L. \quad (17)$$

A sclerotic equilibrium emerges, on the other hand, only if the converse of (17) holds.

Moreover, in an entry equilibrium, i.e., when (17) holds, we must have that
$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) = 0$. If it were strictly positive, or in other words, if the wage were less than w_t^H, all agents with high skill would strictly prefer to become entrepreneurs, which is not possible since, by assumption, $M\lambda > 1$. This argument also shows that $e_t = 1/\lambda$. Then, from (9), (11) and (13), the equilibrium wage must be

$$w_t^e = w_t^H. \quad (18)$$

Note also that when (17) holds, naturally $NV\left(\mathbf{p}^t, \left[w_t^H, \mathbf{w}^{t+1}\right] \mid a_t^j = A^L, s_t^j = 1\right) \leq 0$, so low-skill incumbents would be worse off if they remained as entrepreneurs at the wage rate w_t^H.

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 for the case where condition (17) holds, so that there exists an entry equilibrium. The first portion of the curve shows the willingness to pay of high-skill incumbents, i.e., agents with $a_t^j = A^H$ and $s_t^j = 1$, which is $w_t^H + b_t$ (since entrepreneurship is as profitable for them as for high-skill potential entrants

and they do not have pay the entry cost). The second portion is for high-skill potential entrants, i.e., those with $a_t^j = A^H$ and $s_t^j = 0$, which is by definition w_t^H. These two groups together demand $M\lambda > 1$ workers, ensuring that labor demand intersects labor supply at the wage given in (18).

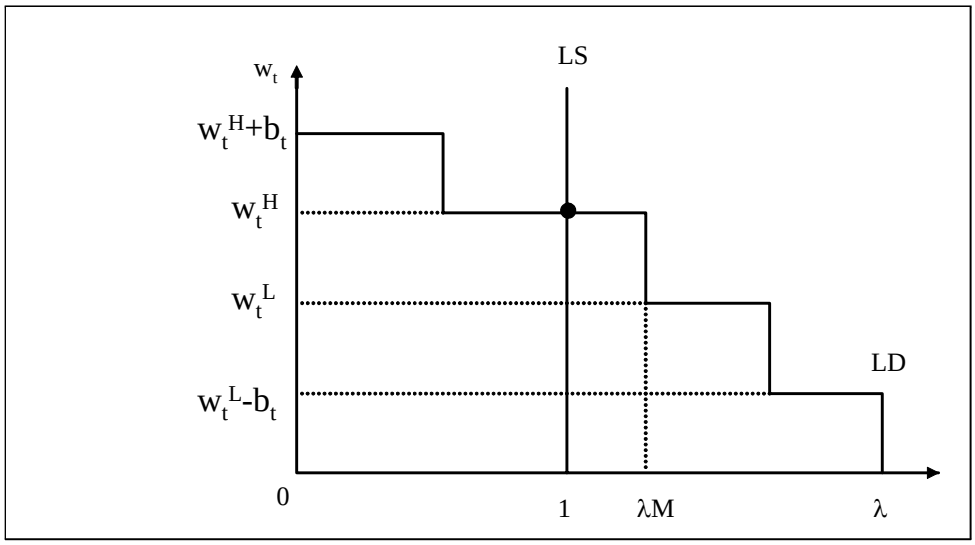


Figure 1: Labor supply and labor demand when (17) holds and there exists an entry equilibrium.

In a sclerotic equilibrium, on the other hand, $w_t^H < w_t^L$, and low-skill incumbents remain in entrepreneurship, i.e., $s_t^j = s_{t-1}^j$. If there were no deaths so that $\varepsilon = 0$, we would have $\mathbf{e}_t = 1/\lambda$ and for any $w_t \in \left[w_t^H, w_t^L\right]$, labor demand would exactly equal labor supply—$1/\lambda$ agents demanding exactly λ workers each, and a total supply of 1. Hence, there would be multiple equilibrium wages. In contrast, when $\varepsilon > 0$, the measure of entrepreneurs who could pay a wage of w_t^L is $\mathbf{e}_t = (1-\varepsilon)\,\mathbf{e}_{t-1} < 1/\lambda$ 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, w_t^H, which is identical to (18). Since at this wage agents with $a_t^j = A^H$ and $s_t^j = 0$ are indifferent between entrepreneurship and production work, in equilibrium a sufficient number of them enter entrepreneurship, and $\mathbf{e}_t = 1/\lambda$. In the remainder, I focus on the limiting case of this economy where $\varepsilon \to 0$, which picks w_t^H as the equilibrium wage even when labor supply coincides with labor demand for a range of wages.[12]

[12] In other words, the wage w_t^H at $\varepsilon = 0$ is the only point in the equilibrium set where the equilibrium correspondence is (lower-hemi) continuous in ε.

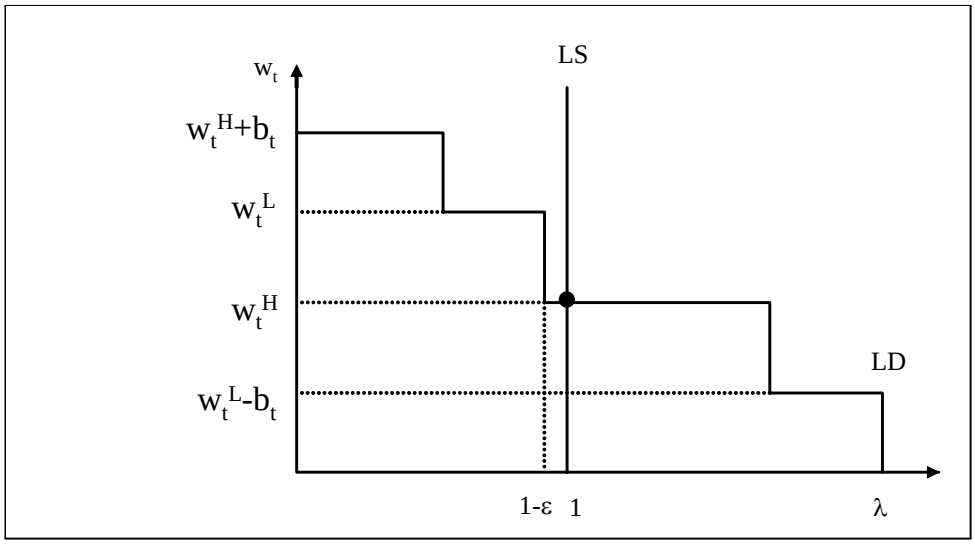


Figure 2: Labor supply and labor demand when (17) does not hold and there exists a sclerotic equilibrium.

Figure 2 illustrates this case diagrammatically. Because (17) does not hold in this case, the second flat portion of the labor demand curve is for low-skill incumbents ($a_t^j = A^L$ and $s_t^j = 1$) who, given the entry barriers, have a higher marginal product of labor than high-skill potential entrants.

The equilibrium law of motion of the fraction of high-skill entrepreneurs, μ_t, is:[13]

$$\mu_t = \begin{cases} \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1}) & \text{if (17) does not hold} \\ 1 & \text{if (17) holds} \end{cases}, \tag{19}$$

starting with some μ_0. The exact value of μ_0 will play an important role below. If we have $s_0^j = 0$ for all j, then any b_0 would apply equally to all potential entrants and as long as it is not so high as to shut down the economy, the equilibrium would involve $\mu_0 = 1$. I consider $\mu_0 = 1$ to be the baseline case in the analysis below. Nevertheless, we may also imagine an economy in which $s_0^j = 1$ for some j or one in which there is some other process of selection into entrepreneurship in the initial period, so that not all initial entrants have high skills. I discuss this issue further below.

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

$$\mu_t = \begin{cases} \varepsilon + (1 - \varepsilon)\left(\sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})\right) & \text{if (17) does not hold} \\ 1 & \text{if (17) holds} \end{cases}$$

3 Political Equilibrium

To obtain a full political equilibrium, we need to determine the policy sequence $\mathbf{p}^t$. I consider two extreme cases: (1) Democracy: the policies b_t and τ_t are determined by majoritarian voting, with each agent having one vote. (2) Oligarchy (elite control): the policies b_t and τ_t are determined by majoritarian voting among the elite at time t.

3.1 Democracy

A democratic equilibrium is an MPE where b_t and τ_t are determined by majoritarian voting at time t. The timing of events implies that the tax rate at time t, τ_t, is decided after investment decisions, whereas the entry barriers are decided before.[14] The assumption $\lambda > 2$ above ensures that workers (non-elite agents) are always in the majority.

At the time taxes are set, investments are sunk, agents have already made their occupation choices, and 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:

$$T_t\left(b_t, \tau_t \mid \hat{\tau}_t\right) = \begin{cases} \frac{1}{1-\alpha}\tau_t(1-\hat{\tau}_t)^{\frac{1-\alpha}{\alpha}}\lambda \sum_{j\in\mathbf{S}_t^E} a_t^j & \text{if } \tau_t \leq \delta \\ 0 & \text{if } \tau_t > \delta \end{cases}, \tag{20}$$

where $\hat{\tau}_t$ is the tax rate expected by entrepreneurs and τ_t is the actual tax rate set by voters. This expression takes into account that if $\tau_t > \delta$, entrepreneurs will hide their output, and tax revenue will be 0. T_t is a function of the entry barrier, b_t, since this can affect the selection of entrepreneurs, and thus the $\sum_{j\in\mathbf{S}_t^E} a_t^j$ term.

The entry barrier, b_t, is set before occupational choices. Low-productivity workers (with $s_t^j = 0$ and $a_t^j = A^L$) know that they will remain workers, and in MPE, the policy choice at time t has no influence on strategies in the future except through its impact on payoff relevant variables. Therefore, the utility of agent j with $s_t^j = 0$ and $a_t^j = A^L$ depends on b_t and τ_t only through the equilibrium wage, $w_t^H\left(b_t \mid \hat{\tau}_t\right)$, and the transfer, $T_t\left(b_t, \tau_t \mid \hat{\tau}_t\right)$, where I have written the equilibrium wage explicitly as a function of the current entry barrier, b_t, and anticipated taxes, $\hat{\tau}_t$. The equilibrium wage depends on $\hat{\tau}_t$ because the labor market clears before tax decisions (in equilibrium, naturally, $\tau_t = \hat{\tau}_t$). Thus $w_t^H\left(b_t \mid \hat{\tau}_t\right)$ is given by (18) with the anticipated tax, $\hat{\tau}_t$, replacing τ_t.

High-productivity workers (with $s_t^j = 0$ and $a_t^j = A^H$) may become entrepreneurs, but as the above analysis shows, in this case, $NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) = 0$, we have

[14] Appendix B presents a more general version of the model, which has both policy choices made simultaneously, and derives the same qualitative results to those in the text.

$W^H = W^L$, so their utility is also identical to those of low-skill workers. Consequently, all workers prefer a level of b_t that maximizes $w_t^H(b_t \mid \hat{\tau}_t) + T_t(b_t, \tau_t \mid \hat{\tau}_t)$. Since the preferences of all workers are the same and they are in the majority, the democratic equilibrium will maximize these preferences.

A democratic equilibrium is therefore given by policy, wage and economic decision sequences $\hat{\mathbf{p}}^t$, $\hat{\mathbf{w}}^t$, and $\hat{\mathbf{x}}^t$ such that $\hat{\mathbf{w}}^t$ and $\hat{\mathbf{x}}^t$ constitute an economic equilibrium given $\hat{\mathbf{p}}^t$, and $\hat{\mathbf{p}}^t$ is such that:

$$\left(\hat{b}_t, \hat{\tau}_t\right) \in \arg\max_{b_t, \tau_t} \left\{ w_t^H(b_t \mid \hat{\tau}_t) + T_t(b_t, \tau_t \mid \hat{\tau}_t) \right\}.$$

Since $T_t(b_t, \tau_t \mid \hat{\tau}_t)$ is maximized at $\tau_t = \delta$ and $w_t^H(b_t \mid \hat{\tau}_t)$ does not depend on τ_t, workers will choose $\tau_t = \delta$.[15] Inspection of (18) and (20) also shows that wages and tax revenue are both maximized when $b_t = 0$, so the democratic equilibrium will not impose any entry barriers. This is intuitive; workers have nothing to gain by protecting incumbents, and a lot to lose, since such protection reduces labor demand and wages. Since there are no entry barriers, only high-skill agents will become entrepreneurs, or in other words $e_t^j = 1$ only if $a_t^j = A^H$. Given this stationary sequence of MPE policies, we can use the value functions (11) and (13) to obtain

$$V^H = W^H = W^L = W = \frac{w^D + T^D}{1 - \beta}, \tag{21}$$

where w^D is the equilibrium wage in democracy, and T^D is the level of transfers, given by δY^D. Since there are no entry barriers now or in the future and $\tau_t = \delta$, equation (15) then implies that $w^D = \alpha(1-\delta)^{1/\alpha} A^H / (1-\alpha)$. The following proposition therefore follows immediately (proof in the text):

Proposition 1 There exists a unique democratic equilibrium, which features $\tau_t = \delta$ and $b_t = 0$. Moreover, we have $e_t^j = 1$ if and only if $a_t^j = A^H$, so $\mu_t = 1$. The equilibrium wage rate is given by

$$w_t^D = w^D \equiv \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H, \tag{22}$$

[15] The results are identical when taxes are on income rather than output (with the standard definition of income, without subtracting the investment expenses for entrepreneurs). In this case, the objective function of the median voter would be: $(1-\tau_t)\,\tilde{w}_t^H(b_t \mid \hat{\tau}_t) + T_t(b_t, \tau_t \mid \hat{\tau}_t)$ (plus continuation value), where $\tilde{w}_t^H(b_t \mid \hat{\tau}_t)$ is the equilibrium wage rate when there is income taxation and $T_t(b_t, \tau_t \mid \hat{\tau}_t)$ is the tax revenue, which is unchanged (this is because tax revenues now include taxes from wage income, but this is offset by the lower tax revenue from entrepreneurs, who are now paying taxes only on their output minus wage bill). It can be verified that $\tilde{w}_t^H(b_t \mid \hat{\tau}_t) = w_t^H(b_t \mid \hat{\tau}_t)/(1-\hat{\tau}_t)$, which implies that $\tau_t = \delta$ is the most preferred tax rate of the median voter.

and the aggregate output is

$$Y_t^D = Y^D \equiv \frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H. \tag{23}$$

An important feature of this equilibrium is that aggregate output is constant over time, which will contrast with the oligarchic equilibrium. Another noteworthy feature is that there is perfect equality because the excess supply of high-skill entrepreneurs ensures that they receive no rents.[16]

3.2 Oligarchy

In oligarchy, policies are determined by majoritarian voting among the elite. At the time of voting over the entry barriers, b_t, the elite consist of those with $s_t = 1$, and at the time of voting over the taxes, τ_t, the elite are those with $e_t = 1$.[17]

Let us start with the taxation decision among those with $e_t = 1$. Appendix A proves that as long as

$$\lambda \geq \frac{1}{2}\frac{A^H}{A^L} + \frac{1}{2}, \tag{24}$$

then both high-skill and low-skill entrepreneurs prefer zero taxes, i.e., $\tau_t = 0$. In the text, I present the analysis when this condition is satisfied, and leave its derivation and the characterization of the equilibrium when it does not hold to the Appendix. Intuitively, condition (24) requires the productivity gap between low and high-skill elites not to be so large that low-skill elites wish to tax profits in order to indirectly transfer resources from high-skill entrepreneurs to themselves.

When condition (24) holds, the oligarchy will always choose $\tau_t = 0$. Then anticipating this tax choice, at the stage of deciding the entry barriers, high-skill entrepreneurs would like to maximize $V^H\left(\left[\left(b_t, 0\right), \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$, where $\mathbf{p}^t \equiv \left[\left(b_t, \tau_t\right), \mathbf{p}^{t+1}\right]$ and recall that $\mathbf{w}^t \equiv \left[w_t, \mathbf{w}^{t+1}\right]$. On the other hand, low-skill entrepreneurs would like to maximize $V^L\left(\left[\left(b_t, 0\right), \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$. Both of these are maximized by setting a level of the entry

[16] Note that Y^D gives the level of output inclusive of consumption and investment. "Net output" and consumption can be obtained by subtracting investment costs as $\left(\left(\alpha + \delta\left(1-\delta\right)\right)\left(1-\delta\right)^{(1-\alpha)/\alpha}\right) A^H / \left(1-\alpha\right)$. All the results stated for output in this paper also hold for net output.

[17] An alternative modeling assumption would be to limit the decision on the tax rate only to agents with $s_t = 1$. In this case, analyzed in the working paper version, the equilibrium here arises if a simple parameter condition is satisfied, and otherwise there are equilibrium cycles. Though these cycles are of theoretical interest, in this version I decided to simplify the analysis by focusing on the case discussed in the text.

barrier that ensures the minimum level of equilibrium wages.[18] Equilibrium wage, given in (18), will be minimized at $w_t^H = 0$, by choosing any

$$b_t \geq b_t^E \equiv \frac{\alpha}{1-\alpha} A^H + \beta \left(\frac{CV^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)}{\lambda} \right). \tag{25}$$

Without loss of any generality, I set $b_t = b_t^E$.

An oligarchic equilibrium then can be defined as a policy sequence $\hat{\mathbf{p}}^t$, wage sequence $\hat{\mathbf{w}}^t$, and economic decisions $\hat{\mathbf{x}}^t$ such that $\hat{\mathbf{w}}^t$ and $\hat{\mathbf{x}}^t$ constitute an economic equilibrium given $\hat{\mathbf{p}}^t$, and $\hat{\mathbf{p}}^t$ is such $\tau_{t+n} = 0$ and $b_{t+n} = b_{t+n}^E$ for all $n \geq 0$. In the oligarchic equilibrium, there is no redistributive taxation and entry barriers are sufficiently high to ensure a sclerotic equilibrium with zero wages.

Imposing $w_{t+n}^e = 0$ for all $n \geq 0$, we can solve for the values of high- and low-skill entrepreneurs from the value functions (13). Let $\tilde{V}^z = V^z\left(\left[\left(b_t^E, 0\right), \mathbf{p}^{t+1}\right], \left[0, \mathbf{w}^{t+1}\right]\right) = V_{t+1}^z\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)$, then

$$\tilde{V}^L = \frac{1}{1-\beta}\left[\frac{\alpha\lambda}{1-\alpha}\frac{\left(1-\beta\sigma^H\right)A^L + \beta\sigma^L A^H}{\left(1-\beta\left(\sigma^H-\sigma^L\right)\right)}\right], \tag{26}$$

and

$$\tilde{V}^H = \frac{1}{1-\beta}\left[\frac{\alpha\lambda}{1-\alpha}\frac{\left(1-\beta\left(1-\sigma^L\right)\right)A^H + \beta\left(1-\sigma^H\right)A^L}{\left(1-\beta\left(\sigma^H-\sigma^L\right)\right)}\right]. \tag{27}$$

These expressions are intuitive. First, consider $\tilde{V}^L$ and the case where $\beta \to 1$; then, starting in the state L, an entrepreneur will spend a fraction $\sigma^L/\left(1-\sigma^H+\sigma^L\right)$ of his future with low skill A^L and a fraction $\left(1-\sigma^H\right)/\left(1-\sigma^H+\sigma^L\right)$ with high skill A^H. $\beta < 1$ implies discounting and the low-skill states which occur sooner are weighed more heavily (since the agent starts out as low skill). The intuition for $\tilde{V}^H$ is identical.

Since there will be zero equilibrium wages and no transfers, it is clear that $W = 0$ for all workers. Therefore, for a high-skill worker, $NV = \tilde{V}^H - b$, implying that

$$b_t = b^E \equiv \frac{1}{1-\beta}\left[\frac{\alpha\lambda}{1-\alpha}\frac{\left(1-\beta\left(1-\sigma^L\right)\right)A^H + \beta\left(1-\sigma^H\right)A^L}{\left(1-\beta\left(\sigma^H-\sigma^L\right)\right)}\right] \tag{28}$$

is a sufficient to ensure zero equilibrium wages.

[18] This is clearly optimal for low-skill entrepreneurs conditional on remaining as entrepreneurs. If they were to leave entrepreneurship, they would at most obtain $W^L\left(\left[\left(b_t = 0, \tau_t = 0\right), \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$, which is strictly less than $V^L\left(\left[\left(b_t = b_t^E, \tau_t = 0\right), \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$ for b_t^E defined in (28) below. The crucial point here is that low-skill elites do not have an option to end the oligarchic regime (see Proposition 4 below).

In this oligarchic equilibrium, aggregate output is:

$$Y_t^E = \mu_t \frac{1}{1-\alpha} A^H + (1-\mu_t) \frac{1}{1-\alpha} A^L, \tag{29}$$

where $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1-\mu_{t-1})$ as given by (19), starting with some μ_0.

As noted above, if all individuals start with $s_0^j = 0$, the equilibrium will feature $\mu_0 = 1$. In this case, and in fact, for any $\mu_0 > M$, μ_t will be a decreasing sequence converging to M and aggregate output Y_t^E is also decreasing over time with:[19]

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{1}{1-\alpha} \left(A^L + M(A^H - A^L) \right). \tag{30}$$

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 ability over time.

Nevertheless, it is also possible to imagine societies in which $\mu_0 < M$, because there is some other process of selection into the oligarchy in the initial period that is negatively correlated with skills in entrepreneurship. In this case, somewhat paradoxically, μ_t and thus Y_t^E would be increasing over time. While interesting in theory, this case appears less relevant in practice, where we would expect at least some positive selection in the initial period, so that high-skill agents are more likely to become entrepreneurs at time $t = 0$ and $\mu_0 > M$.

Another important feature of this equilibrium is that there is a high degree of (income) inequality. Wages are equal to 0, while entrepreneurs earn positive profits—in fact, each entrepreneur earns λY_t^E (gross of investment expenses), and their total earnings equal aggregate output. This contrasts with relative equality in democracy.

Proposition 2 Suppose that condition (24) holds. Then there exists a unique oligarchic equilibrium, with $\tau_t = 0$ and $b_t = b^E$ as given by (28). The equilibrium is sclerotic, with equilibrium wages $w_t^e = 0$, and the fraction of high-skill entrepreneurs given by $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1-\mu_{t-1})$ starting with μ_0. Aggregate output is given by (29) and satisfies $\lim_{t\to\infty} Y_t^E = Y_\infty^E$ as in (30). Moreover, as long as $\mu_0 > M$, aggregate output is decreasing over time.

Appendix A completes the proof of this proposition and also characterizes the equilibrium when condition (24) does not hold.

[19] 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 $Y_t^E = \mu_t \frac{1}{1-\alpha} A^H + (1-\mu_t)\frac{1}{1-\alpha} A^L$ and $Y_\infty^E \equiv \frac{1}{1-\alpha}\left(A^L + \frac{\varepsilon + (1-\varepsilon)\sigma_L}{1-(1-\varepsilon)(\sigma^H - \sigma^L)}(A^H - A^L)\right)$.

3.3 Comparison Between Democracy and Oligarchy

The first important result in the comparison between democracy and oligarchy is that if initial selection into entrepreneurship is on the basis of entrepreneurial skills (e.g., because $s_0^j = 0$ for all j) so that $\mu_0 = 1$, then aggregate output in the initial period of the oligarchic equilibrium, Y_0^E, is greater than the constant level of output in the democratic equilibrium, Y^D. In other words,

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

Therefore, oligarchy initially generates greater output than democracy, because it is protecting the property rights of entrepreneurs. However, the analysis also shows that, in this case, Y_t^E declines over time, while Y^D is constant. Consequently, the oligarchic economy may subsequently fall behind the democratic society. Whether it does so or not depends on whether Y^D is greater than Y_∞^E as given by (30). This will be the case if $(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H / (1-\alpha) > \left(A^L + M(A^H - A^L)\right) / (1-\alpha)$, or if

$$(1-\delta)^{\frac{1-\alpha}{\alpha}} > \frac{A^L}{A^H} + M\left(1 - \frac{A^L}{A^H}\right). \tag{31}$$

If condition (31) holds, then at some point the democratic society will overtake ("leapfrog") the oligarchic society.

As noted above, it is possible to imagine societies in which even in the initial period, there are "elites" that are not selected into entrepreneurship on the basis of their skills. In this case, we will typically have $\mu_0 < 1$. In the extreme case where there is negative selection into entrepreneurship in the initial period, we have $\mu_0 < M$. To analyze these cases, define

$$\bar{\mu}_0 \equiv \frac{(1-\delta)^{\frac{1-\alpha}{\alpha}} - A^L/A^H}{1 - A^L/A^H}. \tag{32}$$

It can be verified that if $\mu_0 > \bar{\mu}_0$, then oligarchy will generate greater output in the initial period. Notice also that $\bar{\mu}_0 > M$ if and only if (31) holds.

This discussion and inspection of (31) immediately establish the following result (proof in the text):

Proposition 3 Assume that condition (24) holds.

1. Suppose also that $\mu_0 = 1$. Then at $t = 0$, aggregate output is higher in an oligarchic society than in a democratic society, i.e., $Y_0^E > Y^D$. If (31) does not hold, then

aggregate output in oligarchy is always higher than in democracy, i.e., $Y_t^E > Y^D$ for all t. If (31) holds, then there exists $t' \in \mathbb{N}$ such that for $t \leq t'$, $Y_t^E \geq Y^D$ and for $t > t'$, $Y_t^E < Y^D$, so that the democratic society leapfrogs the oligarchic society. Leapfrogging is more likely when δ, A^L/A^H and M are low.

2. Suppose next that $\mu_0 < 1$. If $\mu_0 > \max\{M, \bar{\mu}_0\}$, then the results from part 1 apply. If (31) holds and $\mu_0 < \bar{\mu}_0$, then aggregate output in oligarchy, Y_t^E, is always lower than that in democracy, Y^D. If (31) does not hold and $\mu_0 < M$, then aggregate output in oligarchy, Y_t^E, is always higher than that in democracy, Y^D.

This proposition implies that when μ_0 is not excessively low, an oligarchic society will start out as more productive than a democratic society, but will decline over time.[20] There are three important conclusions that follow from the limiting behavior of output in oligarchy. In particular, oligarchies are more likely to be relatively inefficient in the long run:

1. when δ is low, meaning that democracy is unable to pursue highly populist policies with a high degree of redistribution away from entrepreneurs/capitalists. The parameter δ may correspond both to certain institutional impediments limiting redistribution, or more interestingly, to the specificity of assets in the economy; with greater specificity, taxes will be limited, and redistributive distortions may be less important.

2. when A^H is high relative to A^L, so that comparative advantage and thus selecting the high-skill agents for entrepreneurship are important for the efficient allocation of resources.[21]

3. M is low, so that a random selection of agents contains a small fraction of high-skill agents, making oligarchic sclerosis highly distortionary. Alternatively, M is low when σ^H is low, so oligarchies are more likely to lead to low output in the long run when the efficient allocation of resources requires a high degree of churning in the ranks of entrepreneurs.

[20] Proposition 3 compares the income and consumption levels, and not the welfare levels in the two regimes. Since in oligarchy there are high levels of consumption early on, the average expected discounted utility at time $t = 0$ could be higher than in democracy, even when (31) holds.

[21] Another reason why a large gap between A^H and A^L will make oligarchy less desirable is that in this case, condition (24) would not hold, which, as shown in Appendix A, makes oligarchy more inefficient.

On the other hand, if the extent of taxation in democracy is high and the failure to allocate the right agents to entrepreneurship only has limited costs, then an oligarchic society will generate greater output than a democracy in the long run.

These comparative static results may be useful in interpreting why, as discussed in the Introduction, the Northeastern United States so conclusively outperformed the Caribbean plantation economies during the 19th century. First, the American democracy was not highly redistributive, corresponding to low δ in terms of the model here. More important, the 19th century was the age of industry and commerce, where the allocation of high-skill agents to entrepreneurship was probably quite important, and potentially only a small fraction of the population were really talented as inventors and entrepreneurs. This can be thought of as a low value of A^L/A^H and M.

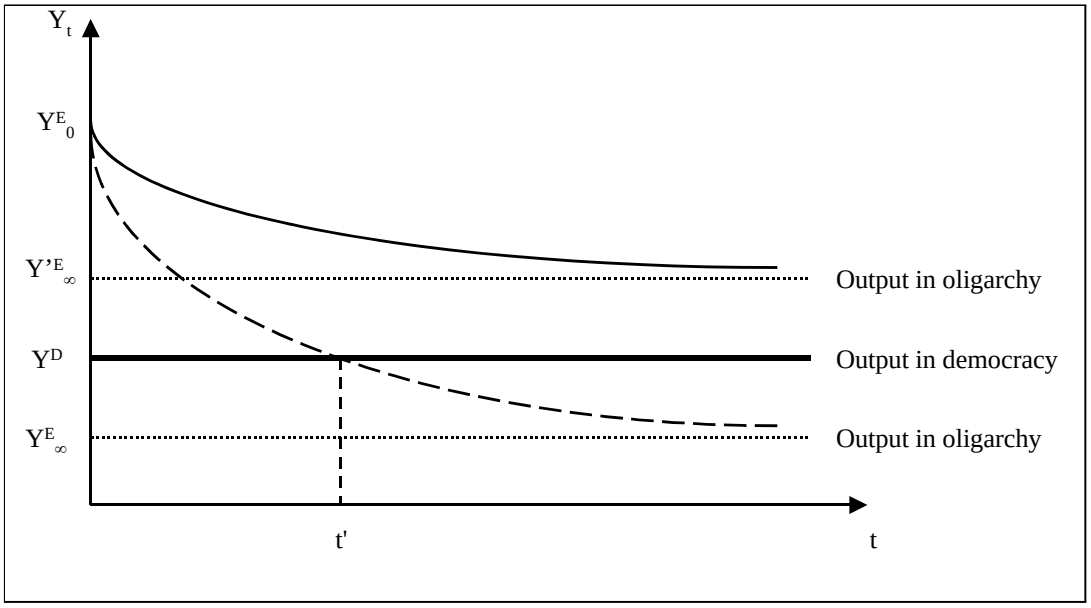


Figure 3: Comparison of aggregate output in democracy and oligarchy. The dashed curve depicts output in oligarchy when (31) holds, and the solid line when it does not.

Figure 3 illustrates the case with $\mu_0 = 1$ (or $\mu_0 > \max\{M, \bar{\mu}_0\}$), and depicts both the situation in which (31) holds and the converse. The thick flat line shows the level of aggregate 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 case where (31) holds and for the case where it does not. Both of these curves asymptote to some limit, either Y_∞^E or $Y_\infty'^E$, which may lie below or above Y^D. The dashed curve shows the case where (31) holds, so after date t', oligarchy generates less aggregate output than democracy. When (31) does not hold,

the solid curve applies, and aggregate output in oligarchy asymptotes to a level higher than Y^D.

Naturally, both of these major results, the greater short-term efficiency and the dynamic costs of oligarchy, are derived from the underlying assumptions of the model. In addition to μ_0 being sufficiently large, the first result is a consequence of the assumption that the only source of distortion in oligarchy is the 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 $t = 0$. The dynamic costs of oligarchy are also stark in this model, since output and distortions in democracy are constant, whereas the allocation of talent deteriorates in oligarchy because of the entry barriers. In more general models, democracy may also create intertemporal distortions. For example, if democracy is expected to tax capital incomes in the future, this will create dynamic distortions, though in this case, it is also reasonable to think that oligarchy may tax human capital more, creating similar distortions. Which set of distortions dominate is an empirical question. Nevertheless, the dynamic distortions of oligarchy emphasized in this paper are new and potentially important, and thus need to be considered in evaluating the allocative costs of these regimes.[22]

The second part of the proposition also highlights the role of selection of individuals into entrepreneurship (and oligarchy) in the initial period. It shows that the results highlighted so far hold even if μ_0 is less than one, as long as it is not very small. On the other hand, if μ_0 is very small to start with, oligarchy may always generate less output than democracy, and in fact, if μ_0 starts out less than M, oligarchy may even have increasing level of output. A very low level of μ_0 may emerge if the oligarchy is started by individuals that are talented in non-economic activities (e.g., elites specialized in fighting in pre-modern times) and these non-economic talents are negatively correlated with entrepreneurial skills. Nevertheless, as noted above, a significant amount of positive selection on the basis of skills even in the initial period seems to be the more reasonable

[22]It is also useful to point out that some alternative institutional arrangements would dominate both democracy and oligarchy in terms of aggregate output performance. For example, a society may restrict the amount of redistribution by placing a constitutional limit on taxation, and let the decisions on entry barriers be made democratically. Alternately, it may prevent entry barriers constitutionally, and place the taxation decisions in the hands of the oligarchy. The perspective here is that these arrangements are not possible in practice because of the inherent commitment problem in politics: those with the political power in their hands make the policy decisions, and previous promises are not necessarily credible. Consequently, it is not possible to give political power to incumbent producers, and then expect them not to use their political power to erect entry barriers, or to vest political power with the poorer agents and expect them not to favor redistribution.

case.

What about inequality and the preferences of different groups over regimes? First, it is straightforward to see that oligarchy always generates more (consumption) inequality relative to democracy, since the latter has perfect equality—the net incomes and consumption of all agents are equalized in democracy because of the excess supply of high-skill entrepreneurs.

Moreover, non-elites are always better off in democracy than in oligarchy, where they receive zero income. In contrast, and more interestingly, it is possible for low-skill elites to be better off in democracy than in oligarchy (though high-skill elites are always better off in oligarchy). This point will play a role in Section 4, so it is useful to understand the intuition. Recall that the utility of low-skill elites in oligarchy is given by (26) above, whereas combining (21), (22) and (23), these low-skill agents in democracy would receive:

$$W^L = \frac{1}{1-\beta}\left[\left(\frac{\alpha\left(1-\delta\right)+\delta}{1-\alpha}(1-\delta)^{(1-\alpha)/\alpha}\right)A^H\right].$$

Comparing this expression to (26) makes it clear that if δ, A^L/A^H, σ^L and/or λ are sufficiently low, these low-skill elites would be better off in democracy than in oligarchy. More specifically, we have (proof in the text):

Proposition 4 If

$$\alpha\lambda\frac{\left(1-\beta\sigma^H\right)A^L/A^H+\beta\sigma^L}{\left(1-\beta\left(\sigma^H-\sigma^L\right)\right)} < \left(\left(\alpha\left(1-\delta\right)+\delta\right)\left(1-\delta\right)^{(1-\alpha)/\alpha}\right), \tag{33}$$

then low-skill elites would be better off in democracy.

Despite this result low-skill elites, even when (33) holds, prefer to remain in entrepreneurship.[23] This is because, given the structure of the political game, if the low-skill incumbent elites give up entrepreneurship, the new entrepreneurs will make the political choices, and they will naturally choose high entry barriers and no redistribution. Therefore, by quitting entrepreneurship, low-skill elites would be giving up their political power. Consequently, they are choosing between being elites and being workers in oligarchy, and clearly, the former is preferred. In Section 4, we will see how, under different assumptions on the political game, a smooth transition from oligarchy to democracy can be possible when (33) holds.

[23]It is straightforward to verify that (33) may fail to hold even though (24) above holds.

3.4 New Technologies

The Introduction discussed the possibility of a more democratic society, such as the United States at the end of the eighteenth century, adapting better to the arrival of new investment or technological opportunities than an oligarchy, such as those in the Caribbean. The model here provides a potential explanation for this pattern.

Suppose that at some date $t' > 0$, there is an unanticipated and exogenous arrival of a new technology,[24] enabling entrepreneur j to produce:

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

where $\psi > 1$ and $\hat{a}_t^j$ is the talent of this entrepreneur with the new technology. Assuming that $l_t^j = \lambda$ for the new technology as well, entrepreneur j's output can be written as

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

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

$$\hat{a}_{t+1}^j = \begin{cases} A^H & \text{with probability} \quad \sigma^H & \text{if } \hat{a}_t^j = A^H \\ A^H & \text{with probability} \quad \sigma^L & \text{if } \hat{a}_t^j = A^L \\ A^L & \text{with probability } 1-\sigma^H & \text{if } \hat{a}_t^j = A^H \\ A^L & \text{with probability } 1-\sigma^L & \text{if } \hat{a}_t^j = A^L \end{cases}, \tag{34}$$

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 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. This is reasonable since new technologies exploit different skills and create different comparative advantages than the old ones.

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 as given by (23) to

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

In contrast, in oligarchy, the elites are in power at time t', and they would like to remain the entrepreneurs even if they do not have comparative advantage for working with the

[24] An interesting question is whether democratic and oligarchic societies would have different propensities to invent new technologies, which is sidestepped here by assuming exogenous arrival of the new technology.

new technology. How aggregate output in the oligarchic equilibrium changes after date t' depends on whether $\psi A^L > A^H$ or not. If it is, then all incumbents switch to the new technology and aggregate output in the oligarchic equilibrium at date t' jumps up to

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

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 skill with the new technology, and the remainder have low skill.

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

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

with μ_t given by (19) as before. Intuitively, now the members of the elite who have high skill with the new technology and those who have low skill with the old technology switch to the new technology, while those with high skill with the old and low skill with the new remain with the old technology (they switch to new technology only when they lose their high-skill 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, with

$$\lim_{t\to\infty} \tilde{Y}_t^E = \frac{1}{1-\alpha}\left[M\psi A^H + M\left(1-M\right)A^H + \left(1-M\right)^2\psi A^L\right].$$

It is also straightforward to verify that, as long as $Y_{\infty}^E \leq Y^D$, 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 a 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 richer 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 to enter entrepreneurship, while the oligarchic society typically fails to do so, and therefore has greater difficulty adapting to technological change.[25]

[25] In practice, it may also 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.

4 Regime Changes

The previous section characterized the political equilibrium under two different scenarios; democracy and oligarchy. Which political system prevails in a given society was treated as exogenous. Why are certain societies democratic, while others are 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 ignores it when there is a choice of regime. Finally, neither of these two approaches provides a framework for analyzing changes in regime, which are ubiquitous.

A more satisfactory approach would be to let the same trade-offs emphasized above also govern which regimes will emerge and persist in equilibrium. In this section, I make a preliminary attempt in this direction.[26] I first discuss how a natural modification of the above framework allows a situation in which an oligarchy will naturally disband itself transitioning to a more democratic regime. Next, I consider an extension where the distribution of income affects political power and the equilibrium regime choice. To simplify the discussion, in this section I assume that $\mu_0 = 1$.

4.1 Smooth Transition from Oligarchy to Democracy

First, I briefly discuss how oligarchy may "voluntarily" transform itself into a democracy in a modified version of the model. I change one assumption from the baseline model. I allow the current elite to also vote to disband oligarchy, upon which a permanent democracy is established. I denote this choice by $d_t \in \{0, 1\}$, with 0 standing for continuation with the oligarchic regime. To describe the law of motion of the political regime, let us denote oligarchy by $D_t = 0$ and democracy by $D_t = 1$. Since transition to democracy is

[26] See Acemoglu and Robinson (2000, 2004) for a class of models of equilibrium political institutions, with an emphasis on shifts in political power between poorer and richer segments of the society. These models do not consider the economic trade-offs between distortionary taxation and entry barriers.

permanent, we have

$$D_t = \begin{cases} 0 & \text{if } d_{t-n} = 0 \text{ for all } n \geq 0 \\ 1 & \text{if } d_{t-n} = 1 \text{ for some } n \geq 0 \end{cases}.$$

Voting over d_t in oligarchy is at the same time as voting over b_t (there are no votes over d_t in democracy, since a transition to democracy is permanent), so agents with $s_t = 1$ vote over these choices (recall the timing of events in subsection 2.1). I assume that after the vote for $d_t = 1$, there is immediate democratization and all agents participate in the vote over taxes starting in period t.

First, imagine a situation where condition (33) does not hold so that even low-skill elites are better off in oligarchy. Then all elites will always vote for $d_t = 0$, and as in Proposition 2, they will also choose $b_t = b^E$ and $\tau_t = 0$. Hence, in this case, the equilibrium remains oligarchic throughout.

What happens when (33) holds? Current low-skill elites, i.e., those with $s_t = 1$ and $a_t = A^L$, would be better off in democracy (recall Proposition 4). If they vote for $d_t = 0$, they stay in oligarchy, which gives them a lower payoff. If instead they vote for $d_t = 1$ and $b_t = 0$, then this will immediately take us to a democratic equilibrium; following this vote, high-skill agents enter entrepreneurship and there are redistributive taxes at the rate $\tau_t = \delta$ as in Proposition 1.

Consequently, when they are in the majority, low-skill elites prefer to transition to a permanent democracy by voting for $d_t = 1$. Since $\mu_0 = 1$, they are initially in the minority, and the oligarchic equilibrium applies. However, because in the oligarchic equilibrium the fraction of high-skill elites decreases over time, the low-skill agents eventually become the majority and choose to disband the oligarchy. This discussion immediately leads to the following proposition:

Proposition 5 Suppose that (24) holds and the society starts as oligarchic. If (33) does not hold, then for all t the society remains oligarchic with $d_t = 0$; the equilibrium involves no redistribution, $\tau_t = 0$ and high entry barriers, $b_t = b^E$ as given by (28), and the fraction of high-skill entrepreneurs is given by $\mu_t = \sigma^H \mu_{t-1} + \sigma^L(1 - \mu_{t-1})$ starting with $\mu_0 = 1$. If (33) holds, then the society remains oligarchic, $d_t = 0$, with no redistribution, $\tau_t = 0$ and high entry barriers, $b_t = b_t^E$ as given by (25) until date $t = \tilde{t}$ where $\tilde{t} = \min t' \in \mathbb{N}$ such that $\mu_{t'} \leq 1/2$ (whereby $\mu_t = \sigma^H \mu_{t-1} + \sigma^L(1 - \mu_{t-1})$ for $t < \tilde{t}$ starting with $\mu_0 = 1$). At $\tilde{t}$, the society transitions to democracy with $d_{\tilde{t}} = 1$, and for $t \geq \tilde{t}$, we have $\tau_t = \delta$, $b_t = 0$ and $\mu_t = 1$.

Intuitively, when (33) holds, low-skill entrepreneurs are better off transitioning to democracy than remaining in the oligarchic society, while high-skill entrepreneurs are always better off in oligarchy. As a result, the society remains oligarchic as long as high-skill entrepreneurs are in the majority, i.e., as long as $t < \tilde{t}$, and the first period in which low-skill entrepreneurs become majority within the oligarchy, i.e., at $\tilde{t}$ such that $\mu_t < 1/2$ for the first time, the oligarchy disbands itself transitioning to a democratic regime (and at that point μ_t jumps up to 1).[27]

This configuration is especially interesting when (31) holds such that oligarchy ultimately leads to lower output than democracy. In this case, if (33) holds, oligarchy transitions into democracy avoiding the long-run adverse efficiency consequences of oligarchy—but when this condition does not hold, oligarchy survives forever with negative consequences for efficiency and output. This extension therefore provide a simple model for thinking about how a society can transform itself from oligarchy to a more democratic system, before the oligarchic regime becomes excessively costly. Interestingly, however, the reason for the transition from oligarchy to democracy is *not* increased inefficiency in the oligarchy, but conflict between high and low-skill agents *within* the oligarchy; the transition takes place when the low-skill elites become the majority.

4.2 Conflict Over Regimes

Finally, I consider an extension where the distribution of income affects the conflict over political regime. In particular, suppose that (33) does not hold, so that while non-elites would like to switch from oligarchy to democracy, both high-skill and low-skill elites would like to preserve the oligarchic system. How will these conflicting interests between elites and non-elites be mediated? A plausible answer is that there is no easy compromise, and whichever group is politically or militarily more powerful will prevail. This is the perspective adopted in this subsection, and the political or military power of a group is linked to its economic power. In other words, in the conflict between the elite and the non-elites, the likelihood that the elite will prevail is increasing in their relative economic strength. This assumption is plausible: a non-democratic regime often transforms 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 depends on the resources available to it.

[27] Notice also that when (33) holds, the level of entry barriers in oligarchy is no longer given by b^E as in (28). This is because the oligarchy is anticipated to end, and hence there are fewer benefits from joining the elite, so a lower entry barrier, b_t^E, is enough to induce $w_t^e = 0$. Of course, $b_t = b^E > b_t^E$ would also induce $w_t^e = 0$.

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 $q_t^D = q^D(\Delta\mathcal{W}_{t-1})$, where $\Delta\mathcal{W}_{t-1} = \mathcal{W}_{t-1}^E - \mathcal{W}_{t-1}^W$ is the wealth gap, the difference between the levels of wealth of the elite and the citizens at time $t-1$. The assumption that economic power buys political power is equivalent to $q^D(\cdot)$ being decreasing. I also assume that when democratic, a society becomes oligarchic with probability

$$q_t^O = q^O(\Delta\mathcal{W}_{t-1})$$

where now $q^O(\cdot)$ is a non-decreasing function, with $q^O(0) = 0$, so that with perfect equality, there is no danger of switching back to oligarchy. Here $\Delta\mathcal{W}_t$ refers to the income gap between the initial elite (those with with $s_1^j = 1$) and the citizens.[28] This discussion immediately leads to the following law of motion for D_t:

$$D_t = \begin{cases} 0 & \text{with probability } 1 - q^D(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 0 \\ 1 & \text{with probability } \quad q^D(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 0 \\ 0 & \text{with probability } \quad q^O(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 1 \\ 1 & \text{with probability } 1 - q^O(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 1 \end{cases}, \tag{35}$$

I also assume that each agent saves out of current income at a constant (exogenous) rate $\nu < 1$, which considerably simplifies the analysis.[29] Let us start with the oligarchy, $D_{t-1} = 0$. Since citizens earn zero income in oligarchy, when we have $\mathcal{W}_t^W = 0$ and $\Delta\mathcal{W}_t = \mathcal{W}_t^E$ for all t. Therefore,

$$\Delta\mathcal{W}_t = \nu\left(\Delta\mathcal{W}_{t-1} + \lambda Y_{t-1}^E\right). \tag{36}$$

This implies

$$\Delta\mathcal{W}_t = \lambda\sum_{n=1}^{t}\nu^n Y_{t-n}^E, \text{ and } \lim_{t\to\infty}\Delta\mathcal{W}_t = \Delta\mathcal{W}_\infty \equiv \frac{\lambda Y_\infty^E}{1-\nu} \text{ if } D_{t-1} = 0, \tag{37}$$

where Y_∞^E is given by (30). Appendix C proves that Y_t^E is still given by (29) above. In addition, let us assume that $\mathcal{W}_0^E$ is small, in particular, less than $\Delta\mathcal{W}_\infty$, which amounts to assuming that the wealth of the elite, and thus the wealth gap, will be increasing over time

[28] The alternative would be for the agents who currently have $s_t = 1$ to become the elite. This would require us to keep track of the entire wealth distribution, which becomes quite involved.

[29] This can be endogenized in a variety of ways, but this added level of analysis does not generate new insights. The important point here is that, since individuals are small in their economic decisions, they will ignore the effect of their savings on aggregate transition probabilities.

Now two interesting cases can be distinguished:[30] (1) There exists $\overline{\Delta\mathcal{W}} < \Delta\mathcal{W}_\infty$ such that $q^D\left(\overline{\Delta\mathcal{W}}\right) = 0$. (2) $q^D\left(\Delta\mathcal{W}_\infty\right) > 0$. In the former case, there also exists $\bar{t}$ such that for all $t \geq \bar{t}$, we have $\Delta\mathcal{W}_t \geq \overline{\Delta\mathcal{W}}$, 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.

In contrast to oligarchy, in democracy, all agents earn the same amount, so when $D_{t+k} = 1$ for all $k \geq 0$,

$$\Delta\mathcal{W}_{t+1} = \nu\Delta\mathcal{W}_t \text{ and } \lim_{t\to\infty} \Delta\mathcal{W}_t = 0. \tag{38}$$

Consequently, an equilibrium with regime changes is a policy sequence $\hat{\mathbf{p}}^t$, a wage sequence $\hat{\mathbf{w}}^t$ and economic decisions $\hat{\mathbf{x}}^t$ such that $\hat{\mathbf{w}}^t$ and $\hat{\mathbf{x}}^t$ constitute an economic equilibrium given $\hat{\mathbf{p}}^t$, and if $D_t = 0$, then $\hat{\mathbf{p}}^t$ is the oligarchic equilibrium policy sequence and $\Delta\mathcal{W}_{t+1}$ is given by (36), and if $D_t = 1$, then $\hat{\mathbf{p}}^t$ is the democratic equilibrium policy sequence and $\Delta\mathcal{W}_{t+1}$ is given by (38). D_t is in turn given by (35) with $D_0 = 0$.

Appendix C also gives the proof of the following proposition on regime change:

Proposition 6 Suppose that (24) holds, (33) does not hold, and there exists $\overline{\Delta\mathcal{W}} < \Delta\mathcal{W}_\infty$ such that $q^O\left(\overline{\Delta\mathcal{W}}\right) = 0$ where $\Delta\mathcal{W}_\infty$ is given by (37), and let $\bar{t} = 1 + \min t \in \mathbb{N} : \Delta\mathcal{W}_t \geq \overline{\Delta\mathcal{W}}$. Then:

- 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 $\bar{t}$, it will always remain oligarchic.
- If $D_0 = 0$ and $D_{t'} = 1$ for the first time in $t' \geq 0$ then $D_t = 1$ for all $t \geq t'$; i.e., if a society becomes democratic at t', it will remain democratic thereafter, and if it starts as democratic, it will always remain democratic.
- 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 non-increasing in t and non-decreasing 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.

[30] A third possibility is $\lim_{t\to\infty} q^D\left(\Delta\mathcal{W}_t\right) = 0$, in which case the nature of the limiting equilibrium depends on the rate at which $q^D\left(\Delta\mathcal{W}_t\right)$ converges to 0.

The most interesting result contained in this proposition is that 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. The initial democracy will always remain democratic, generate an income level Y^D and an equal distribution of income, ensuring that $\Delta Y_t = 0$ and therefore $q^O = 0$. 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 date $\bar{t}$ (which may be $t = 0$), they will be sufficiently richer than the workers to be able to sustain the oligarchic regime forever. This type of path dependence provides a potential explanation for the different development experiences in the Americas and in the former European colonies, discussed by Engerman and Sokoloff (1997). Similar path dependence also results when we compare two societies that start out as oligarchies, but one of them switches to democracy early on, while the other remains oligarchic until income inequality is wide enough to prevent a transition to democracy.[31] Finally, the analysis also shows that newly-created democracies will have the greatest instability and danger of switching back to oligarchy, because wealth inequality between the previous elite and citizens is highest. This inequality disappears over time, and democracy becomes more likely to be consolidated.

5 Discussion and Conclusions

There is now a general consensus that "institutions" have an important effect on economic development. But we are far from understanding what these institutions are. Many economists and political scientists, following Douglass North's emphasis, believe that the extent of property rights enforcement is an important element of this set of institutions, but even here there are fundamental unanswered questions. Most notably, whose property rights should be protected? This question becomes particularly pertinent when there is a conflict between protecting the property rights of various different groups.

This paper develops a model where protecting the property rights of current producers comes at the cost of weakening the property rights of future producers. This is because effective protection of the property rights of current producers requires them to have political power, which they can, in turn, use to erect entry barriers, violating the prop-

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

erty rights of future producers. 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, and oligarchy avoids the distortion effects of redistributive taxation. But, as time goes by and comparative advantage in entrepreneurship shifts away from the incumbents to new agents, the allocation of resources in oligarchy worsens. Contrasting with this, democracy 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 society.

The model therefore provides a potential explanation for relatively high growth rates of many societies with oligarchic features, both historically and during the postwar era, but also suggests a reason for why they often run into significant growth slowdowns. In addition, it predicts that oligarchic societies may fail to take advantage of new growth opportunities, as was the case with the highly oligarchic and relatively prosperous Caribbean plantation economies, which failed to invest in industry and new technology, while the initially-less-prosperous North American colonies industrialized.

I also use this framework to discuss endogenous regime transitions, in particular, to highlight both the possibility of path dependence and of an oligarchy disbanding itself and transitioning to democracy. Path dependence arises because those enriched by the oligarchic regime can use their resources to sustain the system that serves their interests. As a result, two otherwise-identical societies that start with different political regimes may generate significantly different income distributions, which in turn sustain different political regimes and hence economic outcomes. A smooth transition from oligarchy to democracy occurs, on the other hand, is a result of within-elite conflict; under certain conditions, low-skill elites do not find entrepreneurship sufficiently profitable, and they choose to end the oligarchic regime when they become the majority within the elite.

To generate sharp results, the model took a number of major shortcuts. It is important to briefly discuss the importance of these assumptions and how they could be relaxed. First, the model assumes that members of the elite can only keep their status by managing their own firms, even if they have low-skill. In practice, delegating managerial positions

to more productive agents is an option. Incorporating this possibility into the current framework is relatively straightforward as long as delegation of management comes with agency costs. Allowing separation of ownership and management of firms also introduces more interesting angles of analysis. For example, when entry barriers are sufficiently high, high-skill individuals may not start their own businesses, thus creating a sufficient pool of managerial talent, and indirectly increasing the profitability and durability of an oligarchic regime.

Second, the model assumes that entry barriers are "procedural", and do not generate direct revenue. There are two alternative ways of relaxing this assumption, either by allowing individual entrepreneurs to sell their own licenses (firms) to potential newcomers, or by allowing the oligarchy to set monetary entry fees. There are potential problems with both of these arrangements, however. Although private sales would be in the interest of individual low-skill incumbents, they would be harmful for the elite as a group (for instance, because it will drive down the price of licenses and create entry and competition). Hence there are natural reasons to expect that an oligarchic regime will make it difficult, for example by requiring new costly licenses even when there are private sales. Monetary entry fees, on the other hand, would be useful if the proceeds could be redistributed only to members of the elite. In contrast, since, in the model here, the only instrument of redistribution is the lump-sum transfer, setting monetary barriers and allowing entry by newcomers will be harmful to the elite. Moreover, both of these solutions will run into problems when there are credit constraints (which are absent in my baseline model), because in the oligarchic equilibrium, non-elite members earn low wages and will typically be constrained in the amount they can pledge to buy licenses. Because introducing endogenous savings and credit constraints would significantly complicate the analysis, I did not explicitly investigate this issue, but it appears to be an interesting area for research in the future.

Third, in the analysis of regime change, I assumed a very reduced-form link between economic and political power. Investigating how the distribution of economic resources in society influences the distribution of political power is a major area for future research.

Another important area for future investigation is to introduce physical and human capital accumulation in a model of this type to investigate whether, in the presence of intertemporal investments distortions, there might be other forces that would create dynamic distortions in democracies outweighing the dynamic misallocation created by entry barriers in oligarchies.

It is also useful to step back at this point and discuss how the model, despite its abstract nature, can be mapped to reality. The most promising avenue for this is to classify regimes into oligarchic versus democratic, and then empirically investigate whether distortions in oligarchic societies are introduced by entry barriers, while those in democracies are caused by anti-business and redistributive policies, and whether there are any systematic patterns related to the rise and decline of oligarchies different from the dynamics of democratic societies. Leaving such a detailed empirical study to future work, we can note that the broad patterns suggested by the model are consistent with some specific country experiences.

For example, Japan both in the prewar and the postwar periods, and South Korea in the postwar era are examples of oligarchic societies, pursuing pro-business policies and protecting incumbent firms. In Japan, the pre-war era is commonly recognized as highly oligarchic, with the conglomerates known as the *zaibatsu* dominating both politics and the economy (the title of the book on pre-war Japanese politics by Ramseyer and Rosenbluth, 1995, is *Politics of Oligarchy*). The postwar politics in Japan, on the other hand, have been dominated by the Liberal Democratic Party (LDP), which is closely connected to the business elite (see, for example, Ramseyer and Rosenbluth, 1997, and Jansen, 2000). In the Korean case, the close links between the large family-run conglomerates, the *chaebol*, and the politicians are well-documented (see, for example, Kang, 2002). In both cases, government policy has been favorable to major producers and provided them with subsidized loans and protected internal markets as well as secure property rights (e.g., Johnson, 1982, Evans, 1995). For example, in Japan, the Antimonopoly Act of 1947 imposed by the Americans was soon relaxed, and the LDP introduced various anticompetitive statutes to protect existing businesses. Ramseyer and Rosenbluth report that in 1980 there were 491 cartels, and "almost half [of those] had been in effect for twenty-five years and over two-thirds for more than twenty years" (1997, p. 132).[32] Interestingly, both Japan and South Korea have have experienced rapid growth during the postwar era, but notably, their economic systems appear to have run into severe problems over the past 10 or 20 years.

The development experiences of Brazil and Mexico, on the other hand, illustrate both the potential gains and significant costs of oligarchic regimes. Haber (2003), for example, explains how import-substitution policies in these countries were adopted to protect the

[32]However, it should also be noted that inequality of income in both cases has been limited, most likely because of other historical reasons, for example, the extensive land reforms in South Korea undertaken to defuse rural unrest fanned by the Communist regime in the North (e.g., Haggard, 1990).

businesses of the rich elite aligned with the government. He further documents how these import-substitution policies enabled rapid industrialization both before and after World War II, but also created significant distortions and economic problems. For example, he describes the formulation of policies in early 20th-century Mexico as "Manufacturers who were part of the political coalition that supported the dictator Porfirio Diaz were granted protection, everyone else was out in the cold..." (p. 18), and during the later era, "manufacturers could lobby the executive branch of government, which could then, without the need to seek legislative approval, restrict the importation of competing products..." (p. 48).

The most interesting implication of the analysis here is the possibility of an oligarchic society initially growing more rapidly than a similar democratic society, and then falling behind. The divergent economic fortunes of the Northeastern United States and the Caribbean colonies provide a possible illustration. As Galenson (1996) and Keyssar (2000) describe, Northeastern United States developed as a settler colony, approximating a democratic society with significant political power in the hands of smallholders (though naturally those rights were non-existent for the slaves in the South). In contrast, the Caribbean colonies were clear examples of oligarchic societies, with political power in the monopoly of plantation owners, and few rights for the slaves that made up the majority of the population (see, e.g., Beckford, 1972, and Dunn, 1972). In both the 17th and 18th centuries, the Caribbean societies were among the richest places in the world, and almost certainly richer and more productive than the Northeastern United States (see, e.g., Coatsworth, 1993, Eltis, 1995, Engerman, 1981, and Engerman and Sokoloff, 1997). Although the wealth of the Caribbean undoubtedly owed much to the world value of its main produce, sugar, it seems that Caribbean societies were able to achieve these levels of productivity because the planters had every incentive to invest in the production, processing and export of sugar. But starting in the late 18th century, the Caribbean economies lagged behind the United States and many other more democratic societies, which took advantage of new investment opportunities, particularly in industry and commerce (Acemoglu, Johnson and Robinson, 2002, and Engerman and Sokoloff, 1997). In addition, Sokoloff and Kahn (1990) and Kahn and Sokoloff (1993) show that many of the major U.S. inventors in the 19th century were not members of the already-established economic elite, but newcomers with diverse backgrounds. This is consistent with the view that new entrepreneurs, which were important to spearhead the process of growth in the United States, did not emerge or were blocked in the Caribbean, where power remained in the

hands of the planters.

Other historical examples of oligarchic societies that have grown rapidly and then run into stagnation include the Dutch Republic between the 16th and 18th century (e.g., Israel, 1995, or de Vries and van der Woude, 1997) and the Republic of Venice between the 14th and 16th centuries (e.g., Lane, 1973, or Rapp, 1976). Both of these societies achieved remarkable economic success with political power in the hands of a select group of merchants. In both cases, the policies were generally favorable to the merchants, but consistent with the idea here, they subsequently stagnated, especially because there was only limited entry of new individuals into the ranks of the leading merchants, partly due to the same policies protecting the incumbents that had previously fueled economic growth. In the meantime, Britain, which can be thought as less oligarchic than these societies after the Civil War and the Glorious Revolution, was initially behind but then became more prosperous than these republics (see, for example, Davis, 1973, Acemoglu, Johnson and Robinson, 2004). A more in-depth analysis of the rise and decline of oligarchic societies in history is a very interesting area which is open for future research.

6 Appendix A: Preferences over Taxes in Oligarchy

In this Appendix, I derive condition (24), show that when it holds, low-skill elites prefer no redistribution, and prove Proposition 2. I also present the analysis for the case in which this condition does not hold.

Recall that at this point, the entry barriers b_t, is set, investments have been undertaken expecting the tax rate $\hat{\tau}_t$, and the fraction of the entrepreneurs who are high skill, μ_t, and the equilibrium wage level, w_t, are already determined. Therefore, the payoff to an entrepreneur of skill level A^z as a function of the actual tax rate, τ_t, and of μ_t is:

$$\begin{aligned} V^z\left(\left[\left(b_t,\tau_t\right),\mathbf{p}^{t+1}\right],\left[w_t,\mathbf{w}^{t+1}\right]\mid\mu_t\right) &= \frac{\left(1-\tau_t\right)\left(1-\hat{\tau}_t\right)^{\frac{1-\alpha}{\alpha}}A^z\lambda}{1-\alpha}-\left(1-\hat{\tau}_t\right)^{\frac{1}{\alpha}}A^z\lambda-w_t\lambda \\ & w_t+\frac{\tau_t(1-\hat{\tau}_t)^{(1-\alpha)/\alpha}\left(\mu_t A^H+\left(1-\mu_t\right)A^L\right)}{1-\alpha} \quad \text{(A1)} \\ & +\beta CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), \end{aligned}$$

where the first line of (A1) is the net revenue of an entrepreneur of skill level A^z, who has invested expecting a tax rate of $\hat{\tau}_t$, but is now subject to the tax rate of τ_t. The second line is the wage plus the redistribution, when a fraction μ_t of entrepreneurs are high skill and all entrepreneurs have invested expecting a tax rate of $\hat{\tau}_t$ and are being taxed at the rate τ_t.[33] Finally, the third line, $CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)$, is the continuation value of an elite agent as defined in (14). Notice that I have now explicitly conditioned on μ_t, which was unnecessary in the text, but is important now.

The most preferred tax rate for an agent of skill level A^z at the stage of voting over taxes can be found by maximizing (A1). High-skill entrepreneurs will clearly prefer $\tau_t=0$. To see whether low-skill entrepreneurs prefer $\tau_t=0$ over positive taxes, differentiate (A1) with respect to τ_t for $A^z=A^L$. This immediately shows that, irrespective of the value of $\hat{\tau}_t$, low-skill elites prefer positive taxes when

$$\lambda A^L<\mu_t A^H+\left(1-\mu_t\right)A^L. \quad \text{(A2)}$$

Intuitively, if taxing the average entrepreneur, who has productivity $\mu_t A^H+\left(1-\mu_t\right)A^L$, is sufficiently beneficial, low-skill entrepreneurs may support high taxes even though they also have to pay these taxes. The reason why λ matters in this expression is that taxing

[33] Alternatively, we can also allow deviations where a low-skill entrepreneur anticipates his vote for high taxes later, and then modifies his investment accordingly. This does not affect anything, since this will only matter for an agent who is pivotal, which means that a sufficient number of other agents already need to prefer positive taxes.

profits and rebating through lump-sum taxes redistributes not only to the elite but also to the workers (and there are $1/\lambda$ elites, and $(\lambda - 1)/\lambda$ non-elites).

However, even if (A2) holds, the preferences of low-skill entrepreneurs will not have an influence on policies when they are in the minority. So the question is whether (A2) holds when $\mu_t < 1/2$. It is clear that this condition is more likely to hold when μ_t is large. So if (A2) does not hold when $\mu_t = 1/2$, it will never hold, and therefore, condition (24) in the text is sufficient to ensure that an oligarchy will always choose zero taxes. The rest of the proof of Proposition 2 follows from the discussion in the text.

What happens if (24) does not hold? The analysis above implies that until the low-skill entrepreneurs are the majority within the elite, an oligarchic equilibrium as in Proposition 2 will apply. But after the low-skill entrepreneurs are the majority, they will choose the maximum tax rate to redistribute income from the high-skill elites to themselves. As long as they do not have the option to abolish the oligarchic system (as in subsection 4.1), they will erect entry barriers to maintain their elite status. These entry barriers will be lower than before, since profits are now lower and entrepreneurship less desirable because of the redistributive taxes. They will continue to redistribute until μ_t is sufficiently low. In particular, it is useful to distinguish two cases. If

$$\lambda A^L \leq MA^H + (1 - M) A^L, \tag{A3}$$

then low-skill elites will always want to impose high taxes. On the other hand if (A3) does not hold, then there exists $\hat{\mu}$ such that

$$\lambda A^L = \hat{\mu} A^H + (1 - \hat{\mu}) A^L, \tag{A4}$$

after $\mu_t < \hat{\mu}$, it is no longer beneficial for a low-skill elite to impose taxes because the average entrepreneur is not much more skilled than he is.

Therefore, summarizing this discussion:

Proposition 7 Suppose (24) does not hold.

- Then until date $t = \tilde{t} > 0$, an oligarchic equilibrium features $\tau_t = 0$ and $b_t = b_t^E$ as given by (25), and the equilibrium is sclerotic, with equilibrium wages $w_t^e = 0$, and the fraction of high-skill entrepreneurs is $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})$ starting with $\mu_0 = 1$. Date $\tilde{t}$ is defined as $\tilde{t} = \min t' \in \mathbb{N}$ such that $\mu_{t'} \leq 1/2$.

- If (A3) holds, then after date $\tilde{t}$, we have $\tau_t = \delta$ and $b_t = b_t^E$ as given by (25) forever.

- If (A3) does not hold, then between dates $\tilde{t}$ and $\bar{t}$ where $\tilde{t} = \min t' \in \mathbb{N}$ such that $\mu_{t'} \leq \hat{\mu}$ where $\hat{\mu}$ is given by (A4), $\tau_t = \delta$ and $b_t = b_t^E$, and after $\bar{t}$, we again have $\tau_t = 0$ and $b_t = b^E$ as given by (28).

Aggregate output is given by (29) starting at $Y_0^E = \frac{1}{1-\alpha} A^H$ until $\tilde{t}$, and after $\tilde{t}$, by $Y_t^E = (1-\delta)^{(1-\alpha)/\alpha} \left[\mu_t A^H + (1-\mu_t) A^L\right] / (1-\alpha)$, and if (A3) does not hold, after $\bar{t}$, it is again given by (29) with $\lim_{t\to\infty} Y_t^E = Y_\infty^E$ as given by (30). If (A3) holds, then $\lim_{t\to\infty} Y_t^E = (1-\delta)^{(1-\alpha)/\alpha} \left[M A^H + (1-M) A^L\right] / (1-\alpha)$.

An important implication of this result is that if (24) does not hold, then oligarchy is more inefficient than the analysis in the text suggests. This is because the conflict over redistribution within the oligarchy induces distortionary taxation.

7 Appendix B: A More General Model With Simultaneous Choices of Taxes and Entry Barriers

Here I briefly outline a simple generalization which ensures that even if voters choose taxes at the beginning of the period, i.e., before investment decisions, they would set a positive tax rate, and all the results of the main analysis generalize. In addition, in this model, we can dispense with the hiding decisions, h_t^j, since the tax rate preferred by the median voter, which trades off redistribution versus disincentive effects, is always less than 1.

Consider an economy similar to the one analyzed above, with the same technology and preferences, but with three levels of productivity, $A^V \geq A^H > A^L$. The law of motion of productivity is a generalization of (7). Define M^V as the fraction of very high-skill agents in the society and M^H as the fraction of high-skill agents. Assume that

$$\lambda M^V < 1 < \lambda \left(M^V + M^H\right), \tag{B1}$$

which implies that the "marginal" entrepreneur is the high-skill type, because, even if there are no entry barriers, the very high-skill entrepreneurs by themselves cannot hire the entire labor force.

Let us now assume that the timing of events is as follows:

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

2. The entry barrier for new entrepreneurs b_t and the tax rate, τ_t, are set.

3. Agents make occupational choices, $\left[e_t^j\right]$, and entrepreneurs make investment decisions, $\left[k_t^j\right]$.

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

Most importantly, taxes, τ_t, are now set before the investment decisions, exactly at the same time as the entry barriers, b_t. Moreover, there is no hiding decision (in fact, no commitment problem). Let us focus on a democratic equilibrium where $\tau_t = \tau^D$ (it can be shown that they cannot be any other type of democratic MPE).

Assumption (B1) implies that, in democracy, the equilibrium wage will be

$$w_t^e = \max\left\langle \frac{\alpha}{1-\alpha}(1-\tau^D)^{1/\alpha}A^H; 0 \right\rangle,$$

while tax revenues are:

$$T^D = \frac{1}{1-\alpha}\tau^D(1-\tau^D)^{\frac{1-\alpha}{\alpha}}\bar{A},$$

where $\bar{A}$ is a weighted average of A^V and A^H, reflecting the ratio of very high to high skill entrepreneurs. In particular,

$$\bar{A} = \lambda M^V A^V + \left(1-\lambda M^V\right)A^H \geq A^H.$$

Next note that in democracy, i.e., once entry barriers are 0, the preferences of agents with productivity equal to either A^L or A^H are given by

$$\frac{\alpha}{1-\alpha}(1-\tau^D)^{1/\alpha}A^H + \frac{1}{1-\alpha}\tau^D(1-\tau^D)^{\frac{1-\alpha}{\alpha}}\bar{A}, \tag{B2}$$

because, in equilibrium, their utility is given by the wage rate plus redistribution (plus the bequest they have inherited)—agents with $a_t^j = A^H$ may become entrepreneurs, but they receive the same utility in this case. Since $M^V < 1/2$, the democratic tax rate will maximize (B2). The first-order condition for this maximization problem is

$$\frac{1}{1-\alpha}(1-\tau)^{\frac{1-\alpha}{\alpha}}\bar{A} - \frac{1}{1-\alpha}(1-\tau)^{\frac{1-\alpha}{\alpha}}A^H - \frac{1}{\alpha}\tau(1-\tau)^{\frac{1-\alpha}{\alpha}-1}\bar{A} \leq 0 \text{ and } \tau \geq 0$$

with complementary slackness. Inspection of this condition shows that if $\bar{A} = A^H$, then $\tau = 0$, which justifies the claim made in footnote 8 that with two levels of entrepreneurial talent and precommitment to taxes, the equilibrium will involve $\tau = 0$. However, as long as $\bar{A} > A^H$, the solution to this problem is strictly positive, and voters set a positive tax rate,

$$\tau^D = \frac{\bar{A} - A^H}{\bar{A}/\alpha - A^H} < 1, \tag{B3}$$

to redistribute income from the entrepreneurs to themselves.

The rest of the analysis in the text applies, with the democratic equilibrium tax rate given by (A3), and the oligarchic equilibrium unchanged. As a result, output in democracy is now:

$$Y_t^D = Y^D \equiv \frac{1}{1-\alpha}(1-\tau^D)^{\frac{1-\alpha}{\alpha}}\bar{A},$$

whereas output in oligarchy in the initial period is (assuming that $s_0^j = 0$ for all j so that $\mu_0 = 1$):

$$Y_0^E = \frac{1}{1-\alpha}\bar{A} > Y^D,$$

but then limits to

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{1}{1-\alpha}\left(A^L + M^H(A^H - A^L) + M^V(A^V - A^L)\right) < Y_0^E.$$

Whether Y_∞^E is lower than Y^D or not is determined by a similar analysis to that in the text, with the only interesting twist being that now the equilibrium tax rate, τ^d, is higher precisely when there is greater inequality among the entrepreneurs in terms of productivity. This implies that, somewhat paradoxically, oligarchy may be more efficient in societies with *greater* inequality in terms of productivity.

8 Appendix C: Analysis of Equilibrium with Regime Change

With regime change, the dynamic programming problems become more involved. In particular, let $\widetilde{W}$, $\widetilde{V}$ and $\widetilde{CW}$ denote the value functions in oligarchy and $\widehat{W}$, $\widehat{V}$ and $\widehat{CW}$ those in democracy. Also, now let $\mathbf{p}$,$\mathbf{w}$ denote the sequences of policies and wages both in oligarchy and democracy. In addition, the value functions now need to be conditional on the future sequences of income gaps between entrepreneurs and workers in democracy and oligarchy. To do this, let us denote this by $\mathbf{\Delta Y}^t$. Since in democracy, there will be perfect equality and $q^O(0) = 0$, the value functions (11) and (12) in democracy become:

$$\widehat{W}^z\left(\mathbf{p}^t,\mathbf{w}^t,\mathbf{\Delta Y}^t\right) = w_t + T_t + \beta\widehat{CW}^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),$$

with

$$\begin{aligned}
&\widehat{CW}^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)\\
=\ &\sigma^z\max\left\{\widehat{W}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widehat{V}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widehat{b}_{t+1}\right\}\\
&+(1-\sigma^z)\max\left\{\widehat{W}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widehat{V}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widehat{b}_{t+1}\right\}.
\end{aligned}$$

The value functions in oligarchy are:

$$\widetilde{W}^z\left(\mathbf{p}^t,\mathbf{w}^t,\mathbf{\Delta Y}^t\right)=w_t+T_t+\beta\widetilde{CW}^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),$$

with

$$\begin{aligned}
&\widetilde{CW}^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)\\
=\;& q^D\left(\Delta Y_{t-1}\right)\times\left[\sigma^z\max\left\{\widehat{W}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widehat{V}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widehat{b}_{t+1}\right\}\right.\\
&\left.+\left(1-\sigma^z\right)\max\left\{\widehat{W}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widehat{V}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widehat{b}_{t+1}\right\}\right]\\
&.+\left[1-q^D\left(\Delta Y_{t-1}\right)\right]\times\left[\sigma^z\max\left\{\widetilde{W}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widetilde{V}^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widetilde{b}_{t+1}\right\}\right.\\
&\left.\left(1-\sigma^z\right)\max\left\{\widetilde{W}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right),\widetilde{V}^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1},\mathbf{\Delta Y}^{t+1}\right)-\lambda\widetilde{b}_{t+1}\right\}\right].
\end{aligned}$$

These value functions take into account the possibility of switching from oligarchy to democracy. The value functions for the entrepreneurs (13) and (14) change accordingly.

Although these value functions are complicated to calculate, the same arguments in the text established that in an oligarchic MPE, there will be no redistributive taxation and the entry barriers will be set so as to reduce equilibrium wages to zero, i.e., $b_t=\tilde{b}_t^E$ (where $\tilde{b}_t^E$ is now a more complicated function, depending on the future probabilities of switching from oligarchy to democracy). In addition, it is clear that nothing has changed in democracy, since $q^O=0$, and there will be no entry barriers and the tax rate will be $\tau=\delta$. This immediately implies that aggregate output dynamics in oligarchy are given by (29), and the rest of the proof of Proposition 6 follows by noting that $\Delta\mathcal{W}_{t-1}$ is increasing over time in oligarchy and decreasing in democracy.

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