

INEFFICIENT PREDATION, INFORMATION, AND CONTAGIOUS POLITICAL TRANSITIONS*

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Abstract

This paper provides an economic explanation of the democratic revolutions that swept across Northern Africa and the Middle East in early 2011. We model political transitions as equilibrium outcomes of a repeated game, between a ruling class of elite and a working class. The elite, who are predatory, choose the economic institution, which can shift towards laissez-faire following a democratic revolution. The elite ruling class choose between an efficient, publicly observable method of predation (income tax) and an inefficient, hidden method (entry costs on entrepreneurs) that is not observed by the working class. The inefficient method leads to bad labor market outcomes that could have arisen independent of the elite's institutional choice, which is the source of an informational asymmetry. In this context, we characterize the conditions under which (i) autocrats will chose inefficient economic institutions, (ii) information shocks can catalyze revolutions, (iii) revolutions can be contagious due to similar informational transmissions, and (iv) democracy can be consolidated following revolution.

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

JEL codes: D71, D74, P48

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1 Introduction

Recent history. At the beginning of 2011, revolutions swept across North Africa and the Middle East. The initial mass protests seemed to be particularly motivated by economic conditions. Over generations the region’s authoritarian regimes shaped economic institutions to generate rent for themselves and their elite patrons. Interference with resource allocations through mafia-esque systems of barriers to entry had stifled economic dynamism, leaving top-heavy distributions of inefficiently low national incomes. Public outrage against the repressive economic policies of predatory autocrats reached its breaking point during the Arab Spring of 2011, triggered by a surprising democratic revolution against the Ben Ali regime in Tunisia (Kuran, 2011).

While Tunisia had shown a respectable pattern of economic growth and its government had been rated eighth among the African countries in terms institutional quality, corruption remained endemic. Growth that did occur seemed to be increasingly predated by Ben Ali and his vast extended family.¹ As in many autocratic countries, the Tunisian dictator’s predatory method was not directly observable, as an income tax would be, for example. Rather, the regime implemented stochastic barriers to entry, in the form of kickbacks, bureaucratic barriers to entry or malevolent regulations, which shrank expected profit margins on economic investments. As a result, the entrepreneurial class was prevented from achieving operational scales to get the economy to full employment, and the labor force was dramatically under-employed, generating rents for inefficient elite producers.

So, why did the revolutions begin in Tunisia, at this particular point in history? On December 17, 2010, shortly following the unauthorized publication of top-secret American diplomatic cables by Wikileaks, a young Tunisian street vendor with a university degree immolated himself in protest of the confiscation of his merchandize.² Less than a month later, Ben Ali had fled the country following revolutionary street riots calling for an end to his regime. Within weeks, political demonstrations and revolutions against other authoritarian regimes had spread across the region. We provide an economic rationalization of these events.

¹See among many others narratives, *The Economist’s* “A Rum Old Mix” from 7 October 2010 and “More dope, no highs” from 10 December 2010.

²Propagation of the leaks was also crucial, and the emergence of Al Jazeera as a real-time twenty-four-hour news network and widespread diffusion of the internet and social media helped amplify the message. *The Economist* reported in “Sour Young Men” from 6 January 2011 that “better education has turned nearly 4m of Tunisia’s 10.5m people into internet users, with some 1.8m running accounts on Facebook alone”.

Overview of the model. Following Acemoglu and Robinson (2001), we suppose that an authoritarian economic policy is the Markov perfect equilibrium of a repeated game between an elite ruling class and a working class. Throughout the model, we consider the policy decision of an incumbent autocrat in maximizing lifetime expected predatory revenues, constrained by the threat of a democratic revolution. We show that efficient predation through taxation features a “conciliatory income tax rate” against which the workers will never have an economic incentive to revolt. A necessary condition for a revolution, therefore is that the dictator chooses an inefficient predatory economic policy.

The inefficient method imposes hidden barriers to entry on middle class entrepreneurs, which suppresses the demand for labor and the wage rate to an extent that allows less-efficient elite entrepreneurs to make abnormal profits. In this outcome, we show that the economy produces below its capacity, there is unemployed labor, and labor’s share of output is low. We suppose that workers do not know, a priori, whether the bad economic outcome follows directly from the dictator’s economic policy or whether the economy is simply underdeveloped, with an insufficient mass of entrepreneurs able to run relatively large formal firms (La Porta and Schliefer, 2008). We then analyze the conditions under which the autocrat will rationally choose the inefficient predatory instrument, at the risk of revolution.

In our model, the choice between raising revenue directly through taxation or indirectly through factor price manipulation can also be interpreted as a choice of economic institutions. We assume that choosing to manipulate factor prices through barriers to entry is a policy choice that is not easily reversed. Due to the nefarious social norms of commerce and exchange that emerge when firms are subjected to stochastic barriers of entry over extended periods, the assumption that raising revenues by imposing irreversible entry barriers makes the economic policy choice more one of economic institutional choice.

In our model, informational shocks can update workers’ priors about the relation between economic outcomes and economic policies, narrowing the information asymmetry and increasing the expected economic net benefits to revolution. The parameters of the game change following a shock and the Markov perfect equilibrium can transition to a democratically-determined laissez-faire economic institution if the shock is strong enough. Moreover, the paper demonstrates that inefficient economic institutions may be a lasting equilibrium, with regime duration essentially following the probability distribution of a random variable.

Our paper rationalizes the recent revolutionary history in three phases. First of all, we demonstrate the conditions under which “inefficient predation” by autocratic leaders emerges as an initial equilibrium policy. Secondly, we model how democratic revolts can

be catalyzed by unanticipated shocks to the informational structure. We contend that the Wikileaks information shock in December 2010, or the evolution of online social networks, exemplify the types of innovations that could catalyze democratic revolutions. Third, we show how when a revolution occurs, it can be contagious among similar countries. In our model, the costs of revolution are unknown, a priori, and agents form cost expectations. If the costs of the initial revolt were low, would-be revolutionaries in other countries update their own cost expectations and revolutions can spread. Finally, we provide a new insight into the conditions under which democracy can be successfully consolidated following a revolution.

Relation to the economics literature. We have identified two strands of the economics literature on the rational choice of revolutions to which our paper contributes. In the first strand, political transitions follow from *competition over economic resources* between the ruling class and the working class.³ In this literature, revolutions or insurrections, are purely wasteful. In the competitive general equilibrium, labor resources are diverted from productive activity to the wage-paying activities of insurrection and its prevention. Implicitly in these types of models, the working class is treated as an agent of the principled ruler, who can quell insurrections by employing more soldiers.

In the second strand of the literature, it is the ruling class that is agent to the rest of the population (Acemoglu and Robinson, 2001; Acemoglu, 2006; Acemoglu and Robinson, 2006). The ruling class would like to extract the maximum possible rent through their control over economic policy, but the threat of revolution constrains their ability to do so. While revolutions are a crude mechanism by which the working class can exercise their power as principle, the revolution constraint mitigates the political agency problem in the same spirit as found in the democratic political agency literature (Barro, 1973; Ferejohn, 1986; Besley, 2006).

Our paper is most closely related to models of revolution against inefficient economic institutions (Acemoglu, 2006). Our paper differs from this literature in three historically important ways. In Acemoglu and Robinson (2001) and Acemoglu (2006), political transitions to democracy occur following 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.⁴ Our paper does not rely on business cycle shocks to catalyze revolution.

³See Grossman (1991), for example. Blattman and Miguel (2010) reviews the literature on civil wars and Garfinkel and Skaperdas (2007) reviews the literature on conflict more generally.

⁴Similar explanations stress that the opportunity cost of time is lower for would-be rebels during recessions.

Second, there is a limited role for the working class in Acemoglu and Robinson (2001) and Acemoglu (2006), which consider the middle class as the primary opposition to the elite, and unemployment among the working class is not a factor that can trigger revolutions. In our theory, persistent unemployment of labor and low wages are key characteristics of the equilibrium in which revolutions are possible. Furthermore, in Acemoglu (2006), political transitions to democracy are found to be more likely when the income of the middle class increases. In our model, economic repression of the middle class is a necessary condition for a democratic revolution.

Finally, our paper contributes to the literature on information and revolution (or conflict, more generally). Our framework incorporates a novel asymmetry of information between the working class and the dictator. We demonstrate how the equilibrium outcome depends on the depth of the asymmetry and characterize when political transitions to democratic institutions can be triggered by shocks that narrow the information gap between the dictator and the working class. To our knowledge, we are the first to consider the role of information asymmetry between the elite class in control of economic policy and the working class in this type of rational choice model of revolution.⁵

Plan of the paper. The next section describes the economic environment of our model. In the third section, we derive equilibrium predatory economic policy choices under the threat of revolution. We discuss how democratic revolutions can be sparked by information shocks and in the fourth section, we analyze when an initial revolution can be contagious in similar autocratic societies. Finally, we analyze the conditions under which democratic revolutions can be consolidated when there is a possibility that the elite can mount a coup in response. A brief conclusion summarizes the main insights from the model and offers suggestions for interesting areas of future research. An appendix presents several stylized facts on labor's share of total income, economic regulatory policies, and governmental institutional quality that our model can explain.

sions (Collier and Hoeffler, 1998, 2004). It is equally likely, however, that revolutions should be pro-cyclical, since when the economy expands, there is more to fight over (Fearon, 2007).

⁵An older strand of the literature considers an informational asymmetry among citizens, who must decide to collectively demand a political transition (Kuran, 1989, 1991; Lohmann, 1994a,b). In the literature on conflict, more generally, greater information asymmetries between the competing groups often increases the probability of conflict (W arneryd, 2003; Bester and W arneryd, 2006; Dal Bó and Powell, 2009). A key difference of our paper is greater information asymmetry makes political transition *less likely*. Chassang and Padro-i-Miquel (2009) include asymmetric information about the economy in a model of conflict that similarly uses shocks to the information structure to explain the onset of conflict. See also Dal Bó and Powell (2009).

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.⁶ 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 the elite class can become entrepreneurs. Denote the productivity of middle class and elite entrepreneurs by A^m and A^e , respectively. We assume that middle class entrepreneurs are at least as productive as their elite class counterparts, i.e., $A^m \geq A^e \geq 0$. In order to clarify the exposition of the model, we assume that elites entrepreneurs have productivity A^e if and only if middle class entrepreneurs do not also enter the market (otherwise, the productivity of elite is normalized to 0, without loss of generality). This can be due to shallow credit markets, lack of skilled managers, or overcrowded public infrastructures in developing economies.

Development constraints limit each entrepreneur to productively 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. In other words, we suppose that the middle class measure is such that $\theta^m \geq L/\lambda$ or that $\theta^m = \theta^e = 1$. 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 policy is initially controlled by the elite group, who use it predatorily to max-

⁶The production and regulatory structures of the model are adaptations of Acemoglu (2006) and Acemoglu (2010).

imize their own expected lifetime income. The elite have access to two types of predatory economic policies, one of which is distortionary. The non-distortionary method of predation is to directly tax income at rate $\tau \in [0, 1]$. Since labor is supplied inelastically, there are no marginal labor supply decisions so an income tax is equivalent to a lump-sum tax. The elites can make group-specific transfers to themselves with the revenue generated through income taxation.⁷ 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 (gross) profit of middle class entrepreneurs is given by

$$\pi^m(w, B^m) = (A^m - w)l^m - B^m.$$

The profit of elite entrepreneurs, who do not have to pay the entry cost, is given by

$$\pi^e(w) = (A^e - w)l^e.$$

We assume that $w \in [\underline{w}, A^m]$, where \underline{w} is the reservation wage, which depends on earnings possibilities in the informal sector, for example.⁸ 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

⁷We have assumed that the elite have access to an efficient method of predation, as in Acemoglu (2006). 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, rather, demonstrate the conditions under which the elite will *choose* to use inefficient predatory methods. Alternatively, one could assume an upper bound on the tax rate, $\bar{\tau} < 1$.

⁸A 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 (Maarek, 2010; Ortega and Rodriguez, 2006). See the stylized facts presented in the appendix. See also Djankov *et al.* (2002). Alternatively, \underline{w} could represent a monopsony wage that lies below the worker's marginal product.

be

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

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 is \underline{w} , as $\theta^e = 1 < L/\lambda$. Using the terminology of Acemoglu (2006, 2010), we refer to this as *manipulating factor prices*. 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 $\lambda\theta^m = \lambda < L$. The wage rate is competitive if there is sufficient demand for labor among middle class producers. Note the possibility that there is an excess supply of labor even if there are no barriers to entry and only middle class entrepreneurs produce.

As described above, we consider two cases that relate to the level of economic development. 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 policy of the elite. 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 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 only elite entrepreneurs produce and total output is $Y = A^e \lambda < A^m L$. 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 whether or not the elite impose barriers to entry.⁹

In order to simplify exposition and without loss of generality, we define $\underline{w} \equiv \alpha A^m < A^e$. Clearly, the amount that each worker can be taxed cannot exceed $(1 - \alpha)A^m$, since workers would exit the formal sector otherwise for their greater outside option. The total tax base, therefore, cannot exceed $(1 - \alpha)A^m \lambda \theta^m$. It's obvious to show that without the threat

⁹In an appendix, 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, (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.

of revolution, the elite choose the non-distortionary mode of predation and set $\tau = 1$ to maximize their consumption.¹⁰ When a revolutionary threat exists, the elite may choose the hidden mode of predation, that is setting entry costs $B^m > 0$ sufficiently high to exclude middle class entrepreneurs and secure abnormal profits for less efficient elite producers.

2.2 Actors, 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 a democratic 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.¹¹

If a fraction ζ^L of the population takes part in revolutionary activities, the revolution always succeeds. We assume that $L/(L + \theta^e + \theta^m) > \zeta^L$, but that $\theta^m/(L + \theta^e + \theta^m) < \zeta^L$. 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 policy, we abstract the collective political action problem and treat workers as a unitary player against the elite in a repeated game.¹² Since the workers' share in the population is greater than ζ^L , if the workers decide to revolt, it always succeeds.

Revolutions are costly; a fraction of all income (μ) is destroyed if the workers revolt. We propose an uncertainty concerning the cost of revolution. 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 $\mu = E(\mu)$. Workers update their expectation on μ in a Bayesian manner each time a revolution occurs in another country. The elite lose everything after a revolution as they no longer control economic policy. Without manipulating factor prices, the elite

¹⁰Indeed, $(A^m - \underline{w})L > (A^e - \underline{w})\lambda$ 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 $\theta^m = \theta^e = 1$.

¹¹For simplicity, we do not consider the redistributive potential of control over fiscal policy. Similarly, we do not consider the incentive to control natural resources.

¹²Similar assumptions are found throughout the political economy literature. See Grossman and Helpman (1994) and Acemoglu and Robinson (2001) for two prominent examples. The collective action problem in large groups dates back to Olson (1965). See Lohmann (1994b) for a model where costly political action serves as a signalling mechanism that may be sufficient to overcome the collective action problem. Blattman and Miguel (2010) reviews recent micro-level empirical studies of the collective action problem and the decision to rebel. While we abstract from it, the role of social media as a tool for network formation and coordination in overcoming the collective action problem deserves attention from economists.

cannot compete with middle class entrepreneurs and they no longer have the ability to set targeted fiscal transfers.

In our discussion of the equilibrium policy, we show that a “conciliatory” tax rate exists which can prevent revolutions and the elite will never use a mix of taxation and entry barriers. If the elite choose to manipulate factor prices, the nature of the regime is not directly observable for workers. Low wages and unemployment could also result from a lack of middle class entrepreneurs, rather than an inefficient predatory economic policy. We suppose that workers believe that the elite is of a predatory nature with probability ρ , and of a benevolent nature with probability $(1 - \rho)$. There is an information threshold ρ^* , above which the expected net economic benefit of revolting is positive. We assume that with probability ϕ there is an information shock to ρ or μ that is strong enough to make revolution a rational strategy for the workers. Information shocks of this kind are “tail events” given the distribution of ρ so, a priori, ϕ is low.¹³ We describe the informational structure in more detail in the following section.

Initially, the elite control economic policy. Each period, the elite choose their economic policy and then the workers choose whether or not to revolt. 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.¹⁴

1. The economy starts with initial beliefs ρ and μ inherited from last period.
2. Elites choose method of predation, factor price manipulation or the conciliatory tax rate. The tax rate can be modified at any moment, systematic factor price manipulation cannot be.
3. The value of the shock to ρ is revealed and workers choose their strategy (revolt or not).
4. If there was a revolution in another country, the expectation on μ is updated in a Bayesian manner.
5. Consumption takes place and the period ends.

¹³If ρ is stochastic and distributed according to a Poisson c.d.f., for example, then ϕ can be understood to be an instantaneous Poisson rate describing the expected probability of a “tail event”.

¹⁴We save discussion on the length of the time periods until later sections, where we argue that the model can provide a rational choice analysis of the revolutions in North Africa whether one considers the time periods to be instantaneous or longer term (presidential term length, for example).

6. 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.

The state S is a “tuple”: one of (E, μ, ρ, ϕ) or (D, μ, ρ, ϕ) that describes whether economic policy is controlled by the elite (E) or democratically (D) and the information in the economy about the destructive costs of revolution and the level of skepticism in society. The strategy of the elite depends on the state and is denoted by $\sigma^e(S)$. This strategy determines the actions of the elite $\{B^m, \tau\}$. The strategy of the worker depends on the state and the action of the elite and is denoted by $\sigma^l(S, B^m, \tau)$. This strategy determines the action of the worker, $R \in \{0, 1\}$, where $R = 1$ if workers decide to revolt and $R = 0$ if not. If $R = 1$, the share μ of all income is destroyed and the state switches from elite control to democratic control. A pure Markov perfect equilibrium is 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 Bellman equations:

$$V^e(S) = \max_{\sigma^e} \left\{ c^e(\hat{\sigma}^l, \sigma^e, S) + \beta \int V^e(S') dP(S' | \hat{\sigma}^l, \sigma^e, S) \right\} \quad (1)$$

and

$$V^l(S) = \max_{\sigma^l} \left\{ c^l(\hat{\sigma}^e, \sigma^l, S) + \beta \int V^l(S') dP(S' | \hat{\sigma}^e, \sigma^l, S) \right\} \quad (2)$$

where c^i denotes the consumption of agent i as a function of the state S and strategies. $P(S' | \hat{\sigma}^l, \sigma^e, S)$ 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 strategy combination is $\{\hat{\sigma}^e(S); \hat{\sigma}^l(S, B^m, \tau)\}$, such that $\hat{\sigma}^e$ solves equation (1) and $\hat{\sigma}^l$ solves equation (2) is a Markov Perfect Equilibrium. We characterize the pure strategy Markov perfect equilibria of this game in which strategies depend only on the current state of the world and the prior actions taken within the same period.

3 Equilibrium predatory policy under 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. Following Acemoglu and Robinson (2001), we consider the threat of revolt as a “revolution constraint” that affects the policy choice of

the elite. 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. The revolution constraint is simply that the economic policy the elite chose must provide the workers with at least the expected utility of revolution. If the elite use income taxation, the revolution constraint will define the “conciliatory” tax rate, which is the highest the elite can impose without provoking revolution. As the elite can change the tax rate at any time, a revolution will never occur if the efficient method of predation is chosen. If factor price manipulation is the chosen instrument of predation, the revolution constraint makes the future payoff for the elite uncertain. We demonstrate the conditions under which the expected future payoff to the elite from factor price manipulation is greater than the certain future payoff to the elite of taxing income at the conciliatory rate. 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.

3.1 Case 1: Efficient predation - income taxation

In the case of efficient predation, $B^m = 0$ and $\tau \in (0, 1]$. We begin by deriving the revolution constraint and proceed to solve for the elite’s optimal income tax rate. The recursive value function of the workers when income taxation is used is given by the following.

$$V^l(E, \tau > 0) = (1 - R\mu)[1 - (1 - \alpha)\tau]A^m + \beta [(1 - R)\omega^l(E, \tau) + R\omega^l(D)], \quad (3)$$

where $\omega^l(E, \tau)$ and $\omega^l(D)$ are continuation values that depend on whether the workers undergo a democratic revolution ($R = 1$) or not ($R = 0$).

$$\omega^l(E, \tau) = V^l(E, \tau > 0), \quad \text{and} \quad \omega^l(D) = \sum_{t=1}^{\infty} \beta^{t-1} A^m = \frac{A^m}{1 - \beta}. \quad (4)$$

Using (4) in (3) and a little algebra, we rewrite the value function as

$$V^l(E, \tau > 0) = \left[\frac{1}{1 - \beta(1 - R)} \right] \left[(1 - R\mu)[1 - (1 - \alpha)\tau]A^m + R \left(\frac{\beta A^m}{1 - \beta} \right) \right] \quad (5)$$

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

$$V^l(R = 0; E, \tau) - V^l(R = 1; E, \tau) \geq 0. \quad (6)$$

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:

$$\left(\frac{1}{1-\beta}\right) [1 - (1-\alpha)\tau]A^m = (1-\mu)[1 - (1-\alpha)\tau]A^m + \frac{\beta A^m}{1-\beta} \quad (7)$$

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

$$\tau^*(\alpha, \beta, \mu) = \left(\frac{1}{1-\alpha}\right) \left[\frac{\mu(1-\beta)}{\beta + \mu(1-\beta)}\right] \quad (8)$$

The tax rate given by equation (8) is the “conciliatory” tax rate, since the elite cannot tax any more due to the revolution constraint. It is in this sense that the threat of revolution gives the working class de facto political power. 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 $\mu < \beta(1-\alpha)/[\alpha(1-\beta)]$.*

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 .*

We have assumed that tax rates can be changed instantaneously to conciliate the workers if there are shocks to the parameters. 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.

Notice that in the case of efficient predation, there are no informational problems. The workers know that taxation, though the maximum amount subject to the revolution constraint, is the efficient manner for the elite's predation. In other words, 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.¹⁵

3.2 Case 2: Inefficient predation - factor price manipulation

Now, we consider the case of inefficient predation, when the elite set strictly positive barriers to entry. The elite set the entry barrier high enough to prevent the middle class entrepreneurs from being profitable, thus suppressing the demand for labor (and the wage rate) to a point where elite entrepreneurs can produce profitably.¹⁶

As explained earlier, the workers do not directly observe barriers to entry. They only observe the resulting economic outcome, which features low wages and high rates of official sector unemployment. This is observationally equivalent to the outcome if the authoritarian regime were benevolent (maximizing social welfare), but there was a tragedy of development. The workers believe that there is not a development tragedy and the regime is predatory with probability ρ . The workers believe that the regime is benevolent and that there is a tragedy of development that is not a function of the dictator's economic policy with probability $1 - \rho$. The workers decide whether to revolt ($R = 1$) or not ($R = 0$) to maximize the following value function:

$$V^l(E, \tau = 0) = (1 - R\mu)\varepsilon\alpha A^m + \beta [(1 - R)\omega^l(E, \tau = 0) + R\omega^l(D)], \quad (9)$$

where $\varepsilon \equiv (\theta^e \lambda)/L = \lambda/L$ is the employment rate and $\underline{w} \equiv \alpha A^m$ as before. Note that $\varepsilon\alpha A^m$ is the expected income of a worker given the current economic policy that corresponds to the monopsonic wage and the probability of being employed in the official sector. The continuation values depend on whether or not there is a revolution:

$$\omega^l(E, \tau = 0) = V^l(E, \tau = 0) \quad \text{and} \quad \omega^l(D) = \frac{\rho A^m + (1 - \rho)\varepsilon\alpha A^m}{1 - \beta}. \quad (10)$$

¹⁵One 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. Tunisia, for example, is a middle-income country and state capacity should be sufficiently high that the elite have the option to tax income.

¹⁶Alternatively, one can think of this as the elite producers being granted by the state monopsonistic power in the labor market, which they use to drive the wage rate down to $w = \underline{w}$.

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 $1 - \rho$), then a costly revolution will not have an economic return for the working class. Taking into account the workers' uncertainty, their recursive value function can be rewritten as

$$V^l(E, \tau = 0) = \left(\frac{\varepsilon \alpha A^m}{1 - \beta(1 - R)} \right) \left[1 - R\mu + \left(\frac{\beta R}{1 - \beta} \right) \left(1 - \rho + \frac{\rho}{\varepsilon \alpha} \right) \right] \quad (11)$$

As before, the de facto power of the working class implies a revolution constraint in the economy that defines when a revolution is rational, given its expected value. The workers will not revolt so long as the following constraint is satisfied:

$$V^l(R = 1; E, \tau = 0) - V^l(R = 0; E, \tau = 0) \geq 0 \quad (12)$$

Since their policy choice is not directly observable, 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 subject to the revolution constraint, which solves the following expression:

$$\varepsilon \alpha A^m \left[1 - \mu + \left(\frac{\beta}{1 - \beta} \right) \left(1 - \rho + \frac{\rho}{\varepsilon \alpha} \right) \right] = \frac{\varepsilon \alpha A^m}{1 - \beta} \quad (13)$$

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

$$\rho^*(\alpha, \beta, \varepsilon, \mu) = \left(\frac{\varepsilon \alpha}{1 - \varepsilon \alpha} \right) \left[\frac{\mu(1 - \beta)}{\beta} \right] \quad (14)$$

In general, we think of ρ as describing the workers' level of "skepticism" about the autocratic regime. Equation (14) describes the threshold level of skepticism that is required for a revolt to be rational for the workers. The following assumption 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, $1 - \mu + \frac{\beta}{1 - \beta} < \frac{1}{1 - \beta} < 1 - \mu + \left(\frac{\beta}{1 - \beta} \right) \left(\frac{1}{\varepsilon \alpha} \right)$.*

In the same manner, we can identify a critical value for the destructive costs of a revolution, for a given ρ . The critical value, μ^* , solves equation (13) and can be expressed as

$$\mu^*(\alpha, \beta, \varepsilon, \rho) = \left(\frac{\beta}{1 - \beta} \right) \left(\frac{\rho}{\varepsilon \alpha} - \rho \right) \quad (15)$$

If $\mu > \mu^*$, then workers will rationally not revolt.¹⁷ Note that the critical value for μ is necessarily greater than zero if $\rho > 0$. 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.

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 skepticism, $0 < \rho^* < 1$, 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 skepticism 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 skepticism 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 ρ , 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.

3.3 Equilibrium policy

In this section, we analyze the conditions under which the elite will choose implement barriers to entry in order to raise revenues, and thus install inefficient economic institutions.

¹⁷In 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.

The following assumption simply states that the elite value future utility enough to ensure that they never choose the extreme policy of predated 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 $\tau^* > 1 - \beta$.*

If the elite chose the efficient method of predation, the tax rate will be “conciliatory” in the sense that it is the maximum tax rate possible which does not provoke a revolution. Knowing that the maximum income tax rate they can impose is the conciliatory tax rate, τ^* , the elites must choose between erecting barriers to entry ($B = 1$) sufficient to manipulate factor prices or taxing income at τ^* ($B = 0$).

If $\rho > \rho^*$ or $\mu < \mu^*$, then it is not optimal for the elite to choose entry costs since the revolution constraint will have been violated. 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,

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

Therefore, the elite will choose efficient predation when the working class is sufficiently skeptical ($\rho > \rho^*$) or when the expected cost of revolutions is sufficiently low ($\mu < \mu^*$).

If $\rho < \rho^*$ and $\mu > \mu^*$, the elites choose $B \in \{0, 1\}$ to maximize the following recursive value function:

$$V^e(E) = (1 - B) [\tau^*(1 - \alpha)A^m\theta^m\lambda] + B\lambda(A^e - \alpha A^m) + \beta [(1 - B)\omega^e(B = 0) + B\omega^e(B = 1)], \quad (16)$$

where

$$\omega^e(B = 0) = V^e(E) \quad \text{and} \quad \omega^e(B = 1) = (1 - \phi)V^e(B = 1; E) \quad (17)$$

are continuation values 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 factor price manipulation is chosen.

We now describe more specifically the stochastic nature of the key parameters. The level of skepticism among the working class has a stochastic term, so that in time period t the level of skepticism depends on the period-specific shock, i.e., $\rho_t = \rho + \epsilon_t$, where ϵ is distributed according to some mean-zero monotone distribution, F , over support $[\underline{\epsilon}, \bar{\epsilon}]$. The expected value of ρ_t is therefore simply $E(\rho_t) = \rho + \int \epsilon dF(\epsilon) = \rho$. If the elite choose

factor price manipulation, shocks to ρ can lead to revolution through two channels: (i) if $\epsilon > \rho^* - \rho$, then the revolution constraint is violated directly, and (ii) if $\epsilon < \rho^* - \rho$, but sufficient to drop the critical value μ^* such that $\mu^{*'} < \mu$ [see equation (15)]. We denote by ϕ_ρ the joint probability that shocks to ρ lead to $\rho > \rho^*$ or to $\mu < \mu^*$ through the indirect channel, so ϕ_ρ also depends on the initial value of μ .

Workers also revise their expectations on the cost of revolt if they observe a revolt in another country. For simplicity, we assume that the process is independent of shocks to ρ . In the same manner, revisions to the expected cost of revolution can lead to workers revolting through two channels: (i) if $\mu' < \mu^*$, then the revolution constraint is directly violated, and (ii) if $\mu' > \mu^*$, but sufficient to drop the critical value ρ^* such that $\rho > \rho^{*'}$ [see equation (14)]. As before, we denote by ϕ_μ the joint probability that shocks to μ lead to $\mu < \mu^*$ or $\rho > \rho^*$ through the indirect channel, so ϕ_μ also depends on the initial value of ρ . The shocks to ρ and μ are independent, so the probabilities ϕ_ρ and ϕ_μ are independent. From the elites perspective, the probability of a revolt following factor price manipulation takes into account the probabilities of each type of shock, i.e., $\phi = \phi_\rho + \phi_\mu$.

Taking into account the continuation values, the value function can be rewritten as:

$$V^e(E) = \frac{(1 - B) [\tau^*(1 - \alpha)A^m\theta^m\lambda] + B [\lambda(A^e - \alpha A^m)]}{1 - \beta[(1 - B) + B(1 - \phi)]} \quad (18)$$

Given that $\rho < \rho^*$ and $\mu > \mu^*$, the elite rationally choose to manipulate factor prices whenever

$$V^e(B = 1; E) - V^e(B = 0; E) \geq 0 \quad (19)$$

Equation (19) requires that the elite are individually rational when choosing to manipulate factor prices. 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 (18) and using (19) at equality, the critical value ϕ^* solves the following:

$$\frac{\lambda(A^e - \alpha A^m)}{1 - \beta(1 - \phi)} = \frac{\tau^*(1 - \alpha)A^m\theta^m\lambda}{1 - \beta} \quad (20)$$

Algebraic manipulation of equation (20) yields the critical value as a function of the model's parameters.

$$\phi^*(\alpha, A^e, A^m, \beta, \theta^m) = \frac{(A^e - \alpha A^m)(1 - \beta)}{\tau^*(1 - \alpha)A^m\theta^m\beta} - \frac{1 - \beta}{\beta}. \quad (21)$$

When $\rho < \rho^*$ and $\mu > \mu^*$, 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. The following assumption formalizes our supposition.

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 $\phi^* > 0$. We can be sure that $\phi^* < 1$. 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. 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 expectations of the cost of revolution (μ), the perception parameter (ρ), and the informational shock parameter (ϕ).*

1. *If $\rho > \rho^*$ and $\mu < \mu^*$, then the elite will always choose the efficient method of predation ($B = 0$).*

If assumption 4 is satisfied, there exists a $\phi^ \in (0, 1)$ such that*

2. *If $\rho < \rho^*$ and $\mu > \mu^*$, but $\phi > \phi^*$, then the elite will always choose the efficient method of predation ($B = 0$) if assumption 4 is satisfied.*
3. *If $\rho < \rho^*$, $\mu > \mu^*$, and $\phi < \phi^*$, then the elite will always choose the inefficient method of predation ($B = 1$) if assumption 4 is satisfied.*

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

The comparative statics follow from taking partial derivatives of equation (21). The first comparative static indicates that when elite entrepreneurs are more productive, the inefficient method of predation becomes more attractive and the elite tolerate a higher probability that the workers will revolt. The second indicates that when the elite can extract greater revenues efficiently (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.

4 Information and political transitions

4.1 Democratic revolution

Since there exists a conciliatory tax rate that the elite can implement to satisfy the revolution constraint, an economic policy of factor price manipulation is a necessary condition for a democratic revolution. The elite chose factor price manipulation only when the *expected* lifetime predation revenue exceeds that raised by taxing income at the conciliatory rate. 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 skepticism among the working class alter the workers' expected value of revolting. If the expected value of revolt comes to exceed the value of the status quo, democratic revolution is rational. Recall that the level of skepticism 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 word, a positive shock to ρ strengthens the perception that a transition to a laissez-faire economic institution will have a payoff for the workers.

Recalling that factor price manipulation is a necessary condition for a democratic revolution and that proposition 3 implies the autocrat will choose factor price manipulation whenever $\rho < \rho^*$, $\mu > \mu^*$ and $\phi < \phi^*$, we have the following proposition.

Proposition 4. *If $\rho < \rho^*$, $\mu > \mu^*$, and $\phi < \phi^*$, a revolution due to a secular increase in the level of skepticism among the working class occurs with probability ϕ_ρ .*

Note that in our model revolution becomes more likely when the working class has better information about the autocrat's economic policy. This result stands in stark contrast to most of the literature on conflict more generally. In the conflict literature, when the contestants have more information about each other's type, conflict becomes *less likely*.¹⁸ In our model, asymmetry of information between the autocrat and the working class about the economy leads the autocrat to pursue a "conflictual" policy (one that could provoke revolution). Actual conflict, however, does not occur until the informational asymmetry narrows. Thus, in our model, when the working class learns more about the autocrat's type, conflict becomes *more* likely.

¹⁸The reason is that conflict is seen as the consequence of broken down negotiations, and negotiations are more likely to be successful when the sides know more about each other (willingness to fight, for example). See Garfinkel and Skaperdas (2007) and Blattman and Miguel (2010) for reviews of this literature.

4.2 Contagion

We now explicitly describe how shocks to the cost parameter can occur. 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., $\text{prob}(W = W_b) = \text{prob}(W = W_g) = 1/2$. Therefore, the *a priori* expected value of the cost of revolution is given by:

$$E(\mu) = \frac{1}{2} [p\underline{\mu} + (1-p)\bar{\mu}] + \frac{1}{2} [q\underline{\mu} + (1-q)\bar{\mu}] > \mu^* \quad (22)$$

where the inequality is by assumption.¹⁹

Let there be N identical countries such that $\rho < \rho^*$, $\mu > \mu^*$, and $\phi < \phi^*$ in each country. Proposition 3 implies that factor price manipulation will be the method of predation chosen in each of the N countries.²⁰ 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. *A posteriori*, the expected probability that the state of nature is good becomes

$$P(W_g|\underline{\mu}) = \frac{P(\underline{\mu}|W_g)P(W_g)}{P(\underline{\mu})} = \frac{P(\underline{\mu}|W_g)P(W_g)}{P(\underline{\mu}|W_g)P(W_g) + P(\underline{\mu}|W_b)P(W_b)} = \frac{\frac{1}{2}p}{\frac{1}{2}p + \frac{1}{2}q} > \frac{1}{2} \quad (23)$$

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 $W = W_g$. This Bayesian updating about the state of the nature lowers the expected value of the destructive costs of revolution, i.e.,

$$E(\mu_{N_{-i}}|\mu_i = \underline{\mu}) = \frac{\frac{1}{2}p}{\frac{1}{2}p + \frac{1}{2}q} [p\underline{\mu} + (1-p)\bar{\mu}] + \frac{\frac{1}{2}q}{\frac{1}{2}q + \frac{1}{2}p} [q\underline{\mu} + (1-q)\bar{\mu}] < E(\mu) \quad (24)$$

since $p > q$. To highlight the role of informational transmissions, we make the following assumption:

Assumption 5. *p and q are such that (i) $E(\mu_{N_{-i}}|\mu_i = \underline{\mu}) < \mu^*$, or (ii) $E(\mu) > E(\mu_{N_{-i}}|\mu_i = \underline{\mu}) > \mu^*$, but sufficient to push the critical value ρ^* below ρ .*

¹⁹Since the initial state is repressive control by the elite, it must be that $\mu^* < E(\mu)$.

²⁰Wikileaks cables suggest that predation methods were very similar in Egypt, Libya, and Syria. See the cable “Kadhafi Incorporated,” for example.

The following proposition is our explanation for revolutionary contagion.

Proposition 5. *If assumption 5 is satisfied, an informational shock on ρ that induces a revolution in country $i \in N$ with cost $\underline{\mu}$ is a catalyst for revolution in the other N_{-i} identical countries.*

Note that initial revolution follows from an informational shock to the nature of the dictatorship and the effect of contagion operates through expectations about the cost of revolution.²¹ To close the discussion from the previous section, if p and q satisfy proposition 5, ϕ_μ is the joint probability a revolt occurs in one of the N_{-i} similar countries and was low-cost. There continues to exist, of course, a probability that the revolution will be high cost in the good state.

4.3 The Arab Spring of 2011

4.3.1 Conditions for factor price manipulation in the region

It is important to note that our analysis identifies the conditions under which the elite rationally choose the inefficient method of predation, despite the revolutionary risks. We now discuss the conditions within the context of the Arab Spring of 2011. First of all, the costs of revolt have to be sufficiently high so that the net economic benefit of engaging in revolutionary activities is relatively low ($\mu > \mu^*$). This is likely to have been satisfied in the dictatorships in Northern Africa and the Middle East prior to the Tunisian revolution. Generally, international support for these regimes was high and the army and police forces were supposed to be loyal to dictators, many of whom had a military background. Second, the working classes must have a sufficiently un-skeptical image of the authoritarian regime's economic policies ($\rho < \rho^*$). In Northern Africa and the Middle East, until the emergence of Al Jazeera network, the media had been largely under the control of the authoritarian regimes, making it unlikely that workers would receive information critical of the states' economic policies. Furthermore, some autocratic governments had recently been reviewed positively in Western analyses, such as the IMF's 2011 report on the successful reform path of Tunisia's economic policies.²² Third, information shocks must be sufficiently unlikely ($\phi < \phi^*$). Especially for dictators (monarchies) that have been in power for decades (generations),

²¹Again, note that revolutions follow from a positive innovation of information, in contrast to the literature on conflict.

²²IMF head Dominique Strauss-Kahn noted in 2008 that "Tunisia is a good example to follow for many emerging countries."

whose tenures commenced well before recent explosions in information technology diffusion, it is reasonable to suppose that this condition had also been satisfied among the autocracies of the region. Therefore, it seems that conditions were in place for the regimes in the region to engage in inefficient predation. Indeed, in 2008, 37 percent of young university graduates were unemployed three and a half years after obtaining their degrees, which supports the notion that the Tunisian government had been manipulating factor prices to keep middle class entrepreneurs out of the market (World Bank, 2009).

4.3.2 The Wikileaks information shock and revolt in Tunisia

In our model, revolutions occur when the expected value of revolting shifts to exceed the expected value of the status quo. We argue that such shifts can be the result of information shocks. We can interpret informational shocks 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, then one could think of instantaneous informational shocks, such as the Wikileaks release on the Tunisian regime, which revealed that 50 per cent of Tunisia's firms in the official economy were controlled by Ben Ali's vast extended family.²³ 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 2011.²⁴ If a period's length is longer (a presidential term, for example) then 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 common 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.²⁵ Whichever interpretation of time period length, the democratic revolution in Tunisia in January 2011 can be rationalized within the context of our model as an equilibrium outcome following a sufficiently strong

²³See cable 08TUNIS679, "Corruption in Tunisia: What's Yours is Mine."

²⁴Inefficient barriers to entry are clearly identified in the Wikileaks documents. *The Financial Times* reported in "Crackdown Fails to Halt Tunisian Jobs Anger" from 11 January 2011 the content of a 2008 US Embassy cable: "The perception of increasing corruption and the persistent rumors of shady backroom dealings has a negative impact on the economy, regardless of the veracity. Contacts tell us they are afraid to invest for fear the [Ben Ali] family will suddenly want a cut". For examples of political commentation on the role of Wikileaks, see *Foreign Policy's* "The Sick Man of the Middle East" from 12 January 2011 and "Whispering at Autocrats" from 25 January 2011, for instance.

²⁵Also 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.

shock to ρ and a predatory autocratic regime lost power.

Moreover, the revolts in Tunisia and Egypt appear to have had the objective of gaining democratic control over economic institutions, as in our model. It does not appear that the revolutions were sparked by desire to control natural resources or other public assets, as in many other explanations of civil conflict.

4.3.3 Revolutionary contagion

The Tunisian experience, while hardly without casualties, was a relatively low-cost political transition: the army refused to repress the insurrection and the international community put pressure on the regime to relinquish power. In four weeks of revolution 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. The speed with which information about the Tunisian revolution, once revealed, was transmitted worldwide, led 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 end as the cost expectations for revolt are once again updated.

We note, additionally, that there were autocracies in the region, such as King Mohammed VI of Morocco, who were not faced with revolutions during the Arab Spring. While certainly not free of corruption, the Moroccan regime seems to have been less predatory, and undergone significant economic liberalization under the reign of Mohammed VI. Moroccans have attained higher levels of education and have a much lower unemployment rate among the youth. The marginal benefit of laissez-faire reforms achieved by a revolutionary political transition could not cover its costs, even if revealed to be relatively low, following Tunisia.

5 Discussion: democratic consolidation

We now consider the possibility that the elites can mount a coup following a democratic revolution. Our objective is simply to sketch the intuition of such an extension, which would add several steps to the timing of the game. After a democratic revolution and a transition to a laissez-faire economic institution, the size of the middle class is revealed. It can be either $\theta^m = 1$ or $\theta^m > L/\lambda$. Neither the elite nor the working class know if there is a tragedy of development. Our discussion supposes that both the elite and the working class must decide to make an investment in mounting a coup or in consolidating democracy. 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.²⁶

For both players, investments must be individually rational. For the elites, the investment must be less than the value of retaking power, so the set of individually rational investments is bound from above by $\bar{x}_e \equiv \max\{V^e(E; B = 1), V^e(E; \tau = \tau^*)\}$. Furthermore, we suppose that there is a minimum level of investment that is required to mount a coup, even if the workers do not invest, i.e., $x_e \in [\underline{x}_e, \bar{x}_e]$.

If it is revealed that there is a development tragedy ($\theta^m = 1 < L/\lambda$), then the economic situation of the working class will be as before the revolution; the demand for labor has not increased so workers will earn the same monopsonistic wage and have the same level of official sector unemployment. Therefore, if the conditions for the working class do not improve after the democratic revolution, the working class will not have an incentive to invest in democratic consolidation, i.e., $x_d = 0$. It is only when wages and official sector employment rise after the transition to laissez-faire that the working class has an incentive to invest in democratic consolidation each period. The working class will be willing to invest up to their net benefit of controlling the political institution. That is, the maximum individually rational investment per worker each period corresponds to the difference between (i) competitive wages and full employment and (ii) the monopsonistic wage and under-employment, which is given by $\bar{x}_d \equiv A^m(1 - \varepsilon\alpha)$.

We now investigate how introducing these investment decisions changes the value functions of the baseline model. First, consider the elites. Suppose that when the elites were in power before the revolution, they do not know whether there is a tragedy of development or not a priori. Equation (10) describing the continuation value of the elite after choosing

²⁶A richer model would, of course, feature a more sophisticated contest function. See Garfinkel and Skaperdas (2007) for a review of the various contest functions used in the economics of conflict literature.

barriers to entry depends on the upper bounds of the investment. There are two cases to consider. In the first case, $\bar{x}_e > \bar{x}_d L$, and we have that

$$\omega^e(B = 1) = (1 - \phi)V^e(B; E) + \phi\xi [V^e(B; E) - \underline{x}_e] + \phi(1 - \xi) [V^e(B; E) - \bar{x}_d L], \quad (25)$$

where ξ is the probability that there is a development tragedy, or $\xi \equiv \text{prob}(\theta^m \lambda < L)$. In this case, when there is a development tragedy, the elite must only invest the minimum, \underline{x}_e , but when there is not the elite must invest up to that which the workers are willing to, \bar{x}_d . In the second case, $\bar{x}_e < \bar{x}_d L$ and equation (10) becomes

$$\omega^e(B = 1) = (1 - \phi)V^e(B; E) + \phi\xi [V^e(B; E) - \underline{x}_e]. \quad (26)$$

Here, the elite cannot match the investment of the workers in the event that there is no development tragedy.

In the first case, there will never be the possibility that democracy is consolidated, so we focus on the second case. When there is the possibility of a coup d'etat after the revolution, the continuation value from choosing barriers to entry is unambiguously greater than in the baseline model. In effect, the elite will now choose to impose barriers to entry and manipulate factor prices for a greater range of parameter values. Indeed, solving for the critical value of ϕ , below which the elite choose factor price manipulation, yields $\hat{\phi} > \phi^*$. Intuitively, if there is a possibility that the elite can take back control of the political institution after a revolution, they will be more likely to choose factor price manipulation in the first place.

When there is a possibility that the elite can mount a coup, the continuation value after a revolution for the working class becomes the following:

$$\omega^l(D; E, \tau = 0) = \frac{1}{1 - \beta} [\rho(A^m - \bar{x}_e/L) + (1 - \rho)\varepsilon\alpha A^m] \quad (27)$$

The first term indicates that with probability ρ , the dictator had been manipulating factor prices and a transition to laissez-faire raises demand for labor and wage rate up to the competitive level. Each worker must invest up to the amount the elite are willing to invest per worker. The second term indicates that with probability $1 - \rho$, there is really a tragedy of development and the economic situation of the workers would remain unchanged after a revolt. Now that the workers will have to invest in democratic consolidation, the continuation value of revolution is lower. Similar to the discussion of the elite above, the workers

will now choose to revolt upon observing low wages and high unemployment for a smaller range of parameter values. In other words, the critical values become more stringent, i.e., $\hat{\rho} > \rho^*$ and $\hat{\mu} < \mu^*$. The following proposition summarizes the discussion.

Proposition 6. *When there is the possibility of a coup following a democratic revolution, factor price manipulation is more likely, and democratic revolutions are less likely.*

The next proposition summarizes our results concerning democratic consolidation, should a revolution occur.

Proposition 7. *With a possibility of a coup following a democratic revolution,*

1. *When the level of development is sufficiently high ($\lambda\theta^m > L$), democracy is always consolidated following a revolution if $\bar{x}_d L \geq \bar{x}_e$ (that is, if $A^m - \frac{\bar{x}_e}{L} \geq \varepsilon\alpha A^m$). If $\lambda\theta^m > L$, but $\bar{x}_d L < \bar{x}_e$, then revolutions are followed by coup d'états and democracy is not consolidated.*
2. *When there is a tragedy of development ($\lambda\theta^m = \lambda < L$), revolutions are followed by coup d'états and democracy is not consolidated.*

Note that, due to credit constraints and freezing of international accounts for exiled elites, the condition that $\bar{x}_e \leq \bar{x}_d L$ seems reasonable.

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. The contrast between the revolutions in Egypt and Libya are particularly relevant to the last proposition with a high risk of a coup. In Libya, with less developed financial institutions and educational systems, the risk to democratic consolidation would seem to be that the (unregulated) entrepreneurial middle class may constitute an insufficient measure to drive up wage rates and provide an economic return great enough to justify investment in democratic consolidation by the Libyan working class. Besley and Persson (2010), for example, find that political institutions are likely to be more volatile in countries where resource rents are high relative to economic output. Our model suggests that broader developmental considerations are also pertinent to characterizing institutional volatility. Successful consolidation of democracy requires a middle class of entrepreneurs of a sufficient measure to employ the working class, a condition which is independent of a country's resource endowment.

Some growth towards full employment post-revolution is a necessary condition for the successful consolidation of democracy. Joseph Stiglitz wrote 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.”²⁷ Iyengar *et al.* (2011) confirms that employment growth reduced violence during civil conflict using data from the impact of employment programs administered by the American military in Iraq. See also Acemoglu *et al.* (2011) for the role of laissez-faire institutional reforms in establishing the conditions for economic growth following the French Revolution.²⁸

6 Conclusion

This paper has considered the role of information asymmetries in explaining why authoritarian rulers may impose inefficient instruments of predation, such as barriers to entry for entrepreneurs that are not among the ruler’s clientele of elite. We have demonstrated that such policies carry the risk of provoking revolution, but that in the era they were set, informational asymmetries were sufficiently strong enough that dictators rationally exposed themselves to the risk of provoking revolution. In the digital age, when informational diffusion is less costly, releases of information that reduce the asymmetry may trigger revolutions against dictators that have been predated the economy inefficiently. Moreover, we have demonstrated the conditions under which revolutions can be contagious and when revolutions can lead to consolidated laissez-faire democratic 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.²⁹ 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 the role of natural resource wealth in determining the value of holding power as well. Additionally, the analysis would be enriched by allowing for the possibility for the dictator to make investments in revolution prevention, through

²⁷In the same vein, *The New York Times* reported on 5 August 2011 in “In Tunisian Town of Arab Spring Martyr, Disillusionment Seeps In” that the lack of growth and job creation in Sidi Bouzid, where the Tunisian revolution began could threaten consolidation of the new political institution. A local unemployed man was quoted “If there is no development in this region, there will be no stability in the country.”

²⁸Control of economic institutions must be more valuable for the working class than control of resources would be for an elite-led coup. Laissez-faire economic institutions must be complimented with the necessary legal infrastructure and commitment to transition to democracy. The revolutionary transition to democracy must be *bandit-proof*, in the sense that the return to investment in laissez-faire institution to workers must exceed the return to investment in banditry. Banditry has higher relative return when national *assets* are large relative to national *income* and when groups differ in size.

²⁹We thank Farhad Nomani for making this point.

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 autocrat and the workers which makes the probability of success uncertain.

Appendix - Stylized Facts

In this section, we provide evidence for several stylized facts that are compatible with our model. Some of them are well-known in the development economics and political economy literatures, while others are not. We demonstrate that (i) labor's share of total income increases along the development path, (ii) labor's share of total income is greater in democratically governed societies, as suggested by Rodrik (1999), and (iii) the probability that the society is democratically governed increases along the development path. Additionally, we provide two stylized facts that are less well-known: (iv) distortionary industrial regulation in developing economies tends to diminish labor's share of total income and (v) goods markets regulations are stronger (more distortionary) in authoritarian regimes.

First of all, we demonstrate the link between labor's share of income and the level of economic development. We use the labor share data provided by the UNIDO database and define LS as the ratio of total wages to total value added in the manufacturing sector. The labor share data is a panel, beginning from 1973 for some countries.³⁰ To measure economic output, we use PPP-adjusted per capita GDP from the World Bank. The first column of Table 1 shows the positive relationship between labor's income share and level of development, as previously shown by Ortega and Rodriguez (2006), Dauday and Garcia-Penalosa (2006), or Maarek (2010). To measure political institutions, we use the binary variable constructed by Chebub and Ghandi (2004) (0 for democracies and 1 for dictatorships). The results in the second column of Table 1 demonstrate the highly significant correlation between labor's income share and type of political regime, as previously shown by Rodrik (1999). Economies of autocratic countries have lower labor shares. The third column demonstrates that the relationship is robust to the inclusion of year and country fixed effects.

We now describe the link between labor's share of income and the degree of distortionary

³⁰We use the UNIDO labor share data since it does not consider firms with less than four employees and provides a more accurate picture of formal sector labor shares in developing countries. See Rodrik (1999) for an explanation of why the UNIDO data is more appropriate when considering developing countries.

Table 1: Stylized Facts

	<i>dependant variable : labor share</i>						<i>dependant variable : regulations</i>			
	<i>all countries</i>			<i>developing only</i>			<i>REG</i>	<i>QoG</i>	<i>REG</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>GDP per capita</i>	0.00090*** (0.00004)		0.00019* (0.00005)				0.0011*** (0.0004)			0.000085*** (6.36e-06)
<i>DEMO</i>		-9.16*** (0.48)	-4.45*** (0.77)					-0.72*** (0.03)	-0.20*** (0.01)	-0.34*** (0.04)
<i>REG</i>				2.33*** (0.30)	1.19** (0.49)	1.85*** (0.53)	1.39** (0.56)			
<i>country dummies</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>no</i>	<i>no</i>	<i>no</i>
<i>time dummies</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>no</i>	<i>no</i>	<i>no</i>
<i>number of obs</i>	1928	2933	1857	1853	1853	1065	984	3255	2511	2511
<i>number of countries</i>	120	137	120	107	107	74	74	124	141	141

Note : * significant at 10% ** significant at 5% *** significant at 1%. Robust standard errors in brackets

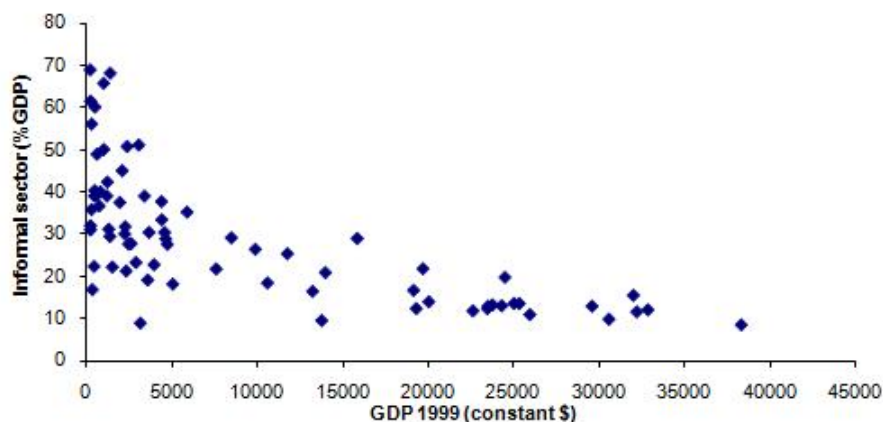
regulation. We use two indicators of regulation to demonstrate the positive correlation between the degree of “economic freedom” and labor’s share of income. The first indicator is from the Fraser Institute, denoted by *REG* (0 if the economy is very regulated and 10 if the economy is very weakly regulated), synthesizes the procedures/costs for entering goods markets, the accessibility of credit, and regulations in labor markets. The seconds indicator is the ICRG’s composite index on the “quality of government,” which we denote by *QoG* (0 is the worst and 10 is the best). The *QoG* and *REG* scores may be good proxies for the quality and the purpose (factor price manipulation) of governmental intervention. Columns (4) - (7) demonstrate that less regulated economies feature greater labor shares. The relationship is robust to the inclusion year and country fixed effects, to estimation over the subset of less developed economies, and to controlling for the level of development.

Finally, the table indicates that economies in autocratic countries are more heavily regulated. The result is the same for either of the measures of regulation that we have chosen. It is also robust to controlling for the level of economic development.

In sum, the stylized facts indicate that labor shares are lower in autocracies, lower in more regulated economies, and that autocratic governments impose more economic regulations. Our model accounts from these stylized facts.

Figure 1 shows that the informal sector is larger in countries that are earlier along the development path. In La Porta and Schliefer (2008), for example, the primary reason for large informal sectors in less developed economies is due to a lack of qualified managers able to direct larger formal sector firms, so most labor is employed in smaller, less productive informal sector firms that are excluded from development channels. La Porta and Schliefer (2008) also find that the difference in working class labor is not systematically different between formal and informal sector enterprises and that workers in the informal sector

Figure 1: The Informal Sector and Economic Development



are paid substantially less than in the formal sector. If the middle class entrepreneurs are sufficiently numerous, a large informal sector can still follow from a policy of factor price manipulation.

There is also a link between the level of economic development and the probability that a country is ruled by a dictator (as well as the frequency with which political institutions alternate between democratic and authoritarian). This will be an important stylized fact to motivate our extension on democratic consolidation that concludes the paper. Among the low income countries, the probability that a political regime is authoritarian is 0.82 (with variance 0.30). Among the middle income countries, the probability that the political regime is authoritarian is 0.67 (with variance 0.49). For the rich countries, the probability is only 0.17 (with variance 0.38).

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