OLIGARCHIC VERSUS DEMOCRATIC SOCIETIES

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Abstract
This paper develops a model to analyze economic performance under different political regimes. 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 against new entrepreneurs. Democracy, where political power is more widely diffused, imposes redistributive taxes on 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. 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 one of rise and decline of oligarchic societies: An oligarchic society may first become richer, but later fall behind a similar democratic society. I also discuss how democracies may be better able to take advantage of new technologies, how within-elite conflict in oligarchies might cause a transition to democracy, and how the unequal distribution of income may keep inefficient oligarchic institutions in place. (JEL: P16, O10)

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] Nevertheless, "protection of property rights" is not a panacea; many *oligarchic* societies where political power is in the hands of the economic elite (e.g., the major producers/investors in the economy) provide a high degree of protection

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1. See North (1981) for the emphasis on property rights. See 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).

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to these asset holders but do not always achieve successful economic growth.[2] Perhaps the clearest example is provided by the Caribbean plantation colonies, where political power was concentrated in the hands of the monopoly of plantation owners; while the elite's property rights were highly secure, the large majority of the population—the slaves—had few political or economic rights. Despite a relatively high level of income per capita during the 18th century, these plantation colonies failed to grow during the 19th century, and today many of them are among the poorer nations in the world.

An alternative political organization is *democracy*, where political power is more equally distributed.[3] Although democratic political institutions have many attractive features, democracies often exhibit populist tendencies, which may lead to high levels of income redistribution, a variety of inefficient policies, and expropriation of assets from certain groups in society. In fact, cross-country evidence suggests that, despite the presence of some very unsuccessful dictatorships, democratic countries have not experienced faster growth than nondemocratic countries in the postwar era (see, e.g., Barro 1999).

This paper constructs a simple model for analyzing the trade-off between oligarchic and democratic societies. The model focuses not only on "property rights enforcement" but also on the use of political power to create various barriers against new entrants. The model economy 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 toward the entrepreneurs by reducing labor demand and wages, also distort the allocation of resources because they prevent the entry of more productive agents into entrepreneurship.[4] Oligarchic societies not only protect the property rights of producers and prevent high levels of distortionary taxation, they also enable the politically powerful elites to create

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).

3. It is also useful to distinguish between oligarchy and dictatorship. Some dictatorships correspond to the rule by the economic elite, and some electoral democracies may be "oligarchic" because the elite controls the parties or the electoral agenda. Other dictatorships are more appropriately classified as "kleptocracies," that is, 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.

4. Entry barriers may take the form of direct regulation or may 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-Silaves, and Shleifer (2003) on the implications of government ownership of banks, which often enables incumbents to receive subsidized credit and thus creates entry barriers. An interesting case in this context is Mexico at the end of the 19th 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).

a non–level playing field and a monopoly position for themselves. In contrast, democratic societies eschew the entry barriers that protect incumbent elites but create economic distortions in order to achieve a more egalitarian distribution of resources.

Which of these two types of distortions is more costly for economic activities 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.[5] In particular, in an oligarchy the politically powerful producers use entry barriers as a way of reducing the labor demand generated by new entrants and thus keeping wages low, which tends to increase their profits. Democracy imposes higher redistributive taxes but also tends to create a relatively level playing field.[6] 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. In addition, a democratic society generates a more equal distribution of income than an oligarchic society, because it redistributes income from entrepreneurs to workers whereas an oligarchic society adopts policies that reduce labor demand, depress wages, and increase the profits of entrepreneurs.

The more interesting results of this paper concern the dynamic trade-offs between these political regimes. Initially, entrepreneurs 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. In the model, changes in comparative advantage are captured by changes in the productivity of each individual over time. This corresponds not only to changes in productivity over the lifetime of an individual or a dynasty but also to variation in which sectors present the major opportunities for growth. For example, new investment opportunities may be in industry whereas existing elites specialize in agriculture. This type of change in the productivity structure of the economy also leads to similar dynamic trade-offs. In particular, oligarchic societies will tend to create entry barriers into new sectors in order to reduce labor demand and keep wages low.

Consequently, a typical equilibrium path in our economy will be one where, of two otherwise identical societies, the oligarchy will first become richer but

5. The evidence presented in Djankov et al. (2002, Table 7) shows that there are more entry barriers in nondemocracies than in democracies. Section 5 discusses a number of historical examples of oligarchic societies with entry barriers protecting incumbents.

6. Rodrik (1999) documents that the share of national income accruing to labor is higher in democracies and that this relationship holds both in the cross-section and in time series. Appendix B, which is available upon request, presents evidence that tax revenues as a share of GDP are also significantly higher in democracies than in nondemocracies.

later fall behind the democratic society. Thus, under some parameter configurations, democracy, despite its potential economic distortions, is better for long-run economic performance than the alternative.

Another interesting implication of the model is that democracies may be better able to take advantage of new technologies than oligarchic societies. This is because democracy allows agents with comparative advantage in the new technology to enter entrepreneurship whereas oligarchy typically blocks new entry.

The model also illustrates a new mechanism for potential regime change; oligarchic societies might smoothly transition to democracy because of within-elite conflict; under certain conditions, low-skill elites may prefer to disband the oligarchic regime and create a democratic one instead. When this is the case, a smooth transition to democracy takes place as low-skill elites become the majority within an oligarchy. Finally, I briefly discuss the potential for change from oligarchy to democracy when both high-skill and low-skill elites prefer oligarchy to democracy. In this case, regime change can result only from conflict between elites and the rest of the society. I provide a brief analysis of this issue by embedding the basic setup in a simple (reduced-form) model of conflict 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 that will 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.

Although the model economy analyzed in this paper is abstract, Section 5 shows that it nonetheless sheds light on a number of interesting questions. In addition to the issues of economic performance under democracy and oligarchy discussed already, the model may shed light on questions concerning the rise and decline of nations. A common conjecture in social sciences is that economic success also sows the seeds of future failures (e.g., Olson 1982; Kennedy 1987). 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 between the 17th and 19th centuries. The northeastern United States developed as a typical settler colony, approximating 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., Engerman 1981; Coatsworth 1993; Eltis 1995). 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 that 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.

Many studies on economic growth and the political economy of development have pointed out the costs of entry barriers, whereas others have emphasized the disincentive effects of redistributive taxation. For example, North and Thomas's classic by 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 costs of redistribution. For example, Romer (1975), Roberts (1977), Meltzer and Richard (1981), Alesina and Rodrik (1994), and Persson and Tabellini (1994) construct models in which the median voter chooses high levels of redistributive taxation, distorting savings, investment, or labor supply decisions. Despite these works, I am not aware of any systematic comparison of the distortions created by redistribution in democracy to those caused by entry barriers in oligarchy or of any analysis of the dynamic costs of oligarchy.

Other related papers include Krusell and Riós-Rull (1996), Leamer (1998), Bourguinon and Verdier (2000), Robinson and Nugent (2001), Acemoglu, Aghion, and Zilibotti (2006), Caselli and Gennaioli (2003), Galor, Moav, and Vollrath (2003), and Sonin (2003). Krusell and Riós-Rull, Bourguinon and Verdier, and Sonin analyze models with vested interests potentially opposed to economic development. Acemoglu, Aghion, and Zilibotti 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 more costly as the economy approaches the world technology frontier and selecting the right entrepreneurs becomes more important. Leamer, Robinson and Nugent, and Galor, Moav and Vollrath 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, independent work by Caselli and Gennaioli 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. Appendix A contains some technical details not provided in the text. Appendix B, which is available on the Web, contains a number of extensions and further results.

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 nonstorable 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 could otherwise occur in the oligarchic equilibrium. That is, 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 and entrepreneurs. Each agent can either be employed as a worker or set up a firm to become an entrepreneur. Although all agents have the same productivity as workers, their productivity in entrepreneurship differs. In particular, agent j at time t has entrepreneurial ability (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 already have an active firm. 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 status $s_t^j \in \{0, 1\}$, which indicates 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" (because 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 an occupational choice $e_t^j \in \{0, 1\}$, that is, whether or not to become an entrepreneur. Moreover, if $e_t^j = 1$, he also makes investment, employment, and hiding decisions, $k_t^j \in \mathbb{R}_+$, $l_t^j \in \mathbb{R}_+$, and $h_t^j \in \{0, 1\}$, where h_t^j denotes whether he decides to hide his output in order to avoid taxation (because 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 will be discussed shortly. 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 transfer $T_t \in [0, \infty)$ for each agent, 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, corresponding, for example, to the bureaucratic procedures that individuals must 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

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

units of the final good, where $l_t^j \in \mathbb{R}_+$ is the amount of labor hired by the entrepreneur and $k_t^j \in \mathbb{R}_+$ is the capital stock of the entrepreneur. To simplify the analysis (and to prevent the introduction of additional state variables), I assume that there is full depreciation of capital at the end of the period, so k_t^j is also the level of investment of entrepreneur j at time t, which is in terms of the unique final good of the economy. Moreover, recall that $c_t^j \in \mathbb{R}$, and so consumption can be negative. Hence, entrepreneurs can invest in capital "out of pocket," which avoids issues related to the modeling of credit markets and implies that the cost of capital (the price of capital relative to final output) is equal to 1.[7]

7. Alternatively and with identical results, k could be taken to be an intermediate good produced one-to-one from the final good and used in the production of the final good. Introducing a credit

I further simplify the analysis by assuming that all firms must operate at the same size λ, so $l_t^j = \lambda$.[8] 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.

The most important assumption here is that each entrepreneur must operate his own firm, so it is his skill, 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-skill entrepreneurs may prefer to hire more skilled managers. If delegation to managers can be done costlessly, entry barriers would create no distortions. Throughout I assume that delegation is prohibitively costly.

To simplify the expressions that follow, 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, a wage rate $w_t \geq 0$, and the fact that $l_t^j = \lambda$, the net profits of an entrepreneur with skill a_t^j at time t are

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

provided that 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

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

The comparison of these two expressions immediately implies that, if $\tau_t > \delta$, then all entrepreneurs will hide their output and there will be no tax revenue. Therefore, the relevant range of taxes will be

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

market in which entrepreneurs borrow from others also leads to identical results, because there is no risk of default. But credit market relations are not the main focus here, and their description would introduce additional notation.

8. 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 efficient allocation of entrepreneurs to workers would not arise. It is also important to have a minimum size, because 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 the option to reenter without incurring the entry cost. Setting the minimum and maximum sizes equal to each other is only a simplification. Similar results also hold when each firm has an inverse-U-shaped average cost curve, so that average costs are high when the firm is either too small or too large.

The (instantaneous) gain from entrepreneurship for an agent of skill level $a_t^j = A^z$ for $z \in \{L, H\}$, as a function of the tax rate τ_t and the wage rate w_t, is

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

Observe that this is the *net gain* to entrepreneurship because the agent receives the wage rate w_t regardless (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 $\Pi^z(\tau_t, w_t) - B_t = \Pi^z(\tau_t, w_t) - \lambda b_t$, because this agent will have to pay the additional cost imposed by the entry barriers.[9]

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. Because entrepreneurs also work as production workers, the supply is equal to 1, so

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

where 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 (s_t^j, a_t^j) that 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 at time $t+1$ he is an incumbent entrepreneur, hence

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

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, then he loses "the license" and next time he sets up a firm, he again incurs the entry cost (and the assumption that $l_t^j = \lambda$ rules out the possibility of operating the firm at a much smaller scale).

9. Private sales of firms from agents with $s_t^j = 1$ to those with $s_t^j = 0$ are also subject to the "procedural" entry cost B_t. 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).

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

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

where $\sigma^H, \sigma^L \in (0, 1)$. Here σ^H is the probability that an agent has high skill in entrepreneurship conditional on having 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 skills over time (i.e., $\sigma^H < 1$), so that the identities of the entrepreneurs necessary to achieve productive efficiency change over time. This feature can be interpreted in two alternative and complementary ways. First, the entrepreneurial skill of an individual or of a dynasty is not constant over time, so changes in comparative advantage necessitate changes in the identity of entrepreneurs. Second, it may be that each individual has a fixed skill in different activities and comparative advantage in entrepreneurship changes as the importance of different activities evolves over time. For example, some individuals may excel in industrial entrepreneurship, whereas others have comparative advantage in agriculture; then as industrial activities become more profitable than agriculture, individuals who have a comparative advantage in industry should enter into entrepreneurship and those who have a comparative advantage in agriculture should exit. Both of these interpretations are parsimoniously captured by the Markov process for skills given in equation (7).

This Markov process also implies that the fraction of agents with high skill in the stationary distribution is[10]

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

Because 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

10. This follows easily by setting entry into and exit from high-skill status equal to each other, that is, $(1 - M)\sigma^L = M(1 - \sigma^H)$.

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 as follows:

1. Entrepreneurial skills $[a_t^j]$ are realized.
2. The entry barrier for new entrepreneurs, b_t, is set.
3. Agents make occupational choices $[e_t^j]$; entrepreneurs make investment decisions $[k_t^j]$.
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 $[h_t^j]$.

Note that I used $[a_t^j]$ to describe the whole set $[a_t^j]_{j\in[0,1]}$ or (more formally) the mapping $\mathbf{a}_t : [0, 1] \to \{A^L, A^H\}$, which assigns a productivity level to each individual j, and similarly for $[e_t^j]$, et cetera.

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. This implies that entrepreneurs can be "held up" after they make their investments. In particular, once investments are sunk, it is in the interest of the workers to tax and redistribute entrepreneurial income. Consequently, entrepreneurs will make their investments decisions anticipating the taxes they will then face. This timing of events is adopted to simplify the exposition. Appendix B shows 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, that is, 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 of Romer (1975), Roberts (1977), and Meltzer and Richard (1981).

2.2. Analysis

Throughout the analysis I focus on the Markov perfect equilibrium (MPE), where strategies are a function of the payoff relevant states only. For individual j, the payoff-relevant state at time t includes his own state (s_t^j, a_t^j), and possibly the fraction of entrepreneurs who have high skills, which is denoted by μ_t and defined as

$$\mu_t = \Pr\left(a_t^j = A^H \middle| e_t^j = 1\right) = \Pr\left(a_t^j = A^H \middle| j \in S_t^E\right).$$

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 given a policy sequence $\{b_t, \tau_t\}_{t=0,1,\dots}$.[11] Let $x_t^j = (e_t^j, k_t^j, h_t^j)$ be the vector of choices of agent j at time t, $x_t = [x_t^j]_{j\in[0,1]}$ the choices for all agents, and $p_t = (b_t, \tau_t)$ the vector of policies at time t. Moreover, let $p^t = \{p_n\}_{n=t}^{\infty}$ denote the infinite sequence of policies from time t onward, and similarly, let w^t and x^t denote the sequences of wages and choices from t onward. Then $\hat{x}^t$ and a sequence of wage rates $\hat{w}^t$ constitute an economic equilibrium given a policy sequence p^t if, given $\hat{w}^t$ and p^t and his state (s_t^j, a_t^j), $\hat{x}_t^j$ maximizes the utility of agent j, given by equation (1), and $\hat{w}_t$ clears the labor market at time t, so that equation (5) holds. Each agent's type in the next period, (s_{t+1}^j, a_{t+1}^j), then follows from equations (6) and (7) given x^t.

I now characterize this equilibrium. Because $l_t^j = \lambda$ for all $j \in S_t^E$ (where, recall that, 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, equation [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 equation (8), the net current gain to entrepreneurship 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 $\int_{j\in S_t^E} dj = 1/\lambda$. Tax revenues at time t and the per capita lump-sum transfers are then given as

$$T_t = \int_{j\in S_t^E} \tau_t y_t^j = \frac{1}{1-\alpha}\tau_t(1-\tau_t)^{(1-\alpha)/\alpha}\lambda \int_{j\in S_t^E} a_t^j. \tag{10}$$

To economize on notation, let us now denote the sequence of future policies and equilibrium wages by $q^t \equiv (p^t, w^t)$. Then the value of an entrepreneur with skill level $z \in \{L, H\}$ as a function of future policies and wages, $V^z(q^t)$, and the value of a worker of type z in the same situation, $W^z(q^t)$,[12] are given

11. For the economic equilibrium (given the policy sequence), there is no difference between the subgame perfect equilibrium and the MPE, because each agent is infinitesimal and would thus ignore his effect on equilibrium prices and policies. The restriction to MPE does matter for the political equilibrium, however.

12. The value functions W^z and V^z should also be conditioned on the sequence of μ_t's, but I suppress this dependence because this variable does not play an important role in the text and does not affect any of the key decisions (it only influences the level of transfers, which are additive).

as follows

$$W^z(q^t) = w_t + T_t + \beta C W^z(q^{t+1}), \tag{11}$$

where $CW^z(q^{t+1})$ is the continuation value for a worker of type z from time $t+1$ onward:

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

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 $CW^z(q^{t+1})$. To understand this continuation value, note that a worker of type $z \in \{L, H\}$ today will have high skill in the next period with probability σ^z, and in this case, he can choose either to remain a worker, receiving value W^H, or become an entrepreneur by incurring the entry cost λb_{t+1}, receiving the value of a high-skill entrepreneur, V^H. The max operator ensures that he chooses whichever option gives higher value. With probability $1-\sigma^z$, he will have low skill and receives the corresponding values.

Similarly, the value functions for entrepreneurs are given by

$$V^z(q^t) = w_t + T_t + \Pi^z(\tau_t, w_t) + \beta C V^z(q^{t+1}), \tag{13}$$

where Π^z is given by equation (9) and now depends on the skill level of the agent, and $CV^z(q^{t+1})$ is the continuation value for an entrepreneur of type z:

$$\begin{aligned} CV^z(q^{t+1}) = \sigma^z & \max\{W^H(q^{t+1}), V^H(q^{t+1})\} \\ & + (1-\sigma^z)\max\{W^L(q^{t+1}), V^L(q^{t+1})\}. \end{aligned} \tag{14}$$

An entrepreneur of skill A^z also receives the wage w_t (working for his own firm) and the transfer T_t in addition to making profits equal to $\Pi^z(\tau_t, w_t)$. The following period, this entrepreneur has high skill with probability σ^z and low skill with probability $1-\sigma^z$; 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 equation (12), in equation (14) there is no additional cost of becoming an entrepreneur because the individual already owns a firm. Second, if an entrepreneur decides to become a worker, then he obtains the value given by equation (12), so that the next time he wishes to operate a firm, he will incur the entry cost.

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

$$NV\left(q^t \mid a_t^j = A^z, s_t^j = s\right) = V^z(q^t) - W^z(q^t) - (1-s)\lambda b_t, \tag{15}$$

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 equations (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 net values given in equation (15). Standard arguments (combined with the fact that instantaneous payoffs are strictly monotonic—e.g., Stokey, Lucas, and Prescott [1989]) immediately imply that $V^z(q^t)$ is strictly monotonic in w_t, T_t and $\Pi^z(\tau_t, w_t)$, so that $V^H(q^t) > V^L(q^t)$. By the same arguments, $NV(q^t|a_t^j = A^z, s_t^j = s)$ is also increasing in $\Pi^z(\tau_t, w_t)$. This in turn implies that for all a and s,

$$\begin{aligned} NV\big(q^t|a_t^j = A^H, s_t^j = 1\big) &\geq NV\big(q^t|a_t^j = a, s_t^j = s\big) \\ &\geq NV\big(q^t|a_t^j = A^L, s_t^j = 0\big). \end{aligned}$$

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 $NV(q^t|a_t^j = A^H, s_t^j = 0)$ or $NV(q^t|a_t^j = A^L, s_t^j = 1)$ 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. Let us define w_t^H as the threshold wage rate at which high-skill non-elite agents are indifferent between entering and not entering entrepreneurship. That is, w_t^H is such that $NV(q^t|a_t^j = A^H, s_t^j = 0) = 0$. Using equations (11) and (13), we obtain this threshold as

$$w_t^H \equiv \max\left\{0, \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^H - b_t + \frac{\beta\big(CV^H(q^{t+1}) - CW^H(q^{t+1})\big)}{\lambda}\right\}. \tag{16}$$

Similarly, define w_t^L as the wage at which low-skill incumbent producers are indifferent between existing entrepreneurship or not, so that at w_t^L, $NV(q^t|a_t^j = A^L, s_t^j = 1) = 0$ and thus

$$w_t^L \equiv \max\left\{0, \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha}A^L + \frac{\beta\big(CV^L(q^{t+1}) - CW^L(q^{t+1})\big)}{\lambda}\right\}. \tag{17}$$

Both expressions are intuitive. In equation (16), 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 and b_t is the per-worker entry cost (λb_t divided by λ). Finally, the term

$$\beta\left(CV^H(q^{t+1}) - CW^H(q^{t+1})\right)$$

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 $w_t < w_t^H$, then the total benefit of becoming an entrepreneur for a non-elite high-skill agent exceeds the cost. Equation (17) 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 be simply written as a comparison of the two thresholds determined above, that is,

$$w_t^H \geq w_t^L. \tag{18}$$

Instead, a sclerotic equilibrium emerges when the converse of (18) holds.

Moreover, in an entry equilibrium (i.e., when equation (18) holds), we must have that $NV(q^t|a_t^j = A^H, s_t^j = 0) = 0$. If it were strictly positive, which would result from the wage being less than w_t^H, all agents with high skill would strictly prefer to become entrepreneurs, which is not possible because, by assumption, $M\lambda > 1$. This argument also shows that the total number (measure) of entrepreneurs in the economy will be $1/\lambda$. From equations (9), (11), and (13), it then follows that the equilibrium wage must be

$$w_t^e = w_t^H. \tag{19}$$

Note also that when equation (18) holds, naturally $NV(q^t|a_t^j = A^L, s_t^j = 1) \leq 0$, and 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 by plotting labor demand and supply in this economy. Labor supply is constant at 1, and labor demand is decreasing as a function of the wage rate. This figure is drawn for the case where condition (18) 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 $w_t^H + b_t$ because 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 equation (19).

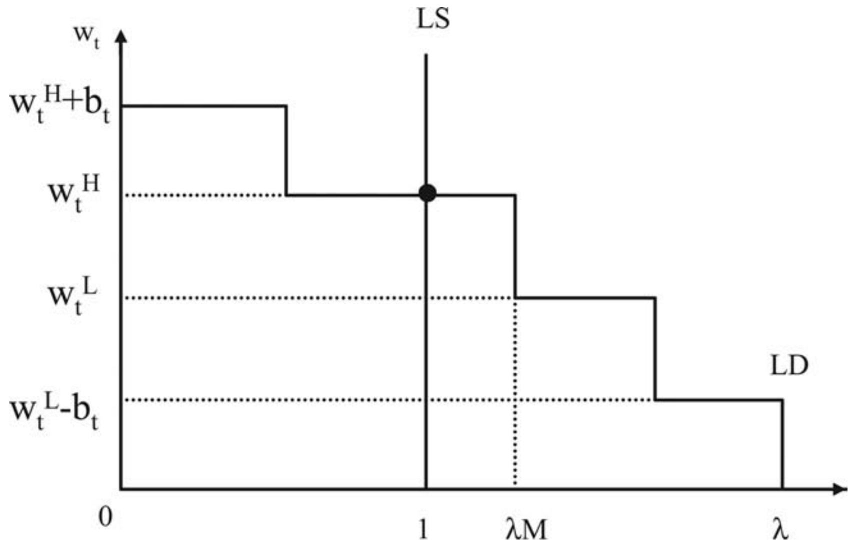

FIGURE 1. Labor supply and labor demand when equation (18) holds and there exists an entry equilibrium.

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 $\varepsilon = 0$, then the total number of entrepreneurs would be $1/\lambda$ and for any $w_t \in [w_t^H, w_t^L]$, labor demand would exactly equal labor supply (i.e., $1/\lambda$ agents demanding exactly λ workers each, and a total supply of 1). Hence, there would be multiple equilibrium wages. In contrast, if $\varepsilon > 0$, then the total number of entrepreneurs who could pay a wage of w_t^L will be less than $1/\lambda$ for all $t > 0$, so there would be excess supply of labor at this wage or indeed at any wage above the lower support of the above range. This implies that the equilibrium wage must be equal to this lower support, w_t^H, which is identical to equation (19). At this wage agents with $a_t^j = A^H$ and $s_t^j = 0$ are indifferent between entrepreneurship and production work, hence in equilibrium a sufficient number of them enter entrepreneurship to ensure that total labor demand is equal to 1. 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.[13]

Figure 2 illustrates this case. Because equation (18) does not hold here, the second flat portion of the labor demand curve is for low-skill incumbents

13. 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.

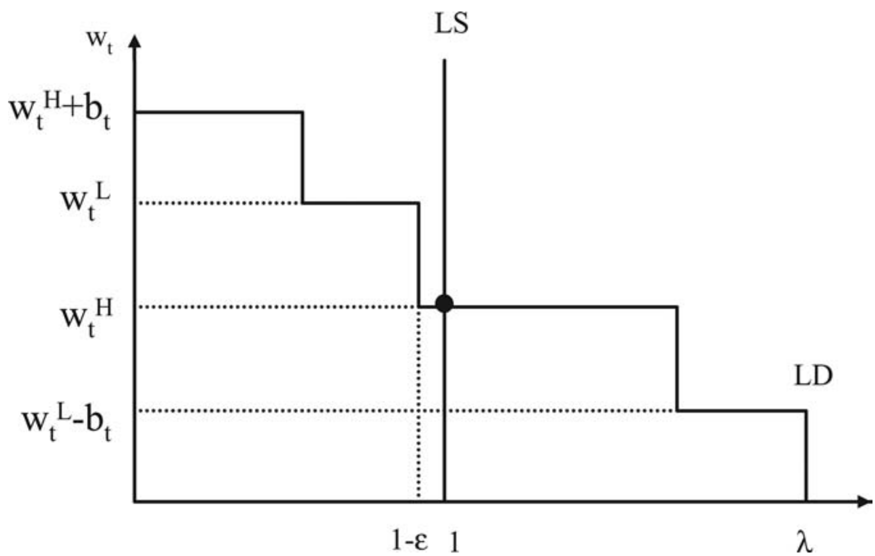

FIGURE 2. Labor supply and labor demand when equation (18) does not hold and there exists a sclerotic equilibrium.

($a_t^j = A^L$ 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[14]

$$\mu_t = \begin{cases} \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1}) & \text{if (18) does not hold,} \\ 1 & \text{if (18) holds,} \end{cases} \tag{20}$$

starting with some μ_0. The exact value of μ_0 will play an important role in what follows. 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. Nevertheless, we may also imagine an economy in which $s_0^j = 1$ for some j or an economy 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 in the next section.

14. For $\varepsilon > 0$, this equation is modified as follows:

$$\mu_t = \begin{cases} \varepsilon + (1 - \varepsilon)\left(\sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})\right) & \text{if (18) does not hold,} \\ 1 & \text{if (18) holds.} \end{cases}$$

3. Political Equilibrium

To obtain a full political equilibrium, we need to determine the policy sequence p^t. I consider two extreme cases: (1) *democracy*, where the policies b_t and τ_t are determined by majoritarian voting, with each agent having one vote; and (2) *oligarchy* (elite control), where 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 investments. The assumption that $\lambda > 2$ ensures that workers (non-elite agents) are always in the majority.

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

$$T_t(b_t, \tau_t|\hat{\tau}_t) = \begin{cases} \frac{1}{1-\alpha}\tau_t(1-\hat{\tau}_t)^{(1-\alpha)/\alpha}\lambda \int_{j\in S_t^E} a_t^j & \text{if } \tau_t \leq \delta, \\ 0 & \text{if } \tau_t > \delta, \end{cases} \tag{21}$$

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 $\tau_t > \delta$, then entrepreneurs will hide their output, and tax revenue will be 0. The per capita transfer T_t is a function of the entry barrier, b_t, because this can affect the selection of entrepreneurs, and thus the $\int_{j\in S_t^E} a_t^j$ 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 $w_t^H(b_t|\hat{\tau}_t)$ and the transfer $T_t(b_t, \tau_t \mid \hat{\tau}_t)$, 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 $w_t^H(b_t \mid \hat{\tau}_t)$ is given by equation (19) with the anticipated tax, $\hat{\tau}_t$, replacing τ_t.

High-skill workers (with $s_t^j = 0$ and $a_t^j = A^H$) may become entrepreneurs, but as the analysis in the previous section shows, in this case $NV(q^t \mid a_t^j = A^H, s_t^j = 0) = 0$, so that $W^H = W^L$ and their utility is also identical to those of low-skill workers. Consequently, all workers prefer a level of b_t that maximizes $w_t^H(b_t \mid \hat{\tau}_t) + T_t(b_t, \tau_t \mid \hat{\tau}_t)$. Because 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 $\hat{p}^t$, $\hat{w}^t$, and $\hat{x}^t$ such that $\hat{w}^t$ and $\hat{x}^t$ constitute an economic equilibrium given $\hat{p}^t$, and $\hat{p}^t$ is such that

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

Because $T_t(b_t, \tau_t \mid \hat{\tau}_t)$ is maximized at $\tau_t = \delta$ and $w_t^H(b_t \mid \hat{\tau}_t)$ does not depend on τ_t, it follows that workers will choose $\tau_t = \delta$.[15] Inspection of equations (19) and (21) 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 do not wish to protect incumbents because such protection reduces labor demand and wages. Because there are no entry barriers, only high-skill agents will become entrepreneurs; 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

$$V^H = W^H = W^L = W = \frac{w^D + T^D}{1 - \beta}, \tag{22}$$

where w^D is the equilibrium wage in democracy and T^D is the level of transfers, given by δY^D. Because there are no entry barriers now or in the future and $\tau_t = \delta$, equation (16) 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 that features* $\tau_t = \delta$ *and* $b_t = 0$. *Moreover,* $e_t^j = 1$ *if and only if* $a_t^j = A^H$, *so* $\mu_t = 1$. *The equilibrium wage rate is given by*

$$w_t^D = w^D \equiv \frac{\alpha}{1 - \alpha}(1 - \delta)^{1/\alpha} A^H, \tag{23}$$

and the aggregate output is

$$Y_t^D = Y^D \equiv \frac{1}{1 - \alpha}(1 - \delta)^{(1-\alpha)/\alpha} A^H. \tag{24}$$

15. The results are identical when taxes are on income rather than output (using 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 (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 less their 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.

An important feature of the democratic 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.

It is useful to observe that Y^D corresponds to the level of output inclusive of consumption and investment. "Net output" and consumption can be obtained by subtracting investment costs from Y^D, and in this case they will be given by

$$Y_{net}^D \equiv ((1-(1-\alpha)(1-\delta))(1-\delta)^{(1-\alpha)/\alpha})A^H/(1-\alpha).$$

It can be easily verified that all the results stated for output in this paper also hold for net output. I focus on output only because the expressions are slightly simpler.

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 $e_t = 1$.[16]

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

$$\lambda \geq \frac{1}{2}\frac{A^H}{A^L} + \frac{1}{2}, \tag{25}$$

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, leaving its derivation and the characterization of the equilibrium when it does not hold to the Appendix. Intuitively, condition (25) requires that the productivity gap between low- and high-skill elites be not so large that low-skill elites wish to tax profits in order to indirectly transfer resources from high-skill entrepreneurs to themselves.

When condition (25) holds, the oligarchy will always choose $\tau_t = 0$. Then, at the stage of choosing the entry barriers, high-skill entrepreneurs would like to set b_t to maximize V^H, whereas low-skill entrepreneurs would like to maximize V^L (both groups anticipating that $\tau_t = 0$). Both of these values are maximized by setting the entry barrier at a level that ensures the minimum level of equilibrium wages.[17] Recall from equation (19) that equilibrium wages in this case are still

16. An alternative modeling assumption would be to limit the tax rate decision to only those with $s_t = 1$. In this case, analyzed in the working paper version, Acemoglu (2003), the equilibrium here arises if a simple parameter condition is satisfied; otherwise, there will be equilibrium cycles. Although these cycles are of theoretical interest, in this version I decided to simplify the analysis by focusing on the case discussed in the text.

17. 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, which is strictly less than V^L for b_t^E defined in (29). The crucial point here is that low-skill entrepreneurs do not have the option of ending the oligarchic regime (see Proposition 4).

given by $w_t^e = w_t^H$, so they will be minimized by ensuring that $w_t^H = 0$, that is, by choosing any

$$b_t \geq b_t^E \equiv \frac{\alpha}{1-\alpha} A^H + \beta\big(CV^H(q^{t+1}) - CW^H(q^{t+1})\big)/\lambda. \tag{26}$$

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

An oligarchic equilibrium can then be defined as a policy sequence $\hat{p}^t$, wage sequence $\hat{w}^t$, and economic decisions $\hat{x}^t$ such that $\hat{w}^t$ and $\hat{x}^t$ constitute an economic equilibrium given $\hat{p}^t$, and $\hat{p}^t$ 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 high enough to ensure a sclerotic equilibrium with zero wages.

Imposing $w_{t+n}^e = 0$ for all $n \geq 0$, we can solve for the equilibrium values of high- and low-skill entrepreneurs from the value functions (13) as follows:

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

$$\tilde{V}^H = \frac{1}{1-\beta}\left(\frac{\alpha\lambda}{1-\alpha}\frac{(1-\beta(1-\sigma^L))A^H + \beta(1-\sigma^H)A^L}{1-\beta(\sigma^H - \sigma^L)}\right). \tag{28}$$

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

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

$$b_t = b^E \equiv \frac{1}{1-\beta}\left(\frac{\alpha\lambda}{1-\alpha}\frac{(1-\beta(1-\sigma^L))A^H + \beta(1-\sigma^H)A^L}{1-\beta(\sigma^H - \sigma^L)}\right) \tag{29}$$

is sufficient to ensure zero equilibrium wages.

In this oligarchic equilibrium, aggregate output is

$$Y_t^E = \mu_t \frac{1}{1-\alpha} A^H + (1-\mu_t)\frac{1}{1-\alpha} A^L, \tag{30}$$

where $\mu_t = \sigma^H \mu_{t-1} + \sigma^L(1-\mu_{t-1})$ as given by (20), starting with some μ_0.

We already noted that if all individuals start with $s_0^j = 0$, then 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 will also be decreasing over time with[18]

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{1}{1-\alpha}\bigl(A^L + M(A^H - A^L)\bigr). \tag{31}$$

Intuitively, the comparative advantage of the members of the elite in entrepreneurship gradually disappears because of the imperfect correlation of entrepreneurial skills 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. Although 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 the oligarchic 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 (25) holds. Then there exists a unique oligarchic equilibrium, with $\tau_t = 0$ and $b_t = b^E$ as given by (29). 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 (30) and satisfies $\lim_{t\to\infty} Y_t^E = Y_\infty^E$ as in (31). 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 (25) does not hold.

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

18. For the case where $\varepsilon > 0$, we have

$$\mu_t = \varepsilon + (1-\varepsilon)\bigl(\sigma^H \mu_{t-1} + \sigma^L(1-\mu_{t-1})\bigr),$$

$$Y_t^E = \bigl(\mu_t A^H + (1-\mu_t)A^L\bigr)/(1-\alpha),$$

$$Y_\infty^E \equiv \bigl(A^L + (\varepsilon + (1-\varepsilon)\sigma_L)(A^H - A^L)/(1-(1-\varepsilon)(\sigma^H - \sigma^L))\bigr)/(1-\alpha).$$

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,

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

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 remains constant. Consequently, the oligarchic economy may subsequently fall behind the democratic society. Whether or not it does depends on whether Y^D is greater than Y_∞^E as given by (31). This will be the case if

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

that is, if

$$(1-\delta)^{(1-\alpha)/\alpha} > \frac{A^L}{A^H} + M\left(1 - \frac{A^L}{A^H}\right). \tag{32}$$

If condition (32) 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" who 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

$$\bar{\mu}_0 \equiv \frac{(1-\delta)^{(1-\alpha)/\alpha} - A^L/A^H}{1 - A^L/A^H}. \tag{33}$$

It can be verified that when $\mu_0 > \bar{\mu}_0$ oligarchy will generate greater output than democracy in the initial period. Notice also that $\bar{\mu}_0 > M$ if and only if condition (32) holds.

This discussion and inspection of condition (32) establish the following result (proof in the text).

PROPOSITION 3. *Assume that condition (25) 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, that is, $Y_0^E > Y^D$. If condition (32) does not hold, then aggregate output in oligarchy is always higher than in democracy, that is, $Y_t^E > Y^D$ for all t. If condition (32) holds, then there exists $t' \in \mathbb{N}$ such that $Y_t^E \geq Y^D$ for $t \leq t'$ and $Y_t^E < Y^D$ for $t > t'$, 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 condition (32) holds and $\mu_0 < \bar{\mu}_0$, then aggregate output in oligarchy, Y_t^E, is always lower than that in democracy, Y^D.*

This proposition implies that when μ_0 is not excessively low (i.e., when there is no negative correlation between initial entry into entrepreneurship and skills), an oligarchic society will start out more productive than a democratic society but will decline over time.[19] 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 under the following circumstances.

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 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.[20]
3. *When 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.

On the other hand, if the extent of taxation in democracy is high and the failure to allocate the right agents to entrepreneurship has only 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

19. Proposition 3 compares the income and consumption levels, not the welfare levels, in the two regimes. Because 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 condition (32) holds.

20. Another reason why a large gap between A^H and A^L will make oligarchy less desirable is that in this case, condition (25) would not hold. Appendix A shows that this makes oligarchy more inefficient.

American democracy was not highly redistributive, corresponding to low δ in terms of the model here. More important, during the 19th century, which was the age of industry and commerce, the allocation of high-skill agents to entrepreneurship was probably quite important and only a small fraction of the population were truly talented as inventors and entrepreneurs. This can be thought of as low values of A^L/A^H and M.

Figure 3 illustrates the case with $\mu_0 = 1$ (or $\mu_0 > \max\{M, \bar{\mu}_0\}$) and depicts the situation in which condition (32) holds as well as 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 condition (32) 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 condition (32) holds; after date t', oligarchy generates less aggregate output than democracy. When condition (32) does not hold, the solid curve applies and aggregate output in oligarchy asymptotes to a level higher than Y^D.

Naturally, these results—in particular, 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, because output and distortions in democracy

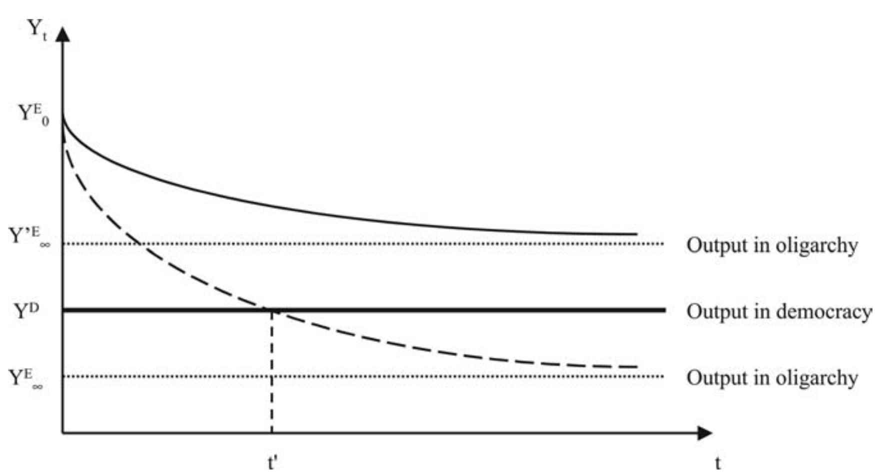

FIGURE 3. Comparison of aggregate output in democracy and oligarchy. The dashed curve depicts output in oligarchy when condition (32) holds, and the solid line when it does not.

are constant whereas the allocation of talent deteriorates in oligarchy owing to 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, then 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 they need to be considered when evaluating the allocative costs of these regimes.[21]

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 discussed so far hold even if $\mu_0 < 1$, 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; in fact, if μ_0 starts out less than M, then oligarchy may even have increasing levels of output. A very low level of μ_0 may emerge if the oligarchy is started by individuals who have comparative advantage in non-economic activities (e.g., elites specialized in fighting during pre-modern times) and these non-economic abilities are negatively correlated with entrepreneurial skills. Nevertheless, as noted already, a significant amount of positive selection on the basis of skills, even in the initial period, seems to be the more reasonable 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, because the latter has perfect equality—the net incomes and consumption of all agents are equalized in democracy owing to 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, though high-skill elites are always better-off in oligarchy, it is possible for low-skill elites to be better-off in democracy than 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 equation (27), whereas combining (22), (23), and (24) yields

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

21. 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. Alternatively, 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 in power make the policy decisions, and previous promises are not necessarily credible. Consequently, we can neither give political power to incumbent producers and expect them not to use their power to erect entry barriers nor vest political power with the poorer agents and expect them not to favor redistribution.

as the utility of these agents in democracy. Comparing this expression with equation (27) makes it clear that if δ, A^L/A^H, σ^L, and/or λ are sufficiently low, then these low-skill elites would be better-off in democracy than in oligarchy. More specifically, we have (proof in the text):

PROPOSITION 4. *Low-skill elites are better off in democracy if*

$$\alpha\lambda \frac{(1-\beta\sigma^H)A^L/A^H + \beta\sigma^L}{1-\beta(\sigma^H-\sigma^L)} < (\alpha(1-\delta)+\delta)(1-\delta)^{(1-\alpha)/\alpha}. \tag{34}$$

Despite this result, low-skill elites prefer to remain in entrepreneurship, even when condition (34) holds.[22] This is because, given the structure of the political game, if low-skill incumbent elites give up entrepreneurship, then 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. In this choice between being elites and workers in oligarchy, the former is clearly 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 condition (34) 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 18th 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,[23] enabling entrepreneur j to produce

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

where $\psi > 1$ and $\hat{a}_t^j$ is the skill 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

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

22. It is straightforward to verify that condition (34) may fail to hold even though (25) holds.

23. An interesting question is whether democratic and oligarchic societies would have different propensities to invent new technologies. This question is sidestepped here by assuming exogenous arrival of the new technology.

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

$$\hat{a}_{t+1}^j = \begin{cases} A^H & \text{with probability } \sigma^H & \text{if } \hat{a}_t^j = A^H, \\ A^H & \text{with probability } \sigma^L & \text{if } \hat{a}_t^j = A^L, \\ A^L & \text{with probability } 1-\sigma^H & \text{if } \hat{a}_t^j = A^H, \\ A^L & \text{with probability } 1-\sigma^L & \text{if } \hat{a}_t^j = A^L, \end{cases} \tag{35}$$

for all $t > t'$ and $\Pr(\hat{a}_t^j = A^H \mid a_{\tilde{t}}^j) = M$ for any $t, \tilde{t}$ and $a_{\tilde{t}}^j$. In other words, $\hat{a}_t^j$ and $\hat{a}_{t'}^j$ are independent of past and future a_t^j. This implies that $\hat{a}_{t'}^j = A^H$ with probability M, and $\hat{a}_{t'}^j = A^L$ with probability $1 - M$ regardless of the skill level of the individual with the old technology. This is reasonable because new technologies exploit different skills and create comparative advantages that differ from the old ones.

It is straightforward to see that the structure of the democratic equilibrium is not affected and at time t', agents with comparative advantage for the new technology become the entrepreneurs. Consequently, aggregate output in democracy jumps from Y^D as given by equation (24) to

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

In contrast, in oligarchy the elites are in power at time t' and would like to remain the entrepreneurs even if they do not have comparative advantage for working with the new technology. How aggregate output in the oligarchic equilibrium changes after date t' depends on whether or not $\psi A^L > A^H$. If it is, then all incumbents switch to the new technology and aggregate output in the oligarchic equilibrium at date t' jumps up to

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

and remains at this level thereafter. This is because $\hat{a}_t^j$ and a_t^j are independent, so from the strong 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

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

with μ_t given by equation (20) 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, whereas 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). Hence, we have that $\tilde{Y}_t^E$, like Y_t^E, is decreasing over time, with

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

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 $\hat{Y}^D - \tilde{Y}_t^E$ (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 democracy. Indeed, even if the oligarchic society was richer than the democratic society before the arrival of the new technology (i.e., $Y^D - Y_t^E < 0$), this ranking may be 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, whereas the oligarchic society typically fails to do so and thus has greater difficulty adapting to technological change.[24]

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 and others are oligarchic, with the elite in control of political power? One response is to appeal to historical accident. Another is to construct a "behind-the-veil" argument, whereby the political system that prevails will be the one generating greater efficiency or ex ante utility. Neither of these two approaches is entirely satisfactory, however. First, because the prevailing political regime influences economic outcomes, rational agents should have preferences over these regimes as well, thus boding against a view that 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 because it recognizes and models this conflict to determine the equilibrium within a particular regime but then

24. 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.

ignores this conflict 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 discussed so far also govern which regimes will emerge and persist in equilibrium. In this section, I make a preliminary attempt in this direction.[25] I first discuss how a natural modification of the above framework leads to a novel type of regime transition whereby, after a certain stage, an oligarchy disbands itself and transitions to a democratic regime. Next, I consider an extension where the distribution of income affects political power and the equilibrium regime choice. To simplify the exposition in this section I assume that $\mu_0 = 1$.

4.1. Smooth Transition from Oligarchy to Democracy

To discuss how oligarchy may "voluntarily" transform itself into a democracy, let us change one assumption from the baseline model: The current elite can now 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, denote oligarchy by $D_t = 0$ and democracy by $D_t = 1$. Because transition to democracy is 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 occurs simultaneously with voting over b_t (there are no votes over d_t in democracy, because 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 then, all agents participate in the vote over taxes starting in period t.

First, imagine a situation where condition (34) 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 also choose $b_t = b^E$ and $\tau_t = 0$ (as in Proposition 2). Hence, in this case, the equilibrium remains oligarchic throughout.

What happens when condition (34) holds? Current low-skill elites, that is, those with $s_t = 1$ and $a_t = A^L$, would be better-off in democracy (recall Proposition 4). If they vote for $d_t = 0$, then they stay in oligarchy, which gives them a

25. Acemoglu and Robinson (2000, 2006) present 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.

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 $d_t = 1$. Because $\mu_0 = 1$, they are initially in the minority and the oligarchic equilibrium applies. However, provided that $M < 1/2$ and that entry barriers are kept throughout, low-skill agents will eventually become the majority and succeed in disbanding the oligarchic regime. One complication is that as μ_t approaches 1/2, high-skill elites may prefer to temporarily reduce the entry barrier and include new entrepreneurs in order to prevent the disbanding of the regime. Nevertheless, this strategy will not be attractive when the future is discounted heavily because it will be costly to reduce entry barriers today for future gains. This argument establishes the following proposition:

PROPOSITION 5. *Suppose condition (25) holds, the society starts as oligarchic, and* $M < 1/2$.

If condition (34) does not hold, then the society remains oligarchic with $d_t = 0$ *for all t, the equilibrium involves no redistribution, that is,* $\tau_t = 0$, *there are high entry barriers, that is,* $b_t = b^E$ *as given by equation (29), and the fraction of high-skill entrepreneurs is* $\mu_t = \sigma^H \mu_{t-1} + \sigma^L(1 - \mu_{t-1})$ *starting with* $\mu_0 = 1$.

If condition (34) holds, then there exists $\bar{\beta} \in (0, 1)$ *such that for all* $\beta \leq \bar{\beta}$, *the society remains oligarchic, that is,* $d_t = 0$, *with no redistribution* ($\tau_t = 0$) *and high entry barriers* ($b_t = b_t^E$) *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 condition (34) holds, low-skill entrepreneurs are better off transitioning to democracy than remaining in the oligarchic society, whereas high-skill entrepreneurs are always better off in oligarchy. Because they discount the future heavily, high-skill entrepreneurs are not willing to reduce entry barriers and sacrifice current profits in order to change the composition of the elite. 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 in the first period in which low-skill entrepreneurs become the majority within the oligarchy (i.e., at $\tilde{t}$, which is the date at which $\mu_t < 1/2$ for the first time), the oligarchy disbands itself and transitions to a democratic regime. At that point μ_t jumps up to 1.[26]

26. Notice also that when condition (34) holds, the level of entry barriers in oligarchy is no longer given by b^E as in equation (29). This is because the oligarchy is anticipated to end and hence there

This configuration is especially interesting when condition (32) holds, which implies that permanent oligarchy would have ultimately led to lower output than democracy. In this case, as long as condition (34) holds, oligarchy transitions to democracy and avoids the long-run adverse efficiency consequences of the sclerotic equilibrium (though when condition (34) does not hold, oligarchy survives forever with negative consequences for efficiency and output). This extension therefore provides a simple framework for thinking about how a society can transition from oligarchy to a more democratic system before the oligarchic regime becomes excessively costly. It is important to observe, however, that the reason for the transition from oligarchy to democracy is not to improve the efficiency of resources in the economy, but because of the 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 condition (34) does not hold. This implies that non-elites would like to switch from oligarchy to democracy, but 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 nondemocratic 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 its resources.

I model the effect of economic power on political power in a reduced-form way; the probability that an oligarchy switches to democracy is assumed to be $\zeta_t^D = \zeta^D(\Delta\mathcal{W}_{t-1})$, where $\Delta\mathcal{W}_{t-1} = \mathcal{W}_{t-1}^E - \mathcal{W}_{t-1}^W$ is the wealth gap, that is, 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 $\zeta^D(\cdot)$ being decreasing. I also assume that a democratic society becomes oligarchic with probability

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

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 $w_t^e = 0$.

where now $\zeta^O(\cdot)$ is a nondecreasing function with $\zeta^O(0) = 0$, which implies that with perfect equality there is no danger of switching back to oligarchy. Here $\Delta\mathcal{W}_t$ refers to the wealth gap between the initial elite (those with with $s_1^j = 1$) and the citizens.[27] This discussion immediately leads to the following law of motion for D_t:

$$D_t = \begin{cases} 0 & \text{with probability } 1 - \zeta^D(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 0, \\ 1 & \text{with probability } \zeta^D(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 0, \\ 0 & \text{with probability } \zeta^O(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 1, \\ 1 & \text{with probability } 1 - \zeta^O(\Delta\mathcal{W}_{t-1}) & \text{if } D_{t-1} = 1. \end{cases} \tag{36}$$

To simplify the analysis, let us assume that each agent saves out of current income at a constant (exogenous) rate $\nu < 1$.[28] First consider an oligarchy, $D_{t-1} = 0$. Because citizens earn zero income in oligarchy, $\mathcal{W}_t^W = 0$ and $\Delta\mathcal{W}_t = \mathcal{W}_t^E$ for all t. Therefore,

$$\Delta\mathcal{W}_t = \nu\big(\Delta\mathcal{W}_{t-1} + \lambda Y_{t-1}^E\big). \tag{37}$$

This implies that $\Delta\mathcal{W}_t = \lambda \sum_{n=1}^{t} \nu^n Y_{t-n}^E$ and that

$$\lim_{t\to\infty} \Delta\mathcal{W}_t = \Delta\mathcal{W}_\infty \equiv \frac{\lambda Y_\infty^E}{1-\nu} \tag{38}$$

if $D_{t-1} = 0$, where Y_∞^E is given by equation (31). Appendix B.2 proves that Y_t^E is still given by equation (30). Let us also assume that $\mathcal{W}_0^E$ is small, in particular, less than $\Delta\mathcal{W}_\infty$. This implies that the wealth of the elite, and thus the wealth gap, will be increasing over time

Now two interesting cases can be distinguished:[29]

1. there exists $\overline{\Delta\mathcal{W}} < \Delta\mathcal{W}_\infty$ such that $\zeta^D(\overline{\Delta\mathcal{W}}) = 0$;
2. $\zeta^D(\Delta\mathcal{W}_\infty) > 0$.

In the first case there also exists $\bar{t}$ such that $\Delta\mathcal{W}_t \geq \overline{\Delta\mathcal{W}}$ for all $t \geq \bar{t}$. Therefore, if the economy does not switch to democracy before $\bar{t}$, then 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.

27. The alternative would be for the agents who currently have $s_t = 1$ to become the elite. This requires keeping track of the entire wealth distribution, which becomes quite involved.

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

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

In contrast to oligarchy, in democracy all agents earn the same amount. Consequently, when $D_t = 1$ for all $t \geq t'$ for some t', we have that

$$\Delta\mathcal{W}_{t+1} = \nu\Delta\mathcal{W}_t \quad \text{and} \quad \lim_{t\to\infty} \Delta\mathcal{W}_t = 0. \tag{39}$$

As a result, an equilibrium with regime changes is a policy sequence $\hat{p}^t$, a wage sequence $\hat{w}^t$ and economic decisions $\hat{x}^t$ such that $\hat{w}^t$ and $\hat{x}^t$ constitute an economic equilibrium given $\hat{p}^t$. Moreover, if $D_t = 0$, then $\hat{p}^t$ is the oligarchic equilibrium policy sequence and $\Delta\mathcal{W}_{t+1}$ is given by equation (37), and if $D_t = 1$, then $\hat{p}^t$ is the democratic equilibrium policy sequence and $\Delta\mathcal{W}_{t+1}$ is given by equation (39). D_t is in turn given by equation (36) with $D_0 = 0$. The following proposition then follows from the description here (the details are provided in Appendix B.2):

PROPOSITION 6. *Suppose equation (25) holds, (34) does not hold, and there exists $\overline{\Delta\mathcal{W}} < \Delta W_\infty$ such that $\zeta^O(\overline{\Delta\mathcal{W}}) = 0$, where ΔW_∞ is given by equation (38). Moreover, define $\bar{t} = 1 + \min t \in \mathbb{N} : \Delta W_t \geq \overline{\Delta\mathcal{W}}$. Then:*

1. *If $D_0 = 0$ and $D_t = 0$ for all $t \leq \bar{t}$, then $D_t = 0$ for all t; that is, if a society starts oligarchic and remains oligarchic until $\bar{t}$, then it will always remain oligarchic.*
2. *If $D_0 = 0$ and $D_{t'} = 1$ for the first time in $t' \geq 0$, then $D_t = 1$ for all $t \geq t'$; that is, if a society becomes democratic at t', then it will remain democratic thereafter, and if it starts as democratic, then it will always remain democratic.*
3. *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', $Z_{t|t'}$ is nonincreasing in t and nondecreasing in t', with $\lim_{t\to\infty} Z_{t|t'} = 0$ (i.e., a society faces the highest probability of switching back to oligarchy immediately after the switch from oligarchy to democracy and this probability is higher if it has spent a longer time in oligarchy).*

The most interesting result contained in this proposition is that of *path dependence*. Two otherwise identical societies, one starting as oligarchic and the other as democratic, will follow very different political and economic trajectories. The initial democracy will always remain democratic, generate an income level Y^D and feature an equal distribution of income, ensuring that $\Delta Y_t = 0$ and therefore $\zeta^O = 0$. On the other hand, if the society starts oligarchic, it will follow the oligarchic equilibrium, with an unequal distribution of income. The greater income of the elites will give them the power to sustain the oligarchic equilibrium, and if there is no transition to democracy until some date $\bar{t}$ (which may be $t = 0$), then the elites will be sufficiently richer than the workers 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, as 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, whereas the other remains oligarchic until income inequality is wide enough to prevent a transition to democracy.[30] 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. As this inequality diminishes over time, democracy is 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 and how? These questions become especially 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 economic opportunities available to future (potential) producers. This is because effective protection of the property rights of current producers requires them to have political power, which they can also use to erect entry barriers that protect not their property rights but their incumbency advantage (and thus manipulate factor prices to their advantage). 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 for analyzing this trade-off. 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 because oligarchy avoids the distortionary effects of redistributive taxation. However, 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 via the disincentive effects of taxation, but these distortions do not worsen over time. Therefore, a

30. See also Bénabou (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 toward the poor.

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 the relatively high growth rates of many societies with oligarchic features, both historically and during the postwar era. It also suggests a reason for why oligarchic societies often run into significant growth slowdowns. In addition, it predicts that oligarchic societies may fail to take advantage of new growth opportunities. This was indeed 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.

This framework can also be used to study endogenous regime transitions, in particular, to highlight the equilibrium path where an oligarchy disbands itself and transitions to democracy as well as the possibility of path dependence. The more interesting result here is the possibility of a smooth transition from oligarchy to democracy. Such a transition occurs as a result of within-elite conflict; under certain conditions, low-skill elites do not find entrepreneurship sufficiently profitable and choose to end the oligarchic regime when they become the majority within the elite. Path dependence, on the other hand, may arise 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.

It is 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 as oligarchic or democratic and then empirically investigate: (1) whether distortions in oligarchic societies are introduced by entry barriers, whereas those in democracies are caused by anti-business and redistributive policies; and (2) whether there are any systematic patterns related to the rise and decline of oligarchies different from the dynamics of democratic societies. A major difficulty here is the classification of societies into "democratic" and "oligarchic" categories, which do not necessarily coincide with the democracy scores used in the empirical literature. Leaving a detailed empirical study to future work, it may be useful to look briefly at some country experiences.

Japan in both the prewar and postwar periods and South Korea in the postwar era could be considered as examples of oligarchic societies pursuing pro-business policies and protecting incumbent firms. In Japan, the prewar 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 prewar Japanese politics by Ramseyer and Rosenbluth (1995) is *Politics of Oligarchy*). The postwar politics in Japan, on the other hand, has been dominated by the Liberal Democratic Party (LDP), which is closely connected to the business elite (e.g., 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 (e.g., Kang 2002). In both countries, government policy has been favorable to major producers. The government provided these companies with subsidized loans, and protected not only their property rights but their internal markets (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, "almost half [of which] had been in effect for twenty-five years and over two-thirds for more than twenty years" (p. 132).[31] Both Japan and South Korea have experienced rapid growth during the postwar era, but their economic systems appear have run into severe problems over the past decade or so.

The development experiences of Brazil and Mexico also 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, who were 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, Haber 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).

Perhaps 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 Keysser (2000) describe, the 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 (e.g., Beckford 1972; Dunn 1972). In both the 17th and 18th centuries, the Caribbean societies were among the richest places in the world and

31. However, it should also be noted that inequality of income in both countries 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 North Korea's communist regime (e.g., Haggard 1990).

were almost certainly richer and more productive than the northeastern United States (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 sugar, its principal resource, Caribbean societies were evidently 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 et al. 2002; 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 established economic elite but newcomers with diverse backgrounds. This is consistent with the view that new entrepreneurs, which were important for spearheading 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; de Vries and van der Woude 1997) and the Republic of Venice between the 14th and 16th centuries (e.g., Lane 1973; 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. This was 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 (e.g., Davis 1973; Acemoglu et al. 2005). A more in-depth analysis of the rise and decline of oligarchic societies in history is an interesting and challenging area for future research.

Appendix A: Preferences over Taxes in Oligarchy

In this Appendix, I derive condition (25) and show that when it holds, low-skill elites prefer no redistribution. I will then provide a proof of Proposition 2 and also present an analysis for the case in which this condition does not hold.

Recall that at this point the entry barrier b_t is set, investments have been undertaken (anticipating the tax rate $\hat{\tau}_t$), and the fraction μ_t of entrepreneurs who are high skilled and the equilibrium wage w_t are already determined. Let $q^t \equiv ([b_t, \tau_t, w_t], q^{t+1})$ and condition the value functions on the current fraction of high-skill entrepreneurs, μ_t. Then 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

$$\begin{aligned} V^z((b_t,\tau_t,w_t),q^{t+1}|\mu_t) = & \frac{(1-\tau_t)(1-\hat{\tau}_t)^{(1-\alpha)/\alpha}A^z\lambda}{1-\alpha} - (1-\hat{\tau}_t)^{1/\alpha}A^z\lambda - w_t\lambda \\ & + w_t + \frac{\tau_t(1-\hat{\tau}_t)^{(1-\alpha)/\alpha}(\mu_t A^H + (1-\mu_t)A^L)}{1-\alpha} \\ & + \beta CV^z(q^{t+1}), \end{aligned} \tag{A.1}$$

where the first line of (A.1) 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 skilled and when all entrepreneurs have invested expecting a tax rate of $\hat{\tau}_t$ and are being taxed at the rate τ_t.[32] Finally, in the third line $CV^z(q^{t+1})$ is the continuation value of an elite agent as defined in equation (14). Notice that I have explicitly conditioned on μ_t. This was unnecessary in the main 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 equation (A.1). High-skill entrepreneurs will clearly prefer $\tau_t = 0$. To see whether low-skill entrepreneurs prefer $\tau_t = 0$ over positive taxes, differentiate equation (A.1) with respect to τ_t for $A^z = A^L$. This immediately shows that, regardless of the value of $\hat{\tau}_t$, low-skill elites prefer positive taxes when

$$\lambda A^L < \mu_t A^H + (1-\mu_t)A^L. \tag{A.2}$$

Intuitively, if taxing the average entrepreneur, who has productivity $\mu_t A^H + (1-\mu_t)A^L$, is sufficiently beneficial, then 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 profits and rebating the reserves through lump-sum transfers 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 condition (A.2) 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 (A.2) holds when $\mu_t < 1/2$. It is clear that this condition is more likely to hold when μ_t is large. Hence, if condition (A.2) does not hold when $\mu_t = 1/2$, then it will never hold, and so, condition (25) is sufficient

32. Alternatively, we could allow deviations where a low-skill entrepreneur anticipates his vote for high taxes later and then modifies his investment accordingly. This does not affect the results because it would only matter for an agent who is pivotal, which means that a sufficient number of other agents already need to prefer positive taxes.

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 condition (25) does not hold? The preceding analysis 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 in order to redistribute income from the high-skill elites to themselves. As long as they do not have the option of abolishing the oligarchic system (as in Section 4.1), they will erect entry barriers to maintain their elite status. These entry barriers will be lower than before, because profits are now lower and entrepreneurship is less desirable because of the redistributive taxes. These low-skill elites will continue to redistribute until μ_t is sufficiently low. In particular, it is useful to distinguish two cases. If

$$\lambda A^L \leq M A^H + (1 - M) A^L, \tag{A.3}$$

then low-skill elites will always want to impose high taxes. On the other hand, if condition (A.3) does not hold, then there exists $\hat{\mu}$ such that

$$\lambda A^L = \hat{\mu} A^H + (1 - \hat{\mu}) A^L. \tag{A.4}$$

Once $\mu_t < \hat{\mu}$, 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.

This analysis is summarized in Proposition A.1.

PROPOSITION A.1. *Suppose condition (25) does not hold.*

1. *Then, until date* $t = \tilde{t} > 0$ *the oligarchic equilibrium features* $\tau_t = 0$ *and* $b_t = b_t^E$ *as given by equation (26). 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* $\tilde{t} = \min t' \in N$ *such that* $\mu_{t'} \leq 1/2$.
2. *If condition (A.3) holds, then after date* $\tilde{t}$*, we have* $\tau_t = \delta$ *and* $b_t = b_t^E$ *as given by equation (26) forever.*
3. *If condition (A.3) does not hold, let* $\bar{t} = \min t' \in \mathbb{N}$ *such that* $\mu_{t'} \leq \hat{\mu}$ *with* $\hat{\mu}$ *given by equation (A.4). Then, between dates* $\tilde{t}$ *and* $\bar{t}$ *we have* $\tau_t = \delta$ *and* $b_t = b_t^E$*. After* $\bar{t}$*,* $\tau_t = 0$ *and* $b_t = b^E$ *as given by equation (29).*

Aggregate output is given by equation (30) starting at $Y_0^E = A^H/(1 - \alpha)$ *until* $\tilde{t}$*. After* $\tilde{t}$ *aggregate output is given by*

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

If condition (A.3) does not hold, then after $\bar{t}$ *output reverts to equation (30) and* $\lim_{t\to\infty} Y_t^E = Y_\infty^E$ *as in equation (31). Otherwise (if condition (A.3) holds),*

$$\lim_{t\to\infty} Y_t^E = (1-\delta)^{(1-\alpha)/\alpha} \frac{MA^H + (1-M)A^L}{1-\alpha}.$$

An important implication of this result is that if condition (25) 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.

Appendix B:

See <http:///www.eeassoc.org/jeea/> (Supplemental Material).

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