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Abstract

This paper presents an agency theory of revolutionary political transitions from autocracy to democracy. We model authoritarian economic policy as the equilibrium outcome of a repeated game between an elite ruling class and a disenfranchised working class, in which workers have imperfect information about the elite's policy choice and the economy's productive capacity. We characterize the conditions under which, in equilibrium, (i) the elite will set inefficient economic institutions under the threat of revolution, (ii) information shocks can catalyze democratic revolutions that may be contagious among similar countries, and (iii) democracy can be consolidated following a political transition.

Keywords: Political transition, Revolution, Asymmetric information, Contagion, Democratic consolidation, Arab Spring

JEL codes: D71, D74, P48

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1 Introduction

Since the end of the Cold War and the fall of the Berlin Wall, popular protest movements, from Eastern Europe to the Middle East, have challenged authoritarian rule and called for transitions to democratic political institutions. Concurrently, economists have paid more and more attention to the role of political institutions and civil conflict in shaping economic institutions and development paths. In this paper, we examine how the predatory incentives of autocratic governments can lead to inefficient economic institutions when the threat of revolution constrains the autocratic institutional choice problem. Given the autocrat's choice to pursue a sclerotic development path to patronize the "elite", we consider the conditions under which a risky democratic revolution can be the rational choice of the disenfranchised.[1]

We take a novel view on non-democratic economic policy-making under the threat of revolution that incorporates an informational asymmetry between the elite ruling class and the disenfranchised working class. As such, we consider autocratic policy-making within the context of a principal-agent problem, a classic method of analyzing economic policy-making when political accountability is enforced democratically (Barro, 1973; Ferejohn, 1986; Besley, 2006).

Autocratic policy-makers, like their rent-seeking democratic counterparts, solve self-interested optimization problems, constrained by their accountability to the principals they "represent". While dissonant politicians can be removed through the electoral process in democratic societies, dictators can only be unseated by revolution or coup d'état. Our focus in this paper is on the "revolution constraint". The dictator would like to extract the maximum possible rent through his control over economic policy, but the threat of revolution constrains his ability to do so (Acemoglu and Robinson, 2001, 2006). The first-order conditions of the autocrat's policy-making problem are similar to those found in the (democratic) political agency literature. The dictator will continue to predate more of the economic output until the marginal benefit of higher current-period predatory revenue equates to the expected cost of provoking revolution with a marginally higher probability.[2]

We apply this political agency logic to a model where authoritarian economic policy is the Markov perfect equilibrium of a repeated game between an elite ruling class and a disenfranchised class of society that can choose to revolt (Acemoglu and Robinson, 2001).

[1] Throughout, we consider the elite ruling class as a single player. The autocratic economic policy that the dictator sets represents a choice on behalf of the elite, so we use the terms "autocrat", "dictator", and "elite" interchangeably.

[2] See Acemoglu *et al.* (2010) for a theory where the principle-agent relationship is between the elite and the military. To our knowledge, Acemoglu *et al.* (2010) is the only other paper to explicitly discuss dictators as agents. Our model does not consider the role of the military, but focuses instead on the principle-agent relationship between the elite and the working class.

To maximize lifetime expected predatory revenues, the elite choose between an efficient, publicly observable method of predation (non-distortionary income tax) and an inefficient, hidden method (entry costs on a middle class of entrepreneurs) that is not observed by the working class.[3] We show that efficient predation through taxation features a "conciliatory income tax rate", which the elite can adjust to maintain power if the level of revolutionary threat changes.

The inefficient method, by contrast, imposes hidden (from the workers) barriers to entry on middle class entrepreneurs, which suppress the demand for labor and the wage rate to an extent that allows less efficient, elite entrepreneurs to make abnormal profits. Throughout, we refer to this policy as one of "factor price manipulation" (Acemoglu, 2006, 2010). When the elite choose to manipulate factor prices, the economy produces below its capacity, there is unemployed labor, and labor's share of output is low. Workers would prefer a laissez-faire economic institution if they knew there was a potential for full employment. Importantly, entry barriers are not observable by the working class and their suppression cannot be immediately achieved.

This structure of our model makes it impossible for the elite to credibly commit to removing barriers to entry once they are set in place. Our framework captures the fact that, due to the nefarious social norms of commerce that emerge when firms are subjected to stochastic barriers of entry over extended periods, a policy of systematic factor price manipulation makes the dictator's decision one of economic institutional choice.

In our model, workers do not know, a priori, whether bad economic outcomes follow directly from the elite's economic policy or whether the economy is naturally under-developed, with an insufficient mass of entrepreneurs able to run relatively large formal firms (La Porta and Schliefer, 2008). As a result, when the elite choose to manipulate factor prices, there is an informational asymmetry between the ruling class and the working class about the source of the economy's stagnation. We analyze the conditions under which the elite will rationally choose the inefficient predatory instrument, at the risk of revolt (Acemoglu, 2006).

Information shocks can update workers' perceptions of the relation between economic outcomes and the economic institution. Examples of such shocks include increases in foreign media access, development of information technology, unauthorized release of confidential state secrets, etc.[4] The Markov perfect equilibrium can transition to a democratically-determined,

[3]Note that tax policy could be interpreted more broadly as a levy on consumption of goods, services, and basic necessities that elites do not have to pay, and not necessarily a formal income tax. Of course, any tax policy would be distortionary in reality. Here, we follow the lead of Acemoglu (2006) in supposing that taxation is *less distortionary* than stochastic entry barriers. Explicitly modeling a dead-weight cost function associated with taxation would not qualitatively affect our results.

[4]Note that the Tunisian revolution began several weeks following the release of confidential American State Department cables about the Tunisian dictator by Wikileaks.

laissez-faire economic institution if the information shock is strong enough to make the expected net benefit of revolting positive.[5] Moreover, the paper demonstrates that inefficient economic institutions may be a lasting equilibrium, with regime duration essentially following the probability distributions of random information variables.

To our knowledge, we are the first to consider the role of asymmetric information between the elite class in control of economic policy and the disenfranchised class in a rational choice model of political transition to democracy. Previous work that has incorporated informational asymmetries into models of democratic revolutions (or mass movements) have concentrated on asymmetries *between* members of the disenfranchised class (Kuran, 1989; Lohmann, 1994; Bueno de Mesquita, 2010; Ellis and Fender, 2010). In these papers, the disenfranchised know that if the revolution succeeds, they will all be better off. What is unknown is the revolutionary zeal of others in the disenfranchised class, which determines the prospects of overcoming the free-rider problem in collective action. In our model, the key uncertainty among the disenfranchised is the growth potential of the economy following a democratic revolution and transition to laissez-faire.

Our paper provides a departure from the literature on conflict more generally, where struggles for power are usually considered within a zero-sum world. In this literature, conflict is the result of competition over a fixed supply of economic resources between competing groups (Garfinkel and Skaperdas, 2007). In one prominent early contribution (Grossman, 1991), conflictual insurrections and their suppressions are purely wasteful diversions of labor resources from productive activity to the wage-paying activities of insurrection and its prevention. Our paper considers instead conflict over control of economic *institutions*, rather than over control of economic *assets*. The uncertainty we introduce is that the working class does not know whether revolution and transition to a laissez-faire economic institution is a zero-sum proposition.

Another novel feature of our model is the possibility of revolutionary contagion. We suppose the costs of revolution are uncertain, ex ante, so agents form cost expectations. This uncertainty comes from the fact that would-be revolutionaries do not know whether the military will remain loyal to the elite or how the international community will react, for example. If the cost of an initial revolt was low, would-be revolutionaries abroad update their own cost expectations and revolutions can spread to similar countries.[6]

In Acemoglu and Robinson (2001), Chassang and Padro-i-Miquel (2009), and many oth-

[5] As is prevalent in the economics literature, we take a rationalist view of revolutionary activity; the disenfranchised class pursues a costly revolution if its expected net utility exceeds the utility provided by the status quo. In the spirit of Tullock (1971), we do not consider the public good payoff of institutional reform in the decision-making calculus of would-be revolutionaries.

[6] Aidt and Jensen (2011) consider a similar information transmission from revolutions abroad in the decision to extend the voting franchise due to a heightened threat of revolution at home.

ers, political transitions to democracy occur during adverse business cycle shocks, which reduce output but do not necessarily increase unemployment levels. The incentive to revolt in these papers is stronger during recessions, since the revolution will destroy a fraction of (the temporarily lower) economic output. Rather, we focus on macroeconomic causes of revolutions that are more structural, such as sclerotic long-run growth paths that feature chronic unemployment.[7] In our theory, persistent unemployment of labor and low wages are key characteristics of the equilibrium in which revolutions are possible.

Finally, we consider the conditions under which democracy can be successfully consolidated following a revolution. When the growth potential of the economy is revealed following a revolution and transition to laissez-faire, the elite can invest in mounting a coup and workers can invest in consolidating democracy. We identify the set of individually rational investments each side would be willing to make to control the economic institution and analyze when democracy can be consolidated.

The paper proceeds as follows. The first section describes the economic environment of our model. In the second section, we derive the equilibrium choice of economic institutions and discuss how contagious democratic revolutions can be sparked by information shocks. The third section analyze the conditions under which post-revolutionary democracy can be consolidated. Our model was inspired by the revolutions in Tunisia and Egypt, brief histories of which are discussed in the fourth section. The final section offers our concluding remarks.

2 Economic environment

2.1 Production structure, economic policies, and output

The economy is populated by a continuum that measures $L + \theta^m + \theta^e$ of risk-neutral agents whose objective is to maximize their lifetime expected consumption.[8] The three groups of agents represent a working class (L), a middle class of entrepreneurs (m) and an elite class (e). For simplicity and without loss of generality, we normalize the population of elites to measure one ($\theta^e = 1$). We assume that the middle class is at least as big as the elite class ($\theta^m \geq 1$) and that the working class makes up the majority of the population ($L > \theta^m + \theta^e$). As such, in a democracy the median voter would be from the working class.

Agents from both the middle class and the elite class can become entrepreneurs. Denote the productivity of middle class and elite entrepreneurs by A^m and A^e, respectively. We

[7] See Acemoglu (2008) for a comparison of oligarchic and democratic societies that allows for such sclerotic equilibria.

[8] The production and regulatory structures of the model are adaptations of Acemoglu (2006) and Acemoglu (2010).

assume that middle class entrepreneurs are at least as productive as the elites, i.e., $A^m \geq A^e$. We also assume that elite entrepreneurs have productivity A^e if and only if middle class entrepreneurs are not in the market (otherwise, the elite's productivity is normalized to 0, without loss of generality).[9]

Development constraints limit each entrepreneur to profitably employ λ workers, who supply labor inelastically. The parameter λ describes the saturation point for firms' organizational scale in developing economies and we assume that firms that enter the market always operate at the saturation point. Denoting the set of entrepreneurs by E, the labor market clearing condition is that $\int_{j \in E} l^j dj \leq L$, where l^j is the labor demanded by entrepreneur j. We impose two important conditions on the measures of the entrepreneurial classes. First, we assume that $\theta^e < L/\lambda$, which means that there will always be an excess supply of labor in the formal labor market when only elite entrepreneurs produce. Second, we allow for the possibility that middle class entrepreneurs are insufficient in measure to fully employ the labor force, i.e., $\theta^m \geq L/\lambda$ or $\theta^m = \theta^e = 1$. Whether or not the middle class is of sufficient measure to generate excess demand for labor when resource allocation is uninhibited by economic policy will be a key source of uncertainty in the model.

Economic institutions are initially controlled by the elite, whose objective is to maximize their expected lifetime income. We suppose that the elite choose between two types of predatory economic institutions, one of which is distortionary and inefficient. The non-distortionary method of predation is to directly tax labor income at rate $\tau \in [0, 1]$. Since labor is supplied inelastically, there are no marginal decisions and an income tax is equivalent to a non-distortionary lump-sum tax. The elites can make group-specific transfers to themselves with the revenue generated through income taxation.[10] Alternatively, the elite may choose to impose barriers to entry on middle class agents that discourage them from becoming entrepreneurs. Under this policy, each period, middle class entrepreneurs must pay b^m, which is purely wasteful and provides the elite with no direct revenues. As they affect production decisions in the economy, barriers to entry are distortionary. Importantly, the imposition of barriers to entry on middle class entrepreneurs are not directly observable by workers, who only observe labor market outcomes. Given a wage rate of w and barriers to entry b^m the

[9] This assumption simplifies exposition of the main ideas presented in our model. Allowing for elite and middle class entrepreneurs to be in the market at the same time does not change qualitatively our main results.

[10] We have assumed that the elite have access to an efficient method of predation, as in Acemoglu (2010). Several studies have recently noted that states are generally not endowed with efficient fiscal instruments, but must invest in the government's fiscal capacity (Besley and Persson, 2009, 2010). We abstract from the investment issue and analyze the conditions under which the elite will *choose* to implement inefficient institutions.

profit of middle class and elite entrepreneurs, respectively, are given by

$$\pi^m(w, b^m) = (A^m - w)l^m - b^m \quad \text{and} \quad \pi^e(w) = (A^e - w)l^e.$$

We assume that $w \in [\underline{w}, A^m]$, where $\underline{w} > 0$ is a minimum living wage for workers in the formal sector. We assume that the formal sector living wage is greater than the worker's outside option for informal work.[11] Furthermore, we suppose that $A^m > A^e > \underline{w}$, so that the elite can make a strictly positive profit at $w = \underline{w}$, but not at $w = A^m$. Given the supply and demand for labor, when there are entry costs, the equilibrium wage rate will be

$$w = \begin{cases} \max\{A^m - b^m/\lambda, \underline{w}\} & \text{if } \theta^m > L/\lambda \\ \underline{w} & \text{if } \theta^m = \theta^e =< L/\lambda \end{cases}$$

If entry costs are such that $A^m - b^m/\lambda < \underline{w}$, then no middle class producers can make a positive profit, there are only elite producers, and the wage rate has been manipulated down to $\underline{w}$.[12] When there are no entry costs ($b^m = 0$), only middle class entrepreneurs produce and the wage rate is A^m if $\lambda\theta^m > L$ and $\underline{w}$ if $\lambda\theta^m = \lambda < L$. Note the possibility that there is an excess supply of labor even if there are no barriers to entry.

As described above, we consider two cases that relate to the level of economic development, which we proxy by the measure of middle class entrepreneurs relative to the measure of workers. In the first case, there is a tragedy of development, in which $\theta^m = \theta^e = 1 < L/\lambda$, and there are not enough middle class entrepreneurs to provide sufficient demand for the entire labor force, regardless of the economic institution. In the second case, there is a potential for full employment, such that $\theta^m > L/\lambda > \theta^e = 1$. To begin, we consider the second case and assume that the elites know that $\theta^m > L/\lambda$, but that workers do not (we relax this assumption later when we consider democratic consolidation).

The total level of (non-storable) economic output in the economy depends on the level of development and the economic policy of the elite. When there is no development tragedy, if $b^m = 0$ total economic output is given by $Y = A^m L$, the wage rate is given by $w = A^m$, and the labor share of income is complete. If, on the other hand, the elite impose barriers to entry sufficient to suppress the demand for labor by the middle class, i.e., $b^m > \lambda(A^m - \underline{w})$, then

[11] A common characteristic of economies that are early along the development path is that low-productivity informal sectors are relatively large. La Porta and Schliefer (2008) show that workers are very similar between formal and informal sectors, but managers are very different. When low-productivity informal sectors are large, wage rates in formal sector are often not competitively determined, as outside informal options are low-wage, and labor share of economic output from formal sector production is very low. See also Djankov *et al.* (2002).

[12] This can be interpreted as a reduced-form of labor market matching models (Pissarides, 2000) where workers have limited bargaining power when there are few alternative employment opportunities.

only elite entrepreneurs produce and total output is $Y = A^e\lambda < A^mL$. The wage rate in this case is $\underline{w}$ and the labor share is $\underline{w}/A^e < 1$. Thus, in the absence of a development tragedy, total income and the workers' share depend on the elite's choice of economic institution.[13]

In order to simplify exposition and without loss of generality, we define $\underline{w} \equiv \alpha A^m < A^e$. We suppose that the government, as well, must leave workers with a living wage of $\underline{w} = \alpha A^m$, so the taxable income of workers is, therefore, $(1-\alpha)A^m$. The tax payments per worker will be $\tau(1-\alpha)A^m$ if $w = A^m$ and zero if $w = \underline{w} = \alpha A^m$. Later, it will be useful to consider workers' net income in these terms, as $[1-\tau(1-\alpha)]A^m$.

Without the threat of revolution, the elite choose the non-distortionary mode of predation and set $\tau = 1$ to maximize their consumption.[14] When a revolutionary threat exists, the elite may choose the hidden mode of predation to secure abnormal profits for less efficient elite producers if the threat of revolution sufficiently constrains the tax revenues the elite could raise through a publicly observable income tax.

2.2 Information structure in the economy

2.2.1 Perceptions of economic capacity

If the working class observes low wages and unemployment, they cannot be sure it results from barriers to entry. The bad economic outcome could also result from a lack of middle class entrepreneurs in an environment where the dictatorship is benevolent and maximizes social welfare. If there are low wages and unemployment in the economy, workers believe with probability ρ that the outcome is a direct result of the dictator's economic institution and that a laissez-faire economic institution would feature full employment. Since the potential for growth is only possible if there is a sufficient measure of middle class entrepreneurs ($\theta^m > L/\lambda$), we refer to ρ as the workers' *confidence in the middle class*.[15] With probability $1-\rho$, workers believe that there is a genuine tragedy of development and that unemployment would persist even with a laissez-faire economic institution.

We suppose that the level of confidence in the middle class among workers has a period-specific stochastic term, i.e., $\rho_t = \rho + \epsilon_t$, where ϵ is distributed according to some mean-zero

[13] In a previous version, we present several panel regressions that verify the stylized facts in our model. Notably, we demonstrate that (i) labor shares increase along the development path, (ii) labor shares are higher in democracies (Rodrik, 1999), (iii) labor shares are higher where economic regulation is less stringent, (iv) informal sectors are larger in less developed countries, and (v) economic regulations are more stringent in autocracies. These results are available upon request.

[14] Indeed, $(A^m - \underline{w})L > (A^e - \underline{w})\lambda$ in the case of no development tragedy where $w = A^m$ and $\lambda\theta^m > L$ and $(A^m - \underline{w})\lambda\theta^m > (A^e - \underline{w})\lambda$ in the case of development tragedy where $w = \underline{w}$ and $\theta^m = \theta^e = 1$.

[15] An earlier version of the paper described ρ as the level of skepticism about the dictator. Either description works, but there is likely to be more uncertainty about the depth of the middle class vis-a-vis the intentions of a dictator.

monotone distribution, F, over support $[\underline{\epsilon}, \bar{\epsilon}]$. We assume that the distribution of information shocks is commonly known. The expected value of ρ_t is therefore simply $E(\rho_t) = \rho + \int \epsilon dF(\epsilon) = \rho$. Shocks to ρ are therefore transitory. The realized value of ρ_t depends on the regime's long-term reputation in society, ρ, and the period-specific shocks, ϵ_t. We discuss different examples of such shocks later in the paper.

2.2.2 Perception of the cost of revolution

Revolutions are costly. The elite lose everything after a revolution as they no longer control economic policy. Without manipulating factor prices, the elite cannot compete with middle class entrepreneurs and they no longer have the ability to set targeted fiscal transfers. Following Acemoglu and Robinson (2001) and others, a fraction of workers' income (μ_t) is destroyed in the wake of a revolution that occurs in period t. We propose an uncertainty concerning the cost of revolution for workers. In concrete terms, would-be revolutionaries do not know, a priori, whether the dictator will respond with repression or whether the international community will intervene, for example. With a slight abuse of notation, we define $\mu = E(\mu_t)$.

For simplicity, suppose that the destructive costs of revolutions follow a two-point distribution over $\{\underline{\mu}, \bar{\mu}\}$. There are two possible informational states of nature, a bad state, W_b, and a good state, W_g. In state W_b, the probability that the revolution cost is high is p and in state W_g, the probability that revolution cost is high is q, where $p > q$. We assume that, a priori, being in the good or bad state is equally likely, i.e., prob$(W = W_b)$ = prob$(W = W_g)$ $= 1/2$. Therefore, the a priori expected value of the cost of revolution in period t is given by:

$$E(\mu_t) = \frac{1}{2}\left[p\underline{\mu} + (1-p)\bar{\mu}\right] + \frac{1}{2}\left[q\underline{\mu} + (1-q)\bar{\mu}\right]. \tag{1}$$

Suppose a small set N of identical countries. If a country $i \in N$ experiences a revolution whose cost was revealed to be $\underline{\mu}$, the N_{-i} other countries update their expectation of the state of nature in a Bayesian manner within each period. A posteriori, the expected probability that the state of nature is good becomes

$$P(W_g|\underline{\mu}) = \frac{P(\underline{\mu}|W_g)P(W_g)}{P(\underline{\mu})} = \frac{P(\underline{\mu}|W_g)P(W_g)}{P(\underline{\mu}|W_g)P(W_g) + P(\underline{\mu}|W_b)P(W_b)} = \frac{\frac{1}{2}p}{\frac{1}{2}p + \frac{1}{2}q} > \frac{1}{2}, \tag{2}$$

since $p > q$. In other words, if a revolution in one country i shown to be low-cost, the N_{-i} other countries update their expectations such that they believe it is more likely that $W = W_g$. The updated beliefs lowers the expected value of the destructive costs of revolution

within the period, i.e.,

$$E(\mu_{t,N_{-i}}|\mu_i = \underline{\mu}) = \frac{\frac{1}{2}p}{\frac{1}{2}p + \frac{1}{2}q}\left[p\underline{\mu} + (1-p)\bar{\mu}\right] + \frac{\frac{1}{2}q}{\frac{1}{2}q + \frac{1}{2}p}\left[q\underline{\mu} + (1-q)\bar{\mu}\right] < E(\mu_t) \quad (3)$$

since $p > q$. Information updating on the costs of revolution is also period-specific. The expected cost of revolution reverts back to μ at the beginning of the following period.

2.3 Timing, strategies and definition of an equilibrium

We consider the formation of the elite's economic policy as the equilibrium outcome of a repeated game between the classes in which the elite's policy decisions are constrained by the threat of revolution. Because workers are the majority, the decisive voter in a democracy would be a worker. We suppose that the democratically determined economic policy would be laissez-faire, since output and labor's net share are higher without entry barriers or income taxes.[16] Agents form their decisions by maximizing lifetime expected stream of consumption, so expected lifetime utility of individual i is given by

$$U_0^i = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t c_t^i. \quad (4)$$

In this rationalist conception, the workers form an expected utility of revolution based on its current-period destructive costs and the probability that the economy gets to full employment after instituting a laissez-faire economic institution.

If a fraction ζ of the population takes part in revolutionary activities, the revolution always succeeds. We assume that $L/(L + \theta^e + \theta^m) > \zeta$, but that $\theta^m/(L + \theta^e + \theta^m) < \zeta$. That is, the workers are sufficiently numerous to revolt successfully, but the middle class of entrepreneurs is not. To highlight the competition between groups for control over economic institutions, we abstract from the collective political action problem and treat workers as a unitary player against the elite in a repeated game. Since the workers' share in the population is greater than ζ, if the workers decide to revolt, it always succeeds.

Each period, the incumbent elite choose their economic policy and then the workers choose whether or not to revolt. We suppose that the elite are predatory, but the workers cannot be sure of this. For now, we consider a transition to democracy as an absorbing state, so that if the workers decide to revolt, democracy is consolidated. The timing of events within a period is the following.

[16] Implicitly, we do not consider the redistributive potential of control over fiscal policy, since the elite lose everything if a revolution succeeds. Similarly, we do not consider the incentive to control natural resources.

1. Elites choose whether or not to impose barriers to entry ($b = 1$ or $b = 0$), having in mind the distribution of ρ_t and μ_t. If $b = 0$, the elite can modify the tax rate at any moment. Barriers to entry, however, cannot be removed within a period.[17] Production takes place for the period.

2. The value of the shock to ρ_t is revealed and workers choose whether or not to revolt.

3. If there was a revolution in another country, the expectation on μ is updated and workers choose whether or not to revolt.

4. Taxes are collected and consumption takes place. If a revolt occurs, democracy is consolidated and the game ends (we will relax this assumption later with the possibility for the elite to mount a coup following a revolt). If no revolt occurs, go back to 1.

There is one state variable in the model, $S = \{E, D\}$, which describes whether economic policy is controlled democratically (D) or by the elite (E). The economy each period is characterized by an information structure, which we denote by the vector $\iota = \langle \mu, \rho, \mu_t, \rho_t \rangle$ for the expectation and the realized values of the information parameters. There are two types of decision-making agents, $a \in \{e, l\}$, representing elites and workers (middle class entrepreneurs are not strategic actors in the game). Actions of the elites follow from a strategy, denoted $\sigma^e(S, \iota)$. The action spaces for the elite are $b \in \{0, 1\}$, which determines whether the elite impose barriers to entry or not, and $\tau \in [0, 1]$. Actions of the workers follow from a strategy, denoted by $\sigma^l(S, \iota)$. The worker's action space is simple $r \in \{0, 1\}$, where $r = 1$ indicates that the workers' action is to revolt. If $r = 1$, the state transitions from E to D and in the process, a share μ_t of all labor income is destroyed. The Markovian strategies are represented by the following mapping:

$$\sigma : S \times \{e, l\} \longrightarrow \{0, 1\}^2 \times [0, 1].$$

A Markov Perfect Equilibrium (MPE) is a mapping σ^* that is a best response to itself at any point in history, i.e., a strategy combination such that each player's strategy is the best response to the other's for all possible states. Consider the following pair of recursive value functions:

$$V^e(S) = \max_{\sigma^e} \left\{ c^e(\widehat{\sigma}^l, \sigma^e, S) + \beta \int V^e(S') dP(S' | \widehat{\sigma}^l, \sigma^e, S) \right\}, \text{ and} \tag{5}$$

[17] In terms of our results, assuming that barriers to entry cannot be removed within a period is equivalent to assuming that removing barriers to entry does affect the level of economic output in the short-term (within a period).

$$V^l(S) = \max_{\sigma^l} \left\{ c^l(\widehat{\sigma}^e, \sigma^l, S) + \beta \int V^l(S') dP(S'|\widehat{\sigma}^e, \sigma^l, S) \right\} \tag{6}$$

where c^i denotes the consumption of agent i as a function of the state S and strategies. $P(S'|\widehat{\sigma}^l, \sigma^e, S)$ denotes the probability distribution function of transition from state S to S'as a function of the strategies, σ^e and σ^l, as well as the initial state. A pure Markov perfect equilibrium is a strategy combination $\{\widehat{\sigma}^e(S, \iota); \widehat{\sigma}^l(S, \iota)\}$, such that $\widehat{\sigma}^e$ solves equation (5) and $\widehat{\sigma}^l$ solves equation (6) within each time period. This defines a sequence of policies, actions, and political institutions. As the game played each period is the same, the economic institutional choices are stable if there is not a transition of political institutions.

3 Equilibrium institutional choice

Throughout the section, we focus on the case where the state is initially controlled by the elite ($S = E$), there is no development tragedy ($\theta^m > L/\lambda$), and the elite are well-informed about the economy's *potential* for full employment. In a later section, we relax the assumption that the elite are well-informed in this way. As the information parameters return to the same expected value each period, the choice of the elite will be consistent across periods. Therefore, policy choice is similar, in spirit, to an institutional choice, since policy-makers face the same optimization problem at the beginning of each period. This set-up captures the fact that economic institutional choice is long-lasting. Our set-up does not allow for economic institutions, once set, to be changed without a transition to democracy first.

Following Acemoglu and Robinson (2001), we consider the threat of revolt as a constraint that affects the policy choice of the elite. In the following subsections, we consider how policy choices under the two predatory instruments are constrained by the threat of revolution. We analyze the game using backward induction. Since the elite move first, we begin by considering the strategy of the workers, given the strategy of the elites. We then discuss institutional choice in equilibrium and how information shocks can result in revolutions, which may be contagious among similar countries. The final subsection concerns democratic consolidation when democracy is not an absorbing state.

3.1 Case 1: Efficient predation - income taxation

The dictator chooses whether or not to implement barriers to entry, $b \in \{0, 1\}$ and the level of taxation if $b = 0$. The problem of setting the tax rate is constrained by the workers' threat of revolt. We begin by deriving the revolution constraint and proceed to solve for the elite's optimal income tax rate when $b = 0$. Recalling that the workers' taxable income is given

by $(1-\alpha)A^m$, workers choose to revolt ($r=1$) or not ($r=0$) to maximize the following recursive value function at stage 2 (before μ is updated for the period):

$$V^l(E|\tau>0) = (1-r\mu)[1-\tau(1-\alpha)]A^m + \beta\left[(1-r)V^l(E|\tau>0) + rV^l(D)\right], \tag{7}$$

where the value to the workers of being in democracy is given by

$$V^l(D|\tau>0) = \sum_{j=t}^{\infty}\beta^j A^m = \frac{A^m}{1-\beta}. \tag{8}$$

Using (8) in (7) and a little algebra, we rewrite the value function as

$$V^l(E|\tau>0) = \left[\frac{1}{1-\beta(1-r)}\right]\left[(1-r\mu)[1-\tau(1-\alpha)]A^m + r\left(\frac{\beta A^m}{1-\beta}\right)\right] \tag{9}$$

The revolution constraint in the case of income taxation is given by

$$V^l(E|\tau>0, r=0) - V^l(E|\tau>0, r=1) \geq 0. \tag{10}$$

The problem of the elite then is to choose the highest tax rate such that the revolution constraint is satisfied. The elite will increase the tax rate to the point that workers are indifferent between revolution and the status quo (when the constraint holds with equality). In other words, the critical tax rate, τ^* solves the following expression:

$$\left(\frac{1}{1-\beta}\right)[1-(1-\alpha)\tau]A^m = (1-\mu)[1-\tau(1-\alpha)]A^m + \frac{\beta A^m}{1-\beta} \tag{11}$$

Algebraic manipulation yields the critical tax rate as a function of the model's parameters.

$$\tau^*(\alpha,\beta,\mu) = \left(\frac{1}{1-\alpha}\right)\left[\frac{\mu(1-\beta)}{\beta+\mu(1-\beta)}\right] \tag{12}$$

The tax rate given by equation (12) is the "conciliatory" tax rate; it is the highest the elite can set while preventing revolution. We make the following assumption to ensure that there are no corner solutions in the elite's problem of setting an optimal income tax rate.

Assumption 1. *The workers revolt with certainty if $\tau = 1$. In other words, $V^l(E|\tau = 1) - V^l(D) < 0$, which has sufficient condition that $\mu < \beta(1-\alpha)/[\alpha(1-\beta)]$.*

We have assumed that tax rates can be changed instantaneously to conciliate the workers if a revolution in another country causes the expected cost of revolution to deviate from its ex-ante expected value at stage 3. Equation (12) should be understood as the tax rate that

elites set based on their ex-ante expectations as well as on the ex-post realization of μ_t should a revolution occur abroad within the period. For example, a low-cost revolution abroad at stage 3 of the game induces an adjustment of the conciliatory tax rate to $\tau^{*'} < \tau^*$. Note that over the long-run, workers expect that the tax rate is stable at τ^* and elites, when adjusting τ following a shock, know that workers expect the tax rate to return to τ^*. Since the cost of revolution is reset to μ each period, so too is the conciliatory tax rate reset to that given by equation (12) if the elite choose to raise revenue through taxation. The adjusted conciliatory tax rate is the solution to

$$V^l(E|\tau > 0) = \left[1 - r\mathrm{E}(\mu_t|\mu_i = \underline{\mu})\right]\left[1 - \tau(1-\alpha)\right]A^m + \beta\left[(1-r)V^l(E|\tau > 0) + rV^l(D|\tau > 0)\right],$$

where

$$V^l(E|\tau > 0) = \frac{(1-\tau^*)A^m}{1-\beta}.$$

Solving for the adjusted critical value yields

$$\tau^{*'} = \left(\frac{1}{1-\alpha}\right)\left[\frac{(1-\beta)\mathrm{E}(\mu_t|\mu_i = \underline{\mu}) - \beta\tau^*}{(1-\beta)\mathrm{E}(\mu_t|\mu_i = \underline{\mu})}\right],$$

which is strictly positive provided that $(1-\beta)\mathrm{E}(\mu_t|\mu_i = \underline{\mu}) - \beta\tau^* > 0$, which we assume to hold. This captures the notion that when policy choices are flexible within an economic institution, the dictator can adjust the policy to prevent revolution should there be a shock to the parameters. In an economic institution that does not feature policy flexibility, this is not the case. Here, we make the extreme assumption that political transitions can always be avoided if predatory policy is flexible. The following proposition summarizes our discussion of predatory tax policy when there exists a revolutionary threat.

Proposition 1. *Under the threat of revolution and if assumption 1 is satisfied, there is a conciliatory tax rate, $0 < \tau^* < 1$, that is the highest the elite can impose without provoking a revolution. The conciliatory tax rate is (i) decreasing in β and (ii) increasing in μ.*

The proposition implies that, while the threat of revolution affects the tax rate implemented, workers will never revolt when the elite chose efficient economic institutions. The comparative statics are intuitive. First, the more that workers value future income, the higher is the incentive to revolt since democracy is an absorbing state and revolution only has current period costs. Greater patience in the working class therefore strengthens the revolution constraint and decreases the conciliatory tax rate. Second, with respect to μ, the more costly are revolutions (in expectation), the looser is the revolution constraint and the higher will be the conciliatory tax rate within the period.

Notice that in the case of efficient predation, there are no informational problems. If the workers observe wage rates above their outside option wage, low unemployment, and labor income taxation, it is revealed that the elite are not manipulating factor prices.[18]

3.2 Case 2: Inefficient predation - factor price manipulation

Now, we consider the case of inefficient predation. The elite set the entry barrier high enough to prevent the middle class entrepreneurs from making positive profits, thus suppressing the demand for labor (and the wage rate) to a point where elite entrepreneurs can produce profitably.

Workers do not directly observe barriers to entry; they only observe the resulting economic outcome of low wages and unemployment in the official sector. This is observationally equivalent to the outcome if the authoritarian policy were non-distortionary and benevolent, but there was a tragedy of development. In period t, workers believe with probability ρ_t that the economic institution is inefficient and a cause for the bad economic outcome. With probability $1-\rho_t$, on the other hand, workers believe there is a tragedy of development that is not a result of distortionary economic institutions. The workers decide whether to revolt ($r=1$) or not ($r=0$) to maximize the following value function:

$$V^l(E|\tau=0) = (1-r\mu)\varepsilon\alpha A^m + \beta\left[(1-r)V^l(E|\tau=0) + rV^l(D|\tau=0)\right] \tag{13}$$

where $\varepsilon \equiv (\theta^e\lambda)/L = \lambda/L$ is the employment rate and $\underline{w} \equiv \alpha A^m$ is the minimum living wage for formal sector work, as before. Note that $\varepsilon\alpha A^m$ is the expected income of a worker who does not observe income taxation, which corresponds to the living wage and the probability of being employed in the official sector. The value of the workers of being in a democracy, given that they did not observe income taxation and have realized the value of the shock to ρ, is given by the following:

$$V^l(D|\tau=0) = \frac{\rho_t A^m + (1-\rho_t)\varepsilon\alpha A^m}{1-\beta}. \tag{14}$$

Note that if the source of low demand for labor and low wages is perceived by the workers to be a genuine lack of development (with probability $1-\rho_t$), then a costly revolution will not have an economic return for the working class. Taking into account the workers' uncertainty

[18] One could similarly imagine a constraint on state capacity that prevented the dictator from imposing a tax rate above some $\bar{\tau}$ (Besley and Persson, 2010). If $\bar{\tau} < \tau^*$, then clearly $\tau = \bar{\tau}$, which may provide further incentive to engage in inefficient predation.

and continuation values, equation (13) can be rewritten as:

$$V^l(E|\tau=0) = \left(\frac{\varepsilon\alpha A^m}{1-\beta(1-r)}\right)\left[1-r\mu+\left(\frac{\beta r}{1-\beta}\right)\left(1-\rho_t+\frac{\rho_t}{\varepsilon\alpha}\right)\right] \tag{15}$$

The workers will not revolt so long as the following constraint is satisfied:

$$V^l(E|\tau=0,r=0) - V^l(E|\tau=0,r=1) \geq 0 \tag{16}$$

Since factor price manipulation is not directly observable by the workers, the threshold parameter in this case relates to the uncertainty we have built into the model. The threshold information parameter ρ^* is the highest ρ_t subject to the revolution constraint, which solves the following expression:

$$\varepsilon\alpha A^m\left[1-\mu+\left(\frac{\beta}{1-\beta}\right)\left(1-\rho_t+\frac{\rho_t}{\varepsilon\alpha}\right)\right] = \frac{\varepsilon\alpha A^m}{1-\beta} \tag{17}$$

Algebraic manipulation of the above expression yields the critical information parameter as a function of the model's parameters:

$$\rho^*(\alpha,\beta,\mu) = \left(\frac{\varepsilon\alpha}{1-\varepsilon\alpha}\right)\left[\frac{\mu(1-\beta)}{\beta}\right] \tag{18}$$

Equation (18) describes the threshold level of confidence in the middle class that is required for a revolt to be rational for the workers. [19] The following assumption is purely technical and ensures that $0 < \rho^* < 1$:

Assumption 2. *If $\rho = 1$, then workers revolt with certainty and if $\rho = 0$, then workers never revolt. A necessary condition is that, $1-\mu+\frac{\beta}{1-\beta} < \frac{1}{1-\beta} < 1-\mu+\left(\frac{\beta}{1-\beta}\right)\left(\frac{1}{\varepsilon\alpha}\right)$.*

Note that the critical value depends on the cost of revolution. While ρ^* is stable across periods, it can fluctuate within periods should there be revolutions abroad in the third stage of the game. For example, a low-cost revolution abroad would change the threshold perception parameter to some $\rho < \tilde{\rho} < \rho^*$.

In the same manner, we identify a critical value for the destructive costs of a revolution, for a given ρ_t. The critical value, μ_t^*, solves equation (17) and can be expressed as

$$\mu_t^*(\alpha,\beta,\varepsilon,\rho) = \left(\frac{\beta}{1-\beta}\right)\left(\frac{\rho_t}{\varepsilon\alpha}-\rho_t\right) \tag{19}$$

[19] Since the workers do not observe the barriers to entry and the economic output cannot change within periods, the elite cannot credibly commit to lifting all entry barriers in the future period, since they will have an incentive to continue with the same policy.

If $\mu_t > \mu^*$, then workers will rationally not revolt.[20] Note that the critical value for μ is necessarily greater than zero if $\rho_t > 0$. When there is no cost to revolting, the workers will always have an incentive to do so. There is no restriction on the upper bound for μ; the destructive costs of revolution can exceed the period's total output.

Note that the critical values of the parameters are linked to one another, since they are both derived from the revolution constraint, equation (16). As a result, shocks to the current period value of ρ_t that are strong enough to violate the constraint (i.e., $\rho_t > \rho^*$) imply that μ_t^* gets pushed below μ_t. To see this, insert the expression for ρ_t^* into equation (19) and re-arrange to find that $\mu_t^* = \mu_t$. Shocks to ρ that are insufficient to violate the revolution constraint affect μ_t^*, but cannot push it below μ_t. Conversely, shocks to μ that are strong enough to violate the constraint imply that ρ_t^* gets pushed above ρ_t. The next proposition summarizes our discussion of the inefficient predatory policy.

Proposition 2. *Under the threat of revolution, when workers do not observe their income being taxed directly,*

1. *if assumption 2 is satisfied there is a threshold level of confidence in the middle class, $0 < \rho^* < 1$, below which the workers will not revolt, where ρ^* is (i) decreasing in β, (ii) increasing in ε, and (iii) increasing in μ, and*

2. *there is a threshold level of destruction, $0 < \mu^*$, above which the workers will not revolt, where μ^* is (i) increasing in β, (ii) decreasing in ε, and (iii) increasing in ρ.*

The comparative statics on ρ^* are intuitive. In the model, the returns to revolution extend into future periods, but the costs are born only in the current period. Therefore, the threshold level of confidence is lower when the workers have a stronger valuation of the future (higher β). Secondly, when the employment rate in the current period is higher, workers have less to gain from a costly revolt, so their threshold level of confidence is greater. Finally, when the expected destructive cost of revolution is higher, workers will need to be more certain that the dictator is manipulating factor prices and that there will be a return to revolting. The critical value ρ^* can be calculated by the dictator, assigned a probability according to the distribution of ϵ, and used to calculate the expected net benefit for the autocrat of using factor price manipulation, at risk of a revolution. The intuition behind the results concerning μ^* are similar.

[20] In much of the analysis of rational conflict, the expected value of conflict is compared to the value in the status quo. When conflict leads to higher utility in expectation, agents contest assets of known value with uncertain probabilities of success (characterized by contest functions). In our set-up, we have assumed that the revolutions that occur are always successful if they include all of the working class. What is uncertain, in our set-up, is the probability that a change in economic institutions will result in economic growth and the cost of revolting. In expected value sense, our approach is similar to the analysis of conflict using contest functions.

We now describe how the elite view the probability of information shocks strong enough to violate the revolution constraint, should the inefficient institution be chosen. Given ρ and the distribution of ϵ, we define $\phi_\rho \equiv 1 - F(\epsilon^*) = 1 - F(\rho^* - \rho)$ to be the probability of such a shock. In the same manner, we define ϕ_μ to be the probability of a shock to μ sufficient to drive μ_t below μ^*. To simplify the analysis, we assume these shocks are independent. We define the cumulative probability of a shock sufficient to violate the revolution constraint by $\phi \equiv \phi_\rho + \phi_\mu$. Of course, ϕ_μ changes if there is a shock to ρ in the second stage, as it affects μ_t^*, but this would not alter the decision of the autocrat in the first stage, before shocks are revealed.

3.3 Equilibrium economic institutional choice

We now analyze the conditions under which the elite will choose to manipulate factor prices and thus install inefficient economic institutions. The following assumption simply states that the elite value future utility enough to ensure that they never choose the extreme policy of predating the entire economic surplus in the first period, which provokes revolution with certainty (due to Assumption 1).

Assumption 3. *The elite prefer to prevent revolutions. In other words,* $V^e(E|\tau = \tau^*) - V^e(E|\tau = 1) \geq 0$*, which requires that* $\tau^* > 1 - \beta$*.*

The elites must choose between erecting barriers to entry ($b = 1$) sufficient to manipulate factor prices or taxing income at the conciliatory rate ($b = 0$). Recall that the threshold perception parameter ρ^* depends on the value of the cost of revolution parameter, μ. Since μ follows a two-point distribution over $\{\underline{\mu}, \overline{\mu}\}$, the threshold parameter will have minimum and maximum values, $\underline{\rho}^* = \rho^*(\underline{\mu})$ and $\overline{\rho}^* = \rho^*(\overline{\mu})$, respectively, where $\underline{\rho}^* < \rho^* < \overline{\rho}^*$.

If ρ is such that $\rho + \underline{\epsilon} > \overline{\rho}^*$, then for any possible shock, $\rho_t > \rho^*$, so as a result $\phi = 1$ and the workers revolt with certainty if the elite choose the inefficient economic institution. If the elite were to choose a policy that resulted in revolution with certainty, they would rather set $\tau = 1$ since it would yield higher current period revenues,

$$(A^m - \underline{w})\lambda\theta^m(1 - \mu) > (A^e - \underline{w})\lambda(1 - \mu).$$

On the contrary, if ρ is such that $\rho + \overline{\epsilon} < \underline{\rho}^*$, then for any possible shock, $\rho_t < \rho^*$, so as a result $\phi = 0$. We thus restrict our attention to the interesting range of parameter values for which the elite consider manipulating factor prices.

The elites choose $b \in \{0, 1\}$ to maximize the following recursive value function evaluated

at stage one of the game in each period, before shocks to ρ and μ are revealed:

$$V^e(E) = (1-b)\left[\tau^*(1-\alpha)A^m\theta^m\lambda\right]+b\lambda(A^e-\alpha A^m)+\beta\left[(1-b)V^e(E|\tau>0)+bCV^e(E|b=1)\right], \tag{20}$$

where τ^* is the expected value of the conciliatory tax rate at stage one and

$$CV^e(E|b=1) = (1-\phi)V^e(E|b=1) \tag{21}$$

is a continuation value that depend on whether the elites use factor price manipulation and ϕ is the probability of an information shock severe enough to violate the revolution constraint if $b=1$. Taking into account the continuation values, the value function can be rewritten:

$$V^e(E) = \frac{(1-b)\left[\tau^*(1-\alpha)A^m\theta^m\lambda\right]+b\left[\lambda(A^e-\alpha A^m)\right]}{1-\beta[(1-b)+b(1-\phi)]} \tag{22}$$

We require that the elite are individually rational when choosing to manipulate factor prices, which is the case whenever the following holds:

$$V^e(E|b=1) - V^e(E|b=0) \geq 0 \tag{23}$$

We now solve for the threshold probability of a shock sufficient to violate the revolution constraint, ϕ^*, above which the elite will never manipulate factor prices. Rearranging equation (22) and using (23) at equality, the critical value ϕ^* solves the following:

$$\frac{\lambda(A^e-\alpha A^m)}{1-\beta(1-\phi)} = \frac{\tau^*(1-\alpha)A^m\theta^m\lambda}{1-\beta} \tag{24}$$

Algebraic manipulation of equation (24) yields the critical value as a function of the model's parameters.

$$\phi^*(\alpha, A^e, A^m, \beta, \theta^m) = \frac{(A^e-\alpha A^m)(1-\beta)}{\tau^*(1-\alpha)A^m\theta^m\beta} - \frac{1-\beta}{\beta}. \tag{25}$$

If $\phi < \phi^*$ then the elite rationally choose to manipulate factor prices. We suppose that if the elite perceive there to be no risk of informational shocks sufficient to provoke revolution ($\phi = 0$), they always choose the inefficient method of predation.

Assumption 4. *$V^e(E|b=1,\phi=0) - V^e(E|b=0,\phi=0) > 0$, which requires that $(A^e - \alpha A^m) > \tau^*(1-\alpha)A^m\theta^m$.*

The assumption ensures that $\phi^* > 0$. If $\phi = 1$, choosing the inefficient institution will provoke revolution with certainty. The elite would have earned higher first period income by maximizing output and setting $\tau = 1$. Due to assumption 3, the elite prefer to prevent

revolution and put in place the conciliatory tax rate. Thus, we can be sure that $\phi^* < 1$. The next proposition summarizes the discussion.

Proposition 3. *Under the threat of revolution, the Markov Perfect Equilibrium can feature the elite choosing to use factor price manipulation ($b = 1$) depending on the possibility of shocks severe enough to violate the revolution constraint, summarized by the distribution parameter ϕ. If assumptions 3 and 4 are satisfied, then there exists a $\phi^* \in (0, 1)$ such that*

1. *If $\phi > \phi^*$, then the elite rationally choose the efficient method of predation.*
2. *If $\phi < \phi^*$, then the elite rationally choose the inefficient method of predation.*

Moreover, the critical value ϕ^* is (i) increasing in A^e and (ii) decreasing in τ^*.

The comparative statics results follow from taking partial derivatives of equation (25). The first indicates that when elite entrepreneurs are more productive, the inefficient method of predation becomes more attractive due to higher profits of elite entrepreneurs and the elite tolerate a higher probability that the workers will revolt. The second indicates that when the elite can extract greater revenues efficiently by taxing labor income (under the revolution constraint), the efficient method of predation becomes more attractive and the probability of informational shocks must be lower for the elites to decide to engage in factor price manipulation.

3.4 Information and contagious political transitions

Since there exists a conciliatory tax rate to satisfy the revolution constraint, there will never be a transition to democracy if the elite choose the efficient economic institution. For the elite, the expected stream of abnormal profits that follows from imposing barriers to entry must be sufficiently high to cover the risk of revolution. Shocks to the level of confidence in the middle class among the working class alter the workers' expected value of revolting within each period. If the expected value of revolt comes to exceed the value of the status quo, democratic revolution is rational. Recall that the level of confidence in the middle class in period t is given by $\rho_t = \rho + \epsilon_t$, where ϵ follows some monotone cdf F. A positive ϵ increases the probability, in the workers' perception, that *growth potential* exists in the economy, but has been repressed by the autocrat's economic policy. In other words, a positive shock to ρ_t strengthens the perception that a transition to a laissez-faire economic institution will have a payoff for the workers. We suppose that ϕ_ρ is small and that ϵ_t is independent across countries so that the joint probability that $\rho_t > \rho^*$ in two countries can be considered zero.

We suppose a small set N of identical countries, where $\phi < \phi^*$ in each country. Proposition 3 implies that factor price manipulation will be the method of predation chosen in each of

the countries. We define $\underline{\mu}^* \equiv \mu^*(\rho + \underline{\epsilon})$ as the lowest possible critical value for μ, given the range of shocks possible on ρ. We have the following proposition.

Proposition 4. *If factor price manipulation was the chosen economic institution in the N countries, then*

1. *a revolution is sparked in a country $i \in N$ due to an informational shock with probability ϕ_ρ, and*

2. *if the revolution in country $i \in N$ was low-cost, then it is a catalyst for revolution in the other N_{-i} identical countries if p and q are such that $E(\mu_{t,N_{-i}}|\mu_i = \underline{\mu}) < \underline{\mu}^*$ [see equation (3)].*

4 Extension: democratic consolidation

We now consider that following a revolution, democracy is not an absorbing state. That is, we allow for the possibility that the elites can mount a coup following a transition to democracy. We now suppose that contrary to our baseline model, neither the elite nor the working class know ex ante the growth potential of the economy in the absence of barriers to entry. Rather than a smooth transition to an absorbing democratic institution, we now consider a new intermediate state, transitional democracy, $S = TD$ (Acemoglu *et al.*, 2010). In any democratic state (transitional or consolidated), the elite can invest x_e to mount a coup and the workers can each invest x_d to defend the democratic state. We suppose the simplest possible contest for power; a successful coup requires that the total investment made by the elite (x_e) exceeds the total investment made by the working class for democratic consolidation ($x_d L$) each period.[21] In other words, if $x_e > x_d L$, then a coup would be successful (the state reverts to $S = E$), and if $x_e \leq x_d L$, then democracy is consolidated (the state becomes $S = D$). Following a democratic revolution, the state is a transitory democracy and the game in state TD is the following:

1. Median voter (a worker) chooses policy. Production takes place and the size of the middle class is revealed if the elite had previously predated using barriers to entry.

2. Workers choose investments in democratic consolidation and the elite choose investments in mounting a coup.

3. Consumption takes place and outcome of the contest for power is revealed.

[21] See Garfinkel and Skaperdas (2007) for a review of the various contest functions used in the economics of conflict literature. See also Acemoglu and Robinson (2008) for a related discussion of investments by elite to maintain inefficient institutions.

Clearly, the preferred policy of the median voter is laissez-faire, with no barriers to entry ($b = 0$) and no predatory taxation ($\tau = 0$). For simplicity, we now suppose that the size of the middle class follows a two-point distribution, $\{\underline{\theta}^m, \overline{\theta}^m\}$. When production takes place, the size of the middle class is revealed to be either $\theta^m = \underline{\theta}^m = 1$, and the economy continues to stagnate, or $\theta^m = \overline{\theta}^m > L/\lambda > \underline{\theta}^m$, and there is the potential for full employment.

We now discuss the willingness to invest in control over the economic institution for the workers and the elite. For both players, investments must be individually rational. The elites will never invest more than the value of retaking power; the maximum the elite are willing to invest is given by:

$$x_e^{\max} \equiv \max\left\{\beta V^e(E|b=1), \beta V^e(E|\tau=\tau^*)\right\}$$

For the workers, the maximum individually rational investment depends on the revealed size of the middle class and the chosen method of predation by the elite. If entry costs were chosen by the elites, then the maximum that each worker is willing to invest is given by

$$x_d^{\max} \equiv \begin{cases} 0 & \text{if } \theta^m = \underline{\theta}^m \\ A^m(1-\varepsilon\alpha) & \text{if } \theta^m = \overline{\theta}^m \end{cases}$$

If there is no potential for economic growth in the transitory democracy, then unemployment remains high, wages remain low, and the workers will not be willing to invest in defense of democracy. If there is a potential for full employment in the economy, then each worker is willing to invest up to the net increase in their expected wage $[A^m(1-\varepsilon\alpha)]$.

We suppose that there is a minimum level of investment that is required to mount a coup, even if the workers do not invest, which we denote by $\underline{x}_e$. Furthermore, we suppose that the elite may be constrained in their ability to make investments in a transitory democracy up to some $\overline{x}_e < x_e^{\max}$ (due to freezing of access to financial assets, for example). Therefore, the set of individually rational investments for the elite is $x_e \in [\underline{x}_e, \overline{x}_e]$. If the equilibrium policy was barriers to entry, we suppose that the elite perceive the probability that there will be no growth in the transitory state by ξ, i.e., $\xi = \text{prob}(\theta^m = \underline{\theta}^m)$.

To begin, we consider the case where the elite choose entry costs in the Markov perfect equilibrium (we show later that this is always the case if entry costs were chosen when democracy is an absorbing state). We now characterize the optimal investment decisions of the elite in the second stage. If the size of the middle class is revealed to be low, the value function of the elites in the second stage of the game is

$$V^e\left(TD|\theta^m = \underline{\theta}^m\right) = -\underline{x}_e + \beta V^e\left(E|b=1\right) > V^e(D) = 0.$$

As willingness to invest in democracy for the workers is zero in this case, the elite's optimal investment is the minimum that is required ($\underline{x}_e$). Since $\underline{x}_e < \overline{x}_e < x_e^{\max} = \beta V^e(E|b=1)$, the investment is individually rational. If, on the other hand, the size of the middle class is revealed to be high so that there is the potential for full employment, the value function of the elite in the second stage depends on the relative investments the classes are willing to make.

$$V^e\left(TD|\theta^m = \overline{\theta}^m\right) = \begin{cases} 0 = V^e(D) & \text{if } \overline{x}_e < x_d^{\max} L \\ -x_d^{\max} L + \beta V^e(E|b=1) > V^e(D) & \text{if } \overline{x}_e > x_d^{\max} L \end{cases}$$

In the first case, the elite do not have the capacity to match the investment that workers are willing to make, so the elite will not invest and democracy will be consolidated. In the second case, the elite can match the maximum investment that workers are willing to make, so the elite invest the minimum necessary to win the contest ($x_d^{\max} L$). Since $x_d^{\max} L < \overline{x}_e < x_e^{\max} = \beta V^e(E|b=1)$, the investment is individually rational. For the remainder of the analysis in this section, we consider the first case, since a transition to a consolidated democracy is not possible in the second case.

Now that we have defined the optimal investments for the workers and the elites, we analyze how introducing these investment decisions changes the value functions of the baseline model when $S = E$. First, consider the decision of the elites. Equation (14), describing the continuation value of the elite after choosing barriers to entry, becomes the following:

$$CV^e(E|b=1) = (1-\hat{\phi})V^e(E|b=1) + \hat{\phi}V^e(TD), \text{ where}$$

$$V^e(TD) = \xi V^e\left(TD|\theta^m = \underline{\theta}^m\right) > V^e(D).$$

When the Markov perfect equilibrium policy choice is to impose barriers to entry, the probability of a revolt and a change of state to transitional democracy is given by $\hat{\phi}$. Note that the critical value of ρ sufficient to trigger a revolt is different when democracy is not an absorbing state. As a result, we have that $\hat{\phi} \neq \phi$.

Similarly, the continuation value after a revolution for the working class [from the value function in equation (15)] becomes the following:

$$CV^l(E|r=1,b=1) = \rho_t V^l\left(TD|\theta^m = \overline{\theta}^m\right) + (1-\rho_t)V^l\left(TD|\theta^m = \underline{\theta}^m\right), \tag{26}$$

where

$$V^l\left(TD|\theta^m = \overline{\theta}^m\right) = \frac{1}{1-\beta}\left(A^m - \overline{x}_e/L\right), \text{ and}$$

$$V^l\left(TD|\theta^m=\underline{\theta}^m\right)=\frac{1}{1-\beta}\varepsilon\alpha A^m.$$

If growth potential is revealed (with probability ρ_t), the workers earn their marginal productivity, less the necessary expenditure for defending democracy, into perpetuity as democracy will be consolidated. If, on the other hand, it is revealed that there is a tragedy of development (with probability $1-\rho_t$), then the workers have no incentive to invest in democracy's defense, power is conceded back to the elite, and the workers earn their expected wage under dictatorial economic policy into perpetuity.

Proposition 5. *For $\phi<\phi^*$, the elites continue to rationally choose factor price manipulation. Moreover, with the possibility of a coup following a revolution, there is a larger range of parameter values for which the elite rationally choose factor price manipulation.*

Proof. The current income of the elite from choosing FPM when $S=E$ remains the same as before. The continuation values from choosing factor price manipulation vary only in the sense that $\phi V^e(TD)>\phi V^e(D)=0$. Consequently, the value of manipulating factor prices is higher when there is the possibility of a coup. For workers, the continuation value from choosing to revolt decreases with the possibility of a coup: $\frac{1}{1-\beta}\left[\rho\left(A^m-\overline{x}_e/L\right)+(1-\rho)\varepsilon\alpha A^m\right]<\frac{1}{1-\beta}\left[\rho A^m+(1-\rho)\varepsilon\alpha A^m\right]$. As a result, the critical value $\rho^{*'}$ that solves the revolution constraint for workers is higher than the previous critical value ρ^*. This implies that the possibility of a shock sufficient to induce revolt is less likely, i.e., $\hat{\phi}<\phi$. As a result, $V^e(E|b=1)$ is higher with the possibility of a coup. When the elite do not know the size of the middle class, their current income from choosing taxation is lower, i.e., $(1-\xi)\tau^*(1-\alpha)LA^m<\tau^*(1-\alpha)LA^m$. If the elite choose taxation, there is now the possibility that there will be no taxable labor income (with probability ξ). As the institution (b) must be chosen before the size of the middle class is revealed, the elite cannot revert to entry costs if there is no taxable labor income. If the size of the middle class is revealed to be high, the conciliatory tax rate will be the same τ^* as in the previous section. As a result, the $\hat{\phi}^*$ that solves $V^e(E|b=1)=V^e(E|\tau>0)$ is lower than in the previous section, i.e., $\hat{\phi}^*<\phi^*$, so the elite are more likely to choose factor price manipulation. □

The next proposition summarizes this section's discussion.

Proposition 6. *If there is the possibility of a coup following a democratic revolution, then*

1. *When the level of development is sufficiently high ($\lambda\theta^m>L$), democracy is always consolidated following a revolution if $\overline{x}_dL\geq\overline{x}_e$ $\left(\text{ i.e., if } A^m-\frac{\overline{x}_e}{L}\geq\varepsilon\alpha A^m\right)$.*
2. *When there is a tragedy of development ($\lambda\theta^m=\lambda<L$), revolutions are followed by coup d'etats and democracy is not consolidated.*

The result can explain why political institutions are more volatile in under-developed countries, whereas democracy has been consolidated following revolutions in countries with relatively well-developed economies.[22] After a revolution, some growth towards full employment is a necessary condition for democracy to be successfully consolidated.

5 Discussion: The Arab Spring of 2011

At the beginning of 2011, revolutions swept across North Africa and the Middle East. The initial mass protests in Tunisia and Egypt seemed to be particularly motivated by dissatisfaction with economic institutions. Over generations the region's authoritarian regimes shaped economic institutions to generate rent for themselves and their elite patrons. The regimes had implemented stochastic barriers to entry, in the form of kickbacks, bureaucratic entry costs, and malevolent regulations, which shrank expected profit margins on economic investments for entrepreneurs. As a result, the entrepreneurial class was deterred from achieving operational scales to get the economy to full employment, and the labor force was dramatically under-employed and under-paid. Overall, it appears that the revolts in Tunisia and Egypt were sparked by desire for democratic control over economic institutions, symbolized by Bouazizi's protest suicide.

Rational revolutions can occur when the expected value of revolting shifts to exceed the expected value of the status quo. We argued that such shifts can be the result of information shocks. Informational shocks can be interpreted in two different ways in our model, depending on how one understands the length of the game's periods. If a period's length is very short, one could think of instantaneous informational shocks, such as the Wikileaks release on the Tunisian regime, which revealed that 50 per cent of large firms in Tunisia's official economy were controlled by Ben Ali's vast extended family.[23] If a period's length is longer (a presidential "term", for example), one could think of informational shocks as more broad evolutions in social communication. The diffusion of information technology in Northern Africa has been explosive over the last decade, with cellular and wireless networks becoming com-

[22] In a similar vein, Besley and Persson (2010), find that political institutions are likely to be more volatile in countries where resource rents are high relative to economic output. Our extension suggests that successful consolidation of democracy requires a middle class of entrepreneurs of a sufficient measure to employ the working class, a condition which seems independent of a country's resource endowment, a priori.

[23] See cable 08TUNIS679, "Corruption in Tunisia: What's Yours is Mine." Released in November 2010, the Wikileaks shock has been noted by many political commentators as a catalyst of the democratic revolution in Tunisia at the beginning January 2011. Also note that the Wikileaks shock contained information to suggest that the United States would not continue to support the Ben Ali regime indefinitely, since the interest of the United States in the region did not depend on its survival. Such an information shock would affect the cost parameter μ rather than the informational parameter we have stressed above. The result, of course, would be identical.

mon place. Such diffusion of informational technology made it far more difficult for the Ben Ali regime to continue hiding its inefficient method of predation from the increasingly wired Tunisian population. The emergence of Al Jazeera as an independent cable news network dedicated to political events in the Arab world is an additional example of an information shock within a period of long length. Whichever interpretation of time-period length, the Tunisian democratic revolution in January 2011 can be rationalized within the context of our model as an equilibrium outcome following a sufficiently strong shock to the information parameter, ρ.

The Tunisian experience, while hardly without casualties, was a relatively low-cost political transition: the army refused to repress the movement and the international community put pressure on the regime to relinquish power. Over four weeks of revolt in Tunisia, 238 protestors were killed. It was not evident, a priori, that rebels in Tunisia would face so little resistance. Within the context of our model, the Tunisian experience led to belief updating in other countries, which drove the expected destructive cost of revolution low enough to make the expected net benefit of revolting positive in other similar countries in the region. The speed with which information about the Tunisian revolution, once revealed, was transmitted worldwide, contributed to a revolution in Egypt within a month's time.

Similarly, the Egyptian experience was relatively low cost, prompting further peaceful demonstrations calling for political transitions throughout the region (Libya, Syria, Yemen, Bahrain, Algeria). Whether the outcome will be a transition of power in these countries is uncertain at the time of this writing. Staying within the context of our model, the use of repressive force in Libya, Syria, and Algeria in response to the revolutionary demonstrations provides adverse information about the cost of revolting. Thus, in the same way that the revolutions became contagious, our model suggests they may come to an abrupt end as the cost expectations for revolt are once again updated.

At the time of this writing, one year after the Egyptian revolution, there has been no economic growth to speak of, and the political institution seems to be in the transitory democracy stage. Our model suggests that, if the economic institution is liberalized, economic growth must be sufficient to allow for individually rational investments in consolidating democratic control.[24] The contrast between the prospects for consolidation in Egypt and Libya are particularly relevant to our final proposition. In Libya, where financial institutions and educational systems are less developed, the likelihood of democratic consolidation seems much smaller. If the (newly unregulated) entrepreneurial middle class is too slight, or lacks sufficient access to credit, economic liberalization will not lead to the job-generating economic

[24]Joseph Stiglitz wrote about Tunisia in a *Financial Times* editorial on 25 May, 2011 "In six months time, if the economy sinks further, forces arguing against liberal democracy will gain strength. The youth who led the revolutions may become angry again, and give up hope."

growth required to rationalize investments in democratic consolidation.

6 Conclusion

This paper has considered the role of information asymmetries in explaining why authoritarian rulers impose inefficient predatory institutions, such as barriers to entry for entrepreneurs that are not among the ruler's elite clientele. We have demonstrated that such institutional choices carry the risk of provoking revolution, but can be rational choices for the elite if informational asymmetries are sufficiently strong. In the digital age, when informational diffusion is less costly, releases of information that reduce the asymmetry may trigger revolutions against autocratic regimes that have been predating the economy inefficiently. Moreover, we have demonstrated the conditions under which revolutions can be contagious and when revolutions can lead to consolidated laissez-faire economic institutions.

There appear to be many interesting avenues for future research in this area. For example, we have not considered the role of ideology in the decision of the working class to revolt. Future research could add a normative element to the utility functions of the agents. In our model, the value of holding power is control over economic institutions. It will be interesting to consider natural resource wealth as additional motivation for holding power. Additionally, the analysis would be enriched by allowing for the possibility for the elite to make investments in revolution prevention, through information control technology to censor potential informational shocks (affecting ϕ), or in revolution repression technology (affecting μ). Finally, the model has assumed that once a revolt gets under way, it is always successful if a critical mass of the population participates. Future work should consider strategic interaction between the elite and the workers which makes the probability of success uncertain.

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