PAMPERED BUREAUCRACY AND TRADE LIBERALIZATION

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Pampered Bureaucracy and Trade Liberalization[1]

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Abstract: This paper shows how a nation's elite maintain ownership of their wealth by creating a 'pampered bureaucracy.' The elite thus divert part of an otherwise entrepreneurial middle class from more productive manufacturing activities, reducing economic efficiency. Trade liberalization is potentially destabilizing since it lowers the opportunity cost to the lower classes of challenging the elite for their wealth. If trade liberalization does take place, it may mandate expansion of the pampered bureaucracy. Therefore, trade liberalization may actually reduce economic efficiency. The econometric results support our model and contribute to the literature on trade liberalization and the size of government.

Keywords. Bureaucracy, efficiency, inefficient institutions, social conflict, trade liberalization.

JEL Classification Numbers: D30, D73, D74, F10, F15.

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1. Introduction

A salient feature of many developing countries is the existence there of an apparently wasteful government bureaucracy. More striking still is that this bureaucracy often has demanding entry criteria, admitting capable applicants predominantly from the middle classes, but then offers its employees highly protected lifetime employment with limited productivity incentives. We will refer to this institution as a 'pampered bureaucracy'. Varma (1998) documents the division within the middle classes created by such actions of the state and its equivalent created by the middle classes' own efforts in the private sector. His work makes a useful distinction, which we will exploit, between the conventional role of the entrepreneurial middle classes as key drivers of economic growth and the less familiar role of the middle classes employed in the pampered bureaucracy as a brake on economic development.

The purpose of our paper is to explore the relationship between potential social conflict, trade liberalization and economic efficiency. The paper's first main theoretical result shows how a nation's elite, having captured the state, can influence the size of the pampered bureaucracy in order to limit the emergence of a dynamic entrepreneurial middle class which would otherwise develop the means to support the expropriation of the elite's wealth. Thus, increasing the size of the pampered bureaucracy tends to reduce economic efficiency and may be regarded as an inefficient economic institution. In the second main result, if trade liberalization tends to increase the elite's wealth this increases the incentive for its expropriation, mandating an increase in the size of the pampered bureaucracy. Therefore, this paper presents a new explanation for how trade liberalization may actually reduce economic efficiency.

These results are obtained by constructing a new model that combines features of an endowments model of international trade with those of a model where one group's endowment may be expropriated by others. There are three goods: commodities, food and manufactures. There are three socio-economic groups within society: the elite, the middle classes and workers. And there are three factors: land, labor and human capital. Land is split into two further subcategories. The elites' wealth (i.e. their endowment) is held in their 'latifundia'; large estates of highly productive land that has been selected

for its suitability to grow a commodity. There is also an excess supply of low-grade land in the hinterlands which may be settled for free. This land is not suitable for producing the commodity but labor can be employed on this land to produce food. The elite and the workers share an endowment in common; each has a unit of labor which they can use to work in the latifundia. The middle classes are endowed with human capital which they can sink into a firm that produces a manufactured good. Or, if it exists, the middle classes may alternatively choose a lifetime of employment in the pampered bureaucracy.

Following standard predictions from trade theory, if a country in our model has relatively large endowments of land and labor, then it will tend to have a comparative advantage in the production of commodities and food; these goods will be referred to collectively as primary products. If the country has a relatively large endowment of human capital then it will tend to have a comparative advantage in the production of manufactures. If the lower classes, the middle classes and workers combined, decide to mount a revolution then ownership of the latifundia is transferred to them (at a cost), and the elite are left only with the fruits of their labor.

The intuition behind the workings of the model is as follows. A key feature of the model is that the characterization of economic equilibrium, whether under international trade or autarky, is independent of who owns which factors. This makes it possible to analyze the lower classes' surplus obtained from revolution, taking the economic equilibrium as given, as the outcome of a Nash bargain. The elite manipulate the size of the pampered bureaucracy in order to reduce the surplus that the lower classes obtain from revolution to zero.

The key economic margin in the model is the allocation of the middle classes between entrepreneurship and the pampered bureaucracy. The elite, via the state, exploit risk aversion among the middle classes about the possible failure of their entrepreneurial ventures to lure them into the pampered bureaucracy. The model works slightly differently under autarky and free trade but the basic outcome is the same. Under autarky, there are two effects. First elite income is used to fund the pampered bureaucracy directly so the surplus from revolution is reduced when the pampered bureaucracy is increased in size. Second, by making entrepreneurs more scarce, this raises the return both to entrepreneurship and also to a career in the pampered bureaucracy since the returns to

either career path must be ex ante identical. This in turn reduces the incentive to mount a revolution. Under free trade only the first effect operates since the world price pins down the returns to entrepreneurship. But the qualitative effect of increasing the size of the pampered bureaucracy is the same under autarky and free trade.

A testable prediction of our model is that if a country has a comparative advantage in primary products, then trade liberalization tends to mandate an increase in the size of the pampered bureaucracy; if the country has a comparative advantage in manufactures then trade liberalization creates an incentive to reduce the size of the pampered bureaucracy. We are able to verify a 'relative' version of this prediction in the data; that trade liberalization mandates a significantly larger increase in the size of the pampered bureaucracy in countries with a comparative advantage in primary products than in countries with a comparative advantage in manufactures. The prediction does not hold for developed countries, possibly because the elites of developed countries have not captured the state and because property rights can be more effectively enforced in countries that are more highly developed.

The literature on social conflict between a nation's elite and the rest of society has attracted a lot of attention recently. So it will be helpful in evaluating the contribution of the present paper to understand the differences between our underlying model of social conflict and those of the prior literature. A canonical model by Acemoglu and Robinson (2000a,b, 2001) identifies a commitment problem between the elite and the poor as a way to understand the extension of the franchise. In their work, the poor have a transitory opportunity to mount a revolution. Revolution cannot be prevented by a transfer of resources from the elite to the poor because the elite cannot credibly commit to continue redistribution in future periods after the opportunity for revolution has passed. Instead the elite may avoid a revolution by conceding to the poor the de jure power to set taxation, moving from dictatorship to democracy in the process.

An important difference between our framework and that of Acemoglu and Robinson is that here the potential for a revolution is not transitory. Thus it is not the elite but the middle classes who have a commitment problem. The middle classes cannot credibly commit not to support a revolution anyway after they have received a transfer from the elite. This renders transfers ineffective in preventing a revolution and motivates the elites'

incentive to manipulate the size of the bureaucracy as an alternative. Thus we abstract entirely from the de jure power to set taxation, and focus instead on the de facto power of the different groups in the presence of the pampered bureaucracy. In our framework it is not important whether the political regime is a democracy or a dictatorship. The key feature is that the elite have sufficient resources to influence the structure of government. This sharpens our focus on the implications for the production structure of the model. Using our model it is also possible to explain the occurrence of high levels of inequality within societies in the developing world without the outbreak of political violence.

Acemoglu and Robinson (2006) also discuss a role for the middle classes. In their framework, the feature that distinguishes the middle classes from the other classes is only their income levels. In our framework, by contrast, the distinction of the middle classes is that they have human capital and hence the potential to develop the manufacturing sector, enabling us to explore the implications of a middle class that differs from the other groups in a more fundamental way.

We are only aware of two papers, by Segura-Cayuela (2006) and Garfinkel, Skepardas and Syropoulos (2008), that study the interaction between (domestic) social conflict and the efficiency implications of trade liberalization. Take each in turn. Segura-Cayuela's model combines features of Acemoglu and Robinson (2006) with a model of international trade. In Segura-Cayuela's model, under autarky the general equilibrium price effects of taxation and expropriation constrain the extent to which the elite can impose inefficient policies. Trade liberalization removes these effects and enables the elite to exercise power in more inefficient ways. Thus, he focuses on the implications of trade liberalization for transitions from dictatorship to democracy while in our framework the regime is held constant and kept out of the picture. A further distinction is that we study a specific inefficient government institution, which enables us to say something about the relationship between trade liberalization and the size of government, while Segura-Cayuela focuses on institutions more broadly defined.

Garfinkel, Skepardas and Syropoulos (2008) examine how trade liberalization affects welfare when a natural resource such as oil is contested by competing domestic groups using real resources. Similar to our work, conflict arises as a result of imperfect property-rights enforcement. A difference between their framework and ours is that in theirs the

competing groups are ex ante identical. When comparing autarky and free trade in their framework, the gains from trade must be weighed against the possibly higher resource costs of conflict. They show that importers of the contested resource gain unambiguously from trade liberalization while exporters of the contested resource lose unambiguously unless the world price of the resource is sufficiently high. Therefore, trade liberalization may be efficiency-reducing in their framework as well, although the mechanism by which this happens is quite different to the one in our model.

Our theory complements existing hypotheses about the relationship between trade liberalization and the size of government. Rodrik (1998) identifies a positive relationship between trade liberalization and government spending, both in theory and in the data. He argues that opening up to trade exposes the population to increased terms-of-trade risk which is mitigated by an expansion of social insurance provided by the government. Rodrik (2000) explores a similar idea but focuses instead on government employment.

Our account of how trade liberalization interacts with the possibility of social conflict is also related to Rodrik (1999). He focuses on how the inadequacy of domestic institutions for resolving social conflict, provoked by external shocks, leads to growth collapses. He makes the point that if the institutions could be made to function better then growth would persist. Our emphasis is instead on inefficient institutions that resolve social conflict, yielding the opposite prediction; the more effectively the institution functions (where the effectiveness of the institution that we study is to made precise below) the worse economic efficiency is likely to be. We also provide a counterweight to Easterly's (2001) finding that the emergence of a "middle class consensus" is associated with faster economic growth and development. In our model the elite can effectively prevent the emergence of a middle class consensus using the pampered bureaucracy and stymies growth of the manufacturing sector. Rodrik (1997) and Rodriguez and Rodrik (2000) provide useful related discussions.

Other papers in the literature focus on the relationship between international trade and institutions but without incorporating the feature of social conflict. For example, Levchenko (2007) models institutional differences as a source of comparative advantage within a framework of incomplete contracts and shows empirically that these are an important determinant of trade flows. Do and Levchenko (2009) model institutions as

fixed costs of entry in a framework where preferences over entry costs depend on firm size and are endogenously determined in a political equilibrium. In this environment, trade liberalization can lead to higher entry costs when it tilts political power towards a small group of large exporters, who prefer to install high entry barriers. Liu and Ornelas (2009) examine the role of trade agreements in the consolidation of democracy. They show that participation in a trade agreement can act as a commitment device to destroy future protectionist rents, thus reducing the incentive of an autocrat to seize power.[3]

The paper is in eight sections. Section 2 sets out the basic model, determines the sequence of events and provides definitions of economic equilibrium and efficiency. Section 3 determines economic equilibrium under autarky and free trade respectively. The political equilibrium is determined in Section 4. It is here that the main theoretical results are presented. The paper then moves on to the empirical analysis. Section 5 presents a description of the data and some summary statistics. Section 6 discusses the framework for estimation. The main results are presented in Section 7. Conclusions are drawn in Section 8.

2. The Basic Model

We extend an 'endowments model' of international trade to allow, in a novel way, for the possibility of revolution wherein an endowment is reallocated from one group of citizens to another. Each citizen is placed in one of three socioeconomic groups: the rich elite, r, the middle classes, m, or the workers, w. The mass of the total population is normalized to one, and the share of each group in the population is fixed exogenously at λ^r, λ^m, and $\lambda^w = 1 - \lambda^r - \lambda^m$ respectively; also fix $\lambda^r, \lambda^m > 0$.

Endowments are as follows: Each member of the elite has an endowment, L, of latifundia and a unit endowment of labor; each member of the middle classes has an endowment, H, of human capital; each worker has a unit endowment of labor only. There is an unlimited amount of 'ordinary-land' which is free and may be settled by anyone. If

[3]Meltzer and Richards (1981) were among the first to identify a problem of social conflict whereby preferences vary across different groups about the size of government. Robinson, Torvik and Verdier (2006) study the incentives of governments to increase government employment using the proceeds of a natural resource boom in order to win office.

there is a revolution then the elites' latifundia are redistributed among the other groups, leaving the elite with only labor.

There are three homogeneous goods: A commodity, c (think of this as being anything from coffee to gold); food, f; and a manufactured good, g. The commodity is the numeraire in the model. The price of food is denoted by π and the price of manufactures is denoted by p.[4]

2.1. Production and Income

Production of manufactures occurs as follows. Each member of the middle classes can become an entrepreneur, sinking her human capital into the set-up of a firm. A firm is successful with probability σ; if successful, then a firm built with human capital H produces output using a linear production technology, $g = H$. If the firm is unsuccessful then it yields an output of zero. Thus, for each entrepreneur, setting up a firm yields an expected income

$$y^e = p\sigma H. \tag{2.1}$$

The share of entrepreneurs in the middle classes is $\lambda^e \in [0, 1]$.

Members of the middle classes, like all other citizens, are risk averse. (This will be shown formally below.) As a result they can be attracted to the bureaucracy by an income, y^b, that gives them exactly the same level of expected welfare as they would achieve from entrepreneurship.[5] Determination of y^b is thus contingent upon a formal specification of welfare which is undertaken in the next subsection.

Production of the commodity takes place on a latifundio, which must also employ labor. Latifundia cannot be used for any other production in the model. the amount of labor employed in the commodity sector (whether it belongs to the elite before a revolution or to the middle classes and workers afterwards) is $\lambda^c \in [0, \lambda^r + \lambda^w]$. The production technology of the commodity takes the Leontief form $c = \min\{\lambda^r L, \lambda^c\}$.

The remaining amount of labor, $\lambda^r + \lambda^w - \lambda^c$, is employed in 'freehold agriculture'

[4]Both of these prices are measured relative to the numeraire.

[5]Throughout the set-up and analysis of the model, for brevity we will drop the adjective 'pampered' and simply use the term 'bureaucracy'.

where it produces food. There, a unit of labor produces output, $\underline{y}$, using low-grade-land (which is free because it is in excess supply) and earns a return $\pi\underline{y}$. The level of $\underline{y}$ (which determines labor productivity in agriculture) and the market clearing price level π will be determined below as part of labor- and product-market equilibrium. However, at this point let us assume parameters are fixed such that $\lambda^r + \lambda^w > \lambda^r L$ and $\underline{y}$ is sufficiently low that there is excess supply of labor to the commodity sector. This pair of restrictions serves two purposes. It ensures that the return to labor is determined in the agricultural sector at $\pi\underline{y}$. It also ensures that elite income can be positive.

Under the assumption that each member of the elite contributes equally towards the costs of the bureaucracy and employs his labor in his own commodity production, elite per-capita income is given by

$$y^r = L - \left(\lambda^b \lambda^m y^b + \left(\lambda^c - \lambda^r\right)\pi\underline{y}\right)/\lambda^r. \tag{2.2}$$

where the first term in brackets is the per-elite-capita cost of the bureaucracy (when divided by λ^r) and the second term in brackets is the share of income that a member of the elite must pay to the workers that he hires. (Note that payment to a member of the elite for his own labor services have been netted out of this expression.) In the event of a revolution, each member of the elite is left only labor income, $\pi\underline{y}$; in that event, the distribution of the latifundia across the remaining groups will be determined in Section 4.

2.2. Preferences and Demands

The utility function of a member of group $i \in \{r, b, e, w\}$ has the following quasi-linear form:

$$u^i = x_c^i + x_f^i + \alpha x_g^i - \frac{1}{2}\left(x_g^i\right)^2$$

where x_c^i, x_f^i, and x_g^i are consumption of the commodity, food, and manufactures respectively by a member of group i. Utility is maximized subject to the budget constraint, $y^i = x_c^i + \pi x_f^i + p x_g^i$. If $y^i \in [0, p(\alpha - p)]$ then the consumer's problem has a corner solution wherein $x_c^i + x_f^i = 0$ and $x_g^i = \frac{y^i}{p}$. If $y^i > p(\alpha - p)$, $i \in \{r, b, e, w\}$, implying that the solution to each group's consumer problem is interior. In that case $x_g^i = \alpha - p$, with

x_c^i and x_f^i being determined by endowments and technology, which determines income, market clearing and prices.

Using the solutions to the consumer's problem in the utility function yields the indirect utility function, which provides the following measure of the welfare of a member of group i, w^i:

$$w^i\left(p, y^i\right) = \begin{cases} \alpha\frac{y^i}{p} - \frac{1}{2}\left(\frac{y^i}{p}\right)^2 & \text{if } y^i \in [0, p(\alpha - p)] \\ y^i + \frac{1}{2}(\alpha - p)^2 & \text{if } y^i > p(\alpha - p). \end{cases} \tag{2.3}$$

It is easily checked that citizens are weakly risk-averse; w^i is weakly concave in y^i. First note that w^i is strictly concave in y^i over the range $y^i \in [0, p(\alpha - p)]$ (i.e. $dw^i/dy^i = \frac{1}{p}(\alpha - y^i) > 0$, and $d^2w^i/dw^i y^{i2} = -\frac{1}{p} < 0$) providing $\alpha > y^i$ for all feasible values of y^i. This will be assumed to hold throughout. Then observe that for $y^i > p(\alpha - p)$, w^i is linear in y^i. Thus overall w^i is weakly concave in y^i. The elite exploit this risk aversion to lure would-be entrepreneurs to the bureaucracy.

Since the income of entrepreneurs is stochastic, (expected) welfare of entrepreneurs is determined stochastically as follows:

$$w^e\left(p, y^e\right) = \begin{cases} \sigma\left(\alpha\frac{y^e}{p} - \frac{1}{2}\left(\frac{y^e}{p}\right)^2\right) & \text{if } y^e \in [0, p(\alpha - p)] \\ \sigma\left(y^e + \frac{1}{2}(\alpha - p)^2\right) & \text{if } y^e > p(\alpha - p). \end{cases} \tag{2.4}$$

If a firm is successful then its owners' demands are given by the solutions for x_c^i, x_f^i, and x_g^i as discussed above. If the firm is unsuccessful then its owner's demands are $x_c^i = x_f^i = x_g^i = 0$.[6]

To simplify the analysis, assume that each group has sufficient income so that the solution to each member's consumer problem is interior. (For an entrepreneur this only holds if her firm is successful.) Clearly, the exact conditions rely on the determination of p in equilibrium. However, at this point we can say that the income of each group is underpinned by a parameter that can be varied to ensure each condition is met. In the case of workers, set $\underline{y} > p(\alpha - p)$. Since elite income is determined partially by the return to labor, this ensures that the condition is met for the elite as well. In the case of entrepreneurs and bureaucrats, set H sufficiently large. Specific details will be provided

[6]It is understood that all variables concerning entrepreneurs are determined in expectation, although we will not need to make a formal distinction between expected and actual outcomes.

after the equilibrium determination of p. Note that for consumption of x_a^i and x_L^i to be positive in the outcome of the consumer problem requires $\pi = 1$; taking all other parameters and p as given, we must set $\underline{y}$ sufficiently low to ensure that the agricultural market and natural-resource-good market clear at this price.

When the economy is open to trade, the demand for imports is measured in the usual way as the excess of domestic demand over domestic supply and the value of exports is equal to the value of imports. However, there is no need to consider imports and exports explicitly. In the present model the gains to trade are captured through the effect of a change in the terms of trade, p, on w^i.

2.3. The Cost and Size of the Pampered Bureaucracy

To choose employment in the bureaucracy, a member of the middle classes requires an income y^b that attains $w^e = w^b$. Using (2.1) and the second lines of (2.3) and (2.4) therefore requires a value of y^b that satisfies

$$\sigma\left(pH + \frac{1}{2}(\alpha - p)^2\right) = y^b + \frac{1}{2}(\alpha - p)^2.$$

This is solved by

$$y^b = p\sigma H - \frac{(1-\sigma)}{2}(\alpha - p)^2. \tag{2.5}$$

The middle classes take λ^b as given, filling all available vacancies providing $y^b \geq p\sigma H - \frac{(1-\sigma)}{2}(\alpha - p)^2$. Then $\lambda^e = 1 - \lambda^b$ is determined residually.

2.4. The Timing of Events

The sequence of events can be summarized as follows.

1. The elite decides whether to set up a bureaucracy. If so, it chooses y^b and λ^b.

2. The lower classes decide whether or not to mount a revolution. If they do not, factor allocations are as described above. If they do mount a revolution, they incur a fixed cost, d, and ownership of the commodity is transferred from the elite to the lower classes.

3. Production is undertaken, incomes and demands are realized, markets clear and consumption takes place.

At first sight, it might have seemed more natural to assume that the decision over whether or not to mount a revolution should come after production is undertaken. Taking this alternative approach is more complicated because in that case firm owners would have to be modeled as two separate groups; those whose firms had been successful and those whose had not. The alternative approach would yield essentially the same results but in a less direct and more complicated way.

2.5. Definitions of Economic Equilibrium and Efficiency

We will consider economic equilibrium under autarky and free trade respectively. In an autarkic equilibrium, the price adjusts to clear the domestic market. Specifically, the autarkic price, $\bar{p}$, solves the market-clearing condition for manufactures:

$$\lambda^r x_g^r(\bar{p}) + \lambda^m \left(\lambda^b x_g^b(\bar{p}) + \lambda^e x_g^e(\bar{p})\right) + \lambda^w x_g^w(\bar{p}) = \lambda^m \lambda^e \sigma H.$$

The left hand side sums demands across groups. The right hand side gives (expected) supply of manufactures.

Under free trade, and because this is a small country, the world price, p_w, is taken as given. By assumption the country has a comparative advantage in the natural-resource-good so $p_w < \bar{p}$. Since the market for manufactures clears at $\bar{p}$, domestic demand for manufactures are greater at p_w and so imports of manufactures are positive. Trade is balanced in free trade equilibrium so an equal value of the natural-resource-good is exported to clear the trade account.

The notion of efficiency determines the total surplus available for distribution to citizens, Ω:

$$\Omega\left(\lambda^b, p\right) \equiv \lambda^r w^r(p) + \lambda^m \left(\lambda^b w^b(p) + \lambda^e w^e(p)\right) + \lambda^w w^w(p)$$

This definition of efficiency will be useful in analyzing the implications of various different policies that we will examine below.

The reduced-form expression for efficiency is as follows:

$$\Omega\left(\lambda^b, p\right) \equiv \lambda^r L + \left(1-\lambda^b\right)\lambda^m p\sigma H + (\lambda^r + \lambda^w - \lambda^r L)\underline{y} + \sum_{i\in\{r,b,e,w\}} \frac{\lambda^i}{2}\left(x_g^i\left(p\right)\right)^2 \qquad (2.6)$$

The first three terms in (2.6) measure the output values of the natural-resource-good, manufactures and agriculture respectively, and the fourth term measures the surplus from consumption. It is self-evident that the value of λ^b that maximizes efficiency is $\lambda^b = 0$, i.e. not to set up a bureaucracy at all. This formalizes the sense in which the bureaucracy is an efficient institution and sets a benchmark against which to compare the values of λ^b that arise in political equilibrium under autarky and free trade.

3. Economic Equilibrium

Recall that $x_g^i\left(p\right) = \alpha - p$ for $i \in \{r, b, w\}$ and $x_g^e\left(p\right) = \alpha - p$ with probability σ and $x_g^e\left(p\right) = 0$ otherwise. Using the fact that $\lambda^w = 1 - \lambda^r - \lambda^m$, write the market clearing condition for manufactures as

$$\left(1 - \lambda^m\left(1-\lambda^b\right)\left(1-\sigma\right)\right)\left(\alpha - \bar{p}\right) = \lambda^e\lambda^m\sigma H.$$

Then the market clearing price is

$$\bar{p} = \alpha - \left(\lambda^e\lambda^m\sigma H\right) / \left(1 - \lambda^m\left(1-\lambda^b\right)\left(1-\sigma\right)\right). \qquad (3.1)$$

Assume α is large enough to ensure that $\bar{p} > 0$. (Note that this does not conflict with the restriction imposed on α earlier to ensure that welfare is concave in income.) Perhaps the most important property of $\bar{p}$ is that it is increasing in λ^b. Intuitively, increasing the size of the bureaucracy reduces the output of manufactures and thus pushes up their price. By (2.1) and (2.5), an increase in p increases both y^e and y^b. So the elite can raise the payoff to the middle classes of maintaining the status quo and thus make revolution less attractive. We will consider free trade as a reduction of p from $\bar{p}$ to p_w.

The efficiency implications of trade liberalization can be evaluated in a straightforward way using (2.6) to obtain a reduced-form expression for Ω in autarky, and then differentiating this with respect to p in order to evaluate the gains to trade. Use the fact

that $x_g^i(\bar{p}) = \alpha - \bar{p}$ for $i \in \{r, b, e, w\}$ in (2.6) to obtain

$$\begin{aligned}\Omega\left(\lambda^b, p\right) \equiv\ & \lambda^r L + \left(1-\lambda^b\right)\lambda^m p\sigma H + (\lambda^r + \lambda^w - \lambda^r L)\underline{y} \\ & + \frac{\left(1-\lambda^m(1-\sigma)\left(1-\lambda^b\right)\right)}{2}(\alpha - p)^2\end{aligned} \tag{3.2}$$

Differentiating this expression with respect to p,

$$\frac{d\Omega}{dp} = \left(1-\lambda^b\right)\lambda^m\sigma H - \left(1-\lambda^m(1-\sigma)\left(1-\lambda^b\right)\right)(\alpha - p) \tag{3.3}$$

From this expression we have two useful insights. First, using (3.1) to substitute $\bar{p}$ for p, note that $d\Omega/dp|_{p=\bar{p}} = 0$, while $d^2\Omega/dp^2 = \left(1-\lambda^m(1-\sigma)\left(1-\lambda^b\right)\right) > 0$. Therefore, a reduction of p from $\bar{p}$ increases efficiency. Secondly, we can see that if $p = 0$ then providing $\alpha > \left(\left(1-\lambda^b\right)\lambda^m\sigma H\right) / \left(1-\lambda^m(1-\sigma)\left(1-\lambda^b\right)\right)$, we have that $d\Omega/dp < 0$. With this restriction on α and with $p \in [0, \bar{p}]$, we have that $d\Omega/dp < 0$ for any reduction in p below $\bar{p}$. Under these parameter restrictions, then, trade liberalization implies an increase in efficiency. This result will serve as a useful benchmark against which to compare the efficiency implications of trade liberalization when the size of the bureaucracy is endogenous.

4. Political Equilibrium

Assume that the lower classes are able to resolve the collective action problem inherent in the decision over whether or not to revolt. The objective of the elite will be to reduce the surplus from revolution to zero through its manipulation of the size of the bureaucracy, thus removing the incentive to revolt.

The economic surplus generated by a revolution is determined using a Nash Bargaining Solution (NBS). This surplus is determined in the usual way as the difference between the payoff to the lower classes from revolution and the payoff to them from maintaining the status quo. Harsanyi (1977) shows that the standard two-person Nash Bargaining Solution (NBS) can be extended to more than two players. To determine the NBS, let us first introduce the following notation. W is the total surplus generated by the lower classes:

$$W\left(\lambda^b, y^r, y^b, y^e, y^w, p\right) \equiv \lambda^m\left(\lambda^b w^b\left(y^b, p\right) + \left(1-\lambda^b\right)w^e\left(y^e, p\right)\right) + \lambda^w w^w\left(y^w, p\right).$$

From this, using (2.1)-(2.5), we can determine a reduced form for the total payoff to the lower classes from maintaining the status quo, W_q:

$$W_q(p) = \lambda^m \sigma \left(pH + \frac{1}{2}(\alpha - p)^2 \right) + \lambda^w \left(\underline{y} + \frac{1}{2}(\alpha - p)^2 \right)$$

The total payoff to the lower classes from mounting a revolution, W_o is determined as follows:

$$W_o\left(\lambda^b, p\right) \equiv \lambda^r y^r\left(\lambda^b, p\right) - d + \lambda^m \sigma \left(pH + \frac{1}{2}(\alpha - p)^2 \right) + \lambda^w \left(\underline{y} + \frac{1}{2}(\alpha - p)^2 \right).$$

Then the total surplus for the lower classes generated by revolution is

$$h\left(\lambda^b, p\right) \equiv W_o\left(\lambda^b, p\right) - W_q(p) = \lambda^r y^r\left(\lambda^b, p\right) - d$$

the income from the commodity less the cost of mounting the revolution. From Harsanyi (1977), the total surplus received by group i, as calculated by the NBS, is given by

$$s^i = \lambda^i w^i\left(p, y^i\right) + \frac{1}{3}\left(\lambda^i w^i\left(p, y^i\right) - d\right).$$

The aim is now to establish that there exists a value of λ^b that ensures

$$h\left(\lambda^b, p\right) = \lambda^r y^r\left(\lambda^b, p\right) - d = 0 \tag{4.1}$$

which would remove the incentive to revolt. We will refer to this as the no-revolution-constraint (NRC), and denote the value of λ^b that solves the NRC by $\tilde{\lambda}^b$.

4.1. The Equilibrium Size of the Pampered Bureaucracy

It is instructive to solve for $\tilde{\lambda}^b$ first under free trade and then under autarky. Under free trade, take p as given and use (2.5) to determine $y^b(p)$. Then $\tilde{\lambda}^b$ is obtained by rearranging (4.1):

$$\tilde{\lambda}^b = \frac{\lambda^r L - \lambda^r (L-1)\,\underline{y} - d}{\lambda^m y^b(p)} \tag{4.2}$$

For $\tilde{\lambda}^b$ to satisfy NRC, it must lie in the interval $[0, 1]$. If the solution lies below zero then this implies that d is too large relative to $\lambda^r y^r\left(\lambda^b, p\right)$ for a revolution to be worth while. From (4.2), an increase in d makes this more likely. If the solution is greater than one then the NRC cannot be satisfied for any value of $\tilde{\lambda}^b$ and there is nothing that the elite

can do (within the context of the present model) to prevent revolution. An increase in L makes this more likely.

Let us now establish the conditions for which there exists a solution $\tilde{\lambda}^b \in [0,1]$ under autarky. Substituting (2.5), (3.1) and (4.2) into (4.1),

$$\begin{aligned} & \lambda^r y^r\left(\lambda^b, \bar{p}\right) - d \qquad (4.3) \\ = \; & \lambda^r \left(L - \lambda^r (L-1)\, \underline{y} - \lambda^b \lambda^m \left(\frac{\sigma H \left(\alpha - \frac{\left(1-\lambda^b\right)\lambda^m \sigma H}{1-\left(1-\lambda^b\right)\lambda^m(1-\sigma)} - \frac{\left(1-\lambda^b\right)^2 (\lambda^m)^2 (1-\sigma)\sigma^2 H^2}{2\left(1-\left(1-\lambda^b\right)\lambda^m(1-\sigma)\right)^2} \right)}{\lambda^r} \right) \right) - d \end{aligned}$$

Use the intermediate value theorem to obtain conditions under which there exists a solution $\tilde{\lambda}^b \in [0,1]$. For values $\lambda^b = 0$ and $\lambda^b = 1$ we can see by inspection of (4.3) that

$$\begin{aligned} h(0,p) &= \lambda^r \left(L - (L-1)\, \underline{y} \right) - d \\ h(1,p) &= \lambda^r \left(L - (L-1)\, \underline{y} \right) - \alpha \lambda^m \sigma H - d \end{aligned}$$

Thus, given λ^r, if L and $\underline{y}$ are sufficiently large relative to d, $h(0,p) - d > 0$. Make α or H sufficiently large as to ensure that $h(1,p) < 0$. Since $h\left(\lambda^b, p\right)$ is a continuous function of λ^b, there must exist a value $\tilde{\lambda}^b$ that satisfies $h\left(\lambda^b, p\right) = 0$. The discussion so far gives us our first main result:

Proposition 1. *Fix λ^r, λ^m, and σ, all in the interval $[0,1]$. Also fix $d > 0$. Then for values of L, α and H sufficiently large there exists a size of the pampered bureaucracy, i.e. a value $\tilde{\lambda}^b \in [0,1]$ satisfying the NRC, that prevents a revolution.*

The proof of this result shows that for α sufficiently large the first derivative of $h\left(\lambda^b, p\right)$ is negative with respect to λ^b, thus establishing conditions under which $\tilde{\lambda}^b$ is unique.

4.2. The Effects of Trade Liberalization on the Pampered Bureaucracy

Having now determined the size of a bureaucracy that prevents a revolution, $\tilde{\lambda}^b \in [0,1]$ (if it exists), we can examine the effects of trade liberalization. The first step will be to show that, given $\tilde{\lambda}^b \in [0,1]$, trade liberalization as captured by a reduction of p from $\bar{p}$ creates an incentive to revolt. The second step will be to examine how $\tilde{\lambda}^b$ must be changed in order to prevent revolution under trade liberalization.

Trade liberalization generates positive surplus for the lower classes. To show this, write out the reduced form for $h\left(\lambda^b, p\right)$ using (2.5) to substitute for y^b but treat p as a parameter:

$$h\left(\lambda^b, p\right) = \lambda^r L - \lambda^r \left(L-1\right) \underline{y} - \lambda^b \lambda^m \left(p\sigma H - \frac{\left(1-\sigma\right)}{2} \left(\alpha - p\right)^2 \right) - d.$$

Differentiating with respect to p,

$$\frac{dh\left(\lambda^b, p\right)}{dp} = -\lambda^b \lambda^m \left(\sigma H + \left(1-\sigma\right)\left(\alpha - p\right)\right).$$

Since by assumption $\alpha > p$ for all $p \in [0, \bar{p}]$, the reduction of p entailed by trade liberalization increases $h\left(\lambda^b, p\right)$, thus establishing that trade liberalization generates an incentive to revolt (for any given λ^b and p and hence $\tilde{\lambda}^b$ and $\bar{p}$).

To calculate the change in the size of the bureaucracy mandated by trade liberalization, differentiate the reduced form expression for $\tilde{\lambda}^b$, (4.2), with respect to p:

$$\frac{d\tilde{\lambda}^b}{dp} = -\frac{\left(\lambda^r L - \lambda^r \left(L-1\right)\underline{y} - d\right)\left(\sigma H + \left(1-\sigma\right)\left(\alpha - p\right)\right)}{\lambda^m \left(p\sigma H - \frac{1-\sigma}{2}\left(\alpha - p\right)^2\right)}. \tag{4.4}$$

Given the structure imposed on the model, $d\tilde{\lambda}^b/dp < 0$; trade liberalization mandates an increase in the size of the pampered bureaucracy in order to prevent a revolution. Another way to see this is first to observe from (2.5) that a reduction of p results in a reduction in y^b and then, from (4.2), that a fall in y^b mandates an increase in $\tilde{\lambda}^b$. Intuitively, the fall in p increases y^r and lowers both y^b and y^e, thus raising the surplus to the lower classes from revolution. Therefore, y^b and y^e do not change as a result of an increase in λ^b. However, from (2.2), increasing the size of the bureaucracy, λ^b, serves to lower y^r and with it the payoff to revolution. Providing they are not constrained by the upper bound, $\lambda^b = 1$, the elite are able to increase the size of the bureaucracy to prevent revolution in the face of trade liberalization. If the upper bound is reached then the elite cannot prevent a revolution.

We are now in a position to examine the efficiency implications of trade liberalization when the size of the bureaucracy is endogenous. Recall, from (4.2), that $\tilde{\lambda}^b$ is a function of p. For convenience, express the equation (4.2) as $\tilde{\lambda}^b\left(p\right)$. Using $\tilde{\lambda}^b\left(p\right)$ in (3.2) and

differentiating with respect to p,

$$\frac{d\Omega}{dp} = \left(1-\tilde{\lambda}^b(p)\right)\lambda^m\sigma H - \left(1-\lambda^m(1-\sigma)\left(1-\tilde{\lambda}^b(p)\right)\right)(\alpha-p) \qquad (4.5)$$
$$-\lambda^m\left(p\sigma H - \frac{(1-\sigma)}{2}(\alpha-p)^2\right)\frac{d\tilde{\lambda}^b(p)}{dp}$$

The first line is the same as in (3.3), which was calculated for λ^b exogenous; we noted previously that the first line is negative providing α is sufficiently large. Now note that as λ^b approaches 1 this becomes easier to satisfy since the first term tends to vanish and the second term increases in size. To sign the second line first note that the term in brackets may be positive or negative depending on the size of H relative to α. Providing that H is sufficiently large, the term in brackets is positive. Now recall that $d\tilde{\lambda}^b/dp < 0$. So the sign of the second line is positive providing H is sufficiently large relative to α. To evaluate the size of the second line relative to the first, observe from (4.4) that the magnitude of $d\tilde{\lambda}^b/dp$ is increasing in L. Therefore, we can make L sufficiently large that the size of the second line is greater than the size of the first. In that case, when the size of the bureaucracy is endogenously determined, it is possible for trade liberalization to be efficiency reducing. We have now established our second main result:

Proposition 2. *Fix λ^r, λ^m, and σ, all in the interval $[0,1]$. Also fix $d > 0$. Then for values of L and H sufficiently large, trade liberalization may be efficiency-reducing when the size of the pampered bureaucracy is endogenous.*

Several possibilities are allowed for under Proposition 2. In the discussion that followed (3.3) we argued that at autarky a small change in prices has a negligible positive effect on efficiency. With the endogenous change in λ^b working in the opposite direction, and with the effect being large in L is large, it is likely that small reductions in p are efficiency reducing. Therefore, a minimum threshold increase in λ^b may be required for trade liberalization to become efficiency improving. This is evident from the first term on the first line of (4.5) which is positive and so tends to work against efficiency improvements from trade liberalization. However, as λ^b tends to 1, this first term tends to zero, making it more likely that the magnitude of the first line is greater than the magnitude of the second and that trade liberalization improves welfare. It is of course possible either that the value of the terms on the first line is greater than that of the second for all values of

$\tilde{\lambda}^b(p) \in [0,1]$, in which case trade liberalization is welfare improving as in the standard model. This is more likely for L relatively small. For L relatively large the reverse is more likely with trade liberalization being everywhere efficiency reducing.

It is worth reflecting on what trade liberalization would imply for the incomes of the elite with λ^b endogenous. (We already know that worker income remains fixed and trade liberalization reduces the incomes of the middle classes since it lowers p; under free trade, λ^b is not an argument in the incomes of the middle classes.) Using (2.2) and (2.5),

$$\begin{aligned} \frac{dy^r}{dp} &= -\frac{\tilde{\lambda}^b(p)\,\lambda^m}{\lambda^r}\left(\sigma H + (1-\sigma)(\alpha - p)\right) \\ &\quad -\frac{d\tilde{\lambda}^b/dp}{\lambda^r}\left(\lambda^m(p\sigma H - \frac{(1-\sigma)}{2}(\alpha-p)^2) + \lambda^r(L-1)\underline{y}\right) \end{aligned} \tag{4.6}$$

The first line of (4.2) shows that when λ^b is held constant a reduction of p increases y^r. The second line tells us that the increase of λ^b that results from a reduction of p works in the opposite direction; intuitively, the increase in elite incomes is eroded by the fact that they must pay for a larger bureaucracy to prevent revolution. Turning to NRC, given (4.1) holds before revolution, the elite must increase λ^b by just enough to ensure that it continues to hold after any given increase in p. Therefore, assuming $\tilde{\lambda}^b(p) \in [0,1]$ both before and after trade liberalization, there is no change in elite income, y^r. However, by (2.3), the elite still have an interest in trade liberalization since they enjoy a consumption gain from the fact that p falls.

5. Data and Summary Statistics

5.1. Data Construction

We measure the size of the bureaucracy using annual data for central government spending on wages and salaries (1972-2008) from the International Monetary Fund's Government Finance Statistics database. Use B_{it} to denote annual spending on the bureaucracy by country i in year t (in millions of US dollars). The sample is restricted to developing countries as defined by the International Monetary Fund. A full list of countries is given in Table 1. We use a widely used measure of trade exposure (see for example Rose 2004, Dutt & Mitra 2009). Define Y_i as country $i's$ GDP expressed in millions of constant

dollars, x_{ij} and m_{ij} as exports to and imports from country j in millions of dollars and $X_i = \sum_{j \neq i} x_{ij}$, $M_i = \sum_{j \neq i} m_{ij}$. Then trade exposure is measured by the following:

$$O_i = \frac{X_i + M_i}{Y_i}, \tag{5.1}$$

which is obtained from the Penn World Tables mark 6.3[7]. We also employ a measure similar to those used in used Frankel and Romer (1999). Let D_{ij} be the distance between country i and j. According to that measure, natural openness is measured as follows:

$$\tilde{O}_i = \sum_{j \neq i} \frac{Yj}{D_{ij}} \tag{5.2}$$

Our measure of revealed comparative advantage (RCA) is due to Balassa (1965). We constructed this using trade flows from the World Bank. The index measures the percentage of country i's exports of product category k to some larger set of product categories ω as a share of the world percentage of product k exports relative to total trade[8]. Let X_{ikt} be country i's exports of product category k to the rest of the world in period t, $X_{i\omega t}$ be total exports from country i to rest of the world within some set of product categories ω. X_{nkt} is the sum of all other countries' (i.e. $j \neq i$) exports in product category k, and $X_{n\omega t}$ are total world exports in the set of product categories. Then

$$RCA_{ikt} = \frac{\left(\frac{X_{ikt}}{X_{i\omega t}}\right)}{\left(\frac{X_{nkt}}{X_{n\omega t}}\right)} \tag{5.3}$$

A country is revealed to have a comparative advantage in product k if $RCA_{ikt} > 1$. In our sample, RCA varies little over time. This temporal stability of comparative advantage allows us assume that underlying comparative advantage is constant across time and use the mode across years as our measure of a country's comparative advantage.

We also control for measurable determinants of bureaucratic spending. Larger countries spend more than smaller countries. To capture size effects, we include total gross domestic product expressed in millions of US dollars (Y_{it}) and population in thousands of

[7]These data are available at http://pwt.econ.upenn.edu/php_site/pwt_index.php

[8]Our trade data comes from the World Bank's World Development Indicators and is pre-aggregated into 5 product categories, so, $\omega =$ { ore metals and minerals, fuels, agriculture, food, manufactures}

individuals (N_{it}). Countries with higher GDP tend to also have higher wage rates. However, it may be that spending on wages and salaries is higher in manufacturing intensive economies because average wages are higher than in primary product intensive economies. An ideal proxy would be middle class wage rates or the minimum wage. Unfortunately, no such data exist at the annual level for a wide variety of developing countries. Instead, we include per-capita income in thousands of dollars (y_{it}) as a control for average wages. In the presence of political or credit constraints, spending should also be partly determined by government revenue. To address this concern, we obtained central government revenue from the International Monetary Fund's Government Finance Statistics, in millions of us dollars (R_{it}). Another potential concern may arise if planned economies are disproportionately manufacturing intensive. These economies may have larger bureaucracies and, in the transition to capitalism both liberalize trade and reduce bureaucratic spending . For transition economies, we constructed a dummy variable which assumes a value of 1 in all years subsequent to transition to a market economy ($post\_s_{it}$). Currency crises often precipitate IMF loans which come with conditionalities attached. Such conditionalities typically mandate both trade liberalization and reduced government expenditures. We control for this possibility by obtaining, from the IMF, data on all outstanding loans to which are attached conditionalities, and construct a variable which equals one if a country obtained an IMF loan in the previous year (imf_{it}). The final sample includes 66 countries and 827 country-years which implies that over the 36 year period, there are an average of 13.3 observations per country and a standard deviation of 9.9 observations per country.

5.2. Summary Statistics

Table 2 reports average country characteristics for all sample countries. Table II reports average county characteristics for all sample counties as well as for low and high openness where high openness is defined as O_{it} above the median (.70). More open economies are larger, more populous and have higher per-capital incomes. They are relatively less likely to have a comparative advantage in manufactures or have an IMF loan outstanding. Transition economies tend to be more open, on average.

6. Framework for Estimation

6.1. Framework for Estimation

The goal of our empirical estimation is to test the prediction of equation (4.4) in primary products intensive and manufacturing intensive economies. This equation tells us that, an increase in the relative price of manufactures necessitates an increase in the size of the bureaucracy. Our identifying assumption is that the change in the relative price depends on a country's comparative advantage. If the country is primary-products intensive, than relatively more closed economies will have a higher price of manufactures relative to the world price. Liberalization (increased openness) raises the supply of manufactures available in the domestic country, decreasing its relative price. Conversely, liberalization implies that the country's relatively inexpensive primary products can be sold on world markets at a higher price, implying an increase in the relative price of primary products. This identifying assumption, along with equation (4.4) implies the following testable hypothesis: Countries with a comparative advantage in primary products experiencing increases in openness experienced increases in bureaucratic size relative to countries with a comparative advantage in manufactures who experienced comparable increases in openness. It is important to note that we recognize that many factors may influence the effect of openness on bureaucratic spending. For example, Rodrik (2000) suggests that risk hedging implies that more open countries should have larger bureaucracies, ceteris paribus.

To understand our main specification, consider the following policy function:

$$B_{it} = G(O_{it}, Z_{it}) \tag{6.1}$$

Here, bureaucracy size is determined by openness, comparative advantage, and a vector of time-varying country-specific characteristics, Z_{it}. The derivative $G_1(\cdot, \cdot)$ gives the average effect of openness on bureaucratic spending. This effect is potentially determined by a large number of equilibrium factors from which we abstract in our model. What our model does have something to say about is the magnitude of $G_1(\cdot, \cdot)$ for primary products and manufacturing intensive countries. In particular, equation (4.4) along with our identifying assumption implies $G_1^{primary}(\cdot, \cdot) > G_1^{manufacturing}(\cdot, \cdot)$.

In order to obtain an empirical analogue of equation (6.1), we need to credibly establish exogeneity of all regressors. First, consider O_{it}. While a developing country's elite potentially have some ability to control the degree of trade, it is likely that trade is to a large degree determined by characteristics of comparative advantage and those of trading partners. We believe that $\tilde{O}_{it}$ is more credibly exogenous than O_{it} because the former can be influenced by the elite only to the extent that they can influence their trading partner's GDP. For robustness, we report all of our results using both O_{it} and $\tilde{O}_{it}$. While we are able to credibly instrument openness, we are not able to obtain convincing instruments of the variables in Z_{it}. It is likely that many of these, such as government revenue, are determined jointly with B_{it}. We address this issue by implementing a dynamic panel data (DPD) specification which allows us to instrument Z_{lit} and O_{it} ($\tilde{O}_{it}$) with lags from previous periods.

A second concern arises in the implementation of panel data models when the variables of interest are trending over time. This leads to biased coefficients and manifests as serial correlation in the estimated residuals. In practice, bureaucratic size exhibits trends over time, and previous period bureaucracy has predictive power for future periods. In other words persistence or sluggish adjustment in B_{it} over time implies that the empirical model should include lags of B_{it}:

$$B_{it} = G(\sum_{\tau=1}^{T} B_{it-\tau}, O_{it}, Z_{it}) \tag{6.2}$$

Our DPD specification allows us to model persistence in the dependent variable by including lags on the right-hand side. Assuming additive separability of Z_{it} and taking first differences to remove time-invariant country-specific confounders leads to the following linear dynamic approximation of (6.2)

$$\Delta B_{i,t} = \alpha_0 + \sum_{\tau=1}^{T} \gamma_\tau \Delta B_{i,t-\tau} + \alpha_1 \Delta O_{it} + \beta \Delta \mathbf{Z}_{it} + \Delta \varepsilon_{it} \tag{6.3}$$

Now suppose we were to split our sample in to two groups: countries with a comparative advantage in primary products and countries with a comparative advantage in manufactures. Denote γ_2^p and γ_2^m as the estimated coefficients when estimating equation (6.3) on the two subsamples. Our model predicts $\gamma_2^p > \gamma_2^m$. Our main specification is

obtained by exploiting the fact that combining the two separate equations and linking γ_2^p and γ_2^m with an indicator function for comparative advantage in primary products yields efficiency gains relative to two separate regressions:

$$\Delta B_{i,t} = \alpha_0 + \sum_{\tau=1}^{T} \gamma_\tau \Delta B_{i,t-\tau} + \alpha_1 \Delta O_{it} \times rca_{pi} + \beta \Delta \mathbf{Z}_{it} + \Delta \varepsilon_{it} \tag{6.4}$$

It is well known that in models of the form (6.4), unobserved country effects are correlated with the lagged dependent variable, leading to inconsistency of standard errors. Consistent estimates may be obtained by estimating the General Method of Moments (GMM) estimator originally proposed by Arellano and Bond (1991) (A/B), which, through the moment condition $E(B_{is}\Delta\varepsilon_{it}) = 0$ for $s \leq t-T$, implies validity of instrumenting $\Delta B_{i,t-1}$ with the lagged differences $\Delta B_{i,t-T}, \Delta B_{i,t-T-1}...\Delta B_{i,0}$. An attractive feature of this procedure is that the additional moment conditions $E(Z_{is}\Delta\varepsilon_{it}) = 0$ for $s \leq t-T$ allow us to instrument $\Delta \mathbf{Z}_{it}$ with the lagged differences $\Delta Z_{i,t-T}, \Delta Z_{i,t-T-1}$....Arellano and Bover (1995) show that lagged levels are often poor instruments for lagged differences. Blundell and Bond (1998) (B/B) show that problem is mitigated by using a system-GMM estimator which employs the additional moment conditions $E(\Delta B_{it}\varepsilon_{it}) = 0$ and $E(\Delta Z_{it}\varepsilon_{it}) = 0$ so that we can incorporate the levels $B_{i,t-T}, B_{i,t-T-1}...$ and $Z_{i,t-T}, Z_{i,t-T-1}$...as additional instruments for $\Delta B_{i,t-1}$ and $\Delta Z_{i,t-1}$ For robustness, we report estimates from both estimators. Because these estimators are inconsistent in the presence of serial correlation, for each regression we test for serial correlation in the first-differenced residuals as well as instrument validity. For all the regressions, our results confirm the absence of serial correlation and the validity of the instruments.

7. Main results

Table 3 presents estimates of equation (4) in logs. Only two lags of the dependent variable are sufficient to eliminate serial correlation in the differenced residuals. Column (1) estimates equation (4) using the A/B estimator. The estimated effect of openness on the size of the bureaucracy is larger for countries with a comparative advantage in primary products than for countries with a comparative advantage in manufactures. The elastic-

ity of the size of the bureaucracy with respect to openness is 16.1 percent greater in the former relative to the latter, which is in line with the prediction of our theoretical model.

As suggested above, higher GDP, and average incomes translate into higher B_{it}. Population, government revenue or the presence of IMF conditionalities do not have a statistically significant effect. Interestingly, recent transitions to capitalism appear to increase bureaucratic size. The results from B/B estimation (column (3)) share the properties of equation (6.1), except that government revenue becomes significant and the transition to capitalism decreases bureaucracy size.

Our model's main prediction is invariant to the use of $\tilde{O}_{it}$ (equations (2) and (4)). One interesting distinction is that, while the effect of openness on bureaucratic spending is always higher in primary products intensive industries, the signs of the aggregate effect is sensitive to the measure of openness. As noted above, we perform tests of overidentifying restrictions and serial correlation on all estimated equations. The Sargan Test indicates that our overidentifying restrictions are valid, and the 2nd order serial correlation test fails to reject the null of no serial correlation in the differenced residuals.

Our main results are robust to a number of model specifications. In addition to checking our results with both the A/B and B/B methodologies, testing for validity of the instruments and serial correlation, we have also performed a variety of robustness checks: The next version of this paper will present the robustness tests. In particular, the robustness tests we are in the process of performing are as follows:

- To check for the presence of outliers, we exclude fuel intensive countries from the sample
- To test whether our results hold for all economies, we include developed countries into the sample
- To control for endogeneity in the explanatory variables, we instrument our controls with their own lags
- We estimate the main equation using a variety of combinations of control variables.
- We estimate the main equation using time-aggregation of the Balassa index

- We control for heteroskedasticity by employing robust standard errors.

- We check for model specification (and ignore concerns regarding serial correlation) by estimating the main equation in levels
- We check for specification robustness by estimating the main equation in levels instead of logs.

8. Conclusions

In this paper, we have shown how a country's elite, in a situation where it has captured the state, may be able to create a pampered bureaucracy and manipulate its size in order to maintain social stability. One effect of increasing the size of the pampered bureaucracy is to reduce the amount of surplus available for expropriation, thus making revolution less attractive. Another is to make entrepreneurial talent more scarce, thus raising the income of the middle classes and hence their interest in maintaining the status quo. In a situation where the country has a comparative advantage in primary products, trade liberalization increases the income of the elite relative to the lower classes and thus mandates an increase in the size of the pampered bureaucracy in order to maintain social stability. We were able to find some support for this prediction in the data.

We think that the main idea of the present paper could usefully be developed in a number of directions. One would be to think about how the model could be used to motivate the social conflict that has arisen as a result of the prescriptions of conditionality imposed by the International Monetary Fund and World Bank. Such conditionality required that recipients of loans should 'stabilize, privatize and liberalize.' Elaborating on the second and third requirements, (the first is concerned with the macroeconomic environment and is beyond the scope of the present paper) these were for a country to reduce the size of government while liberalizing trade. The present paper suggests a new way in which an externally imposed reduction in the size of government in conjunction with trade liberalization may trigger social unrest. It would be interesting to explore this idea in greater detail.

The model of the present paper has focused on one particular aspect of government while regarding all other institutions as exogenous. It would be worth thinking explicitly about how the determination of the institutions incorporated within the model interact. Governments do have control over the probability with which firms are successful (σ) and the cost of undertaking a revolution (f). Our focus on the size of the pampered bureaucracy seems reasonable, holding these other institutions constant, since the government is likely to have direct control over it and can adjust its size relatively quickly. But it would be interesting to examine the interactions between all these institutions within the context of a fully specified dynamic framework.

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A. Appendix

Table 1: List of Countries

Albania	Djibouti	Lesotho	Romania
Azerbaijan	Dominica	Liberia	Rwanda
Belarus	Dominican Republic	Lithuania	Senegal
Benin	Egypt	Madagascar	Seychelles
Bhutan	El Salvador	Maldives	Sri Lanka
Bolivia	Estonia	Mali	Tajikistan
Brazil	Gabon	Mauritius	Tanzania
Bulgaria	Georgia	Mexico	Thailand
Bulgaria	Guinea	Moldova	Togo
Cameroon	Haiti	Mongolia	Tunisia
Chad	Honduras	Morocco	Turkey
Chile	Hungary	Nicaragua	Ukraine
Colombia	India	Niger	Uruguay
Comoros	Jamaica	Pakistan	Vanuatu
Congo, Republic of	Kazakhstan	Paraguay	Zimbabwe
Costa Rica	Latvia	Peru	
Croatia	Lebanon	Poland	

Notes: The unbalanced panel spans the years 1972-2008.

Table 2: Mean Country Characteristics, by Openness

	All Countries (1)	Low Openness (2)	High Openness (3)	P-value (2) vs. (3) (4)
Number of countries	66	33	33	–
Means				
B_{it}	193.65	135.05	257.04	0.000
	[284.10]	[195.26]	[345.30]	
Y_{it}	1790.67	1565.36	2034.36	0.000
	[1651.74]	[1390.51]	[1865.58]	
R_{it}	601.76	482.38	711.61	0.3321
	[336.25]	[352.42]	[320.60]	
N_{it}	46577.0	7082.13	83091.2	0.000
	[157297.8]	[12127.2]	[211551.4]	
y_{it}	1.6223	0.2151	3.144	0.000
	[8.9964]	[0.01846]	[0.6469]	
Proportions				
rca_p	0.670	0.733	0.602	0.000
	[0.470]	[0.021]	[0.490]	
imf_{it}	0.277	0.306	0.244	0.049
	[0.447]	[0.461]	[0.430]	
$post\_s_{it}$	0.147	0.037	0.266	0.000
	[0.355]	[0.191]	[0.442]	

Column (1) reports average country characteristics for the entire sample. Columns (2) and (3) report average country characteristics for countries with low and high openness where high openness is defined as greater than the median (.70).Standard deviations in brackets.

Table 3 Main Results

	(1)	(2)	(3)	(4)
$\Delta B_{i,t-1}$	0.503***	0.478***	0.674***	0.705***
	(0.0184)	(0.0274)	(0.0105)	(0.0185)
$\Delta B_{i,t-2}$	-0.0760***	-0.0688***	-0.121***	-0.134***
	(0.00863)	(0.0232)	(0.00753)	(0.00992)
O_{it}	-0.115		0.0487	
	(0.0854)		(0.0404)	
$O_{it} \times rca_p$	0.161***		0.106***	
	(0.0348)		(0.0200)	
$\tilde{O}_{it}$		-0.701**		-0.587***
		(0.280)		(0.169)
$\tilde{O}_{it} \times rca_p$		0.207***		0.115
		(0.0762)		(0.0738)
Y_{it}	0.699***	0.703***	0.547***	0.553***
	(0.0460)	(0.0316)	(0.0208)	(0.0256)
R_{it}	0.000824	-0.00311	0.0127***	0.00667**
	(0.00241)	(0.00290)	(0.00235)	(0.00306)
N_{it}	0.00100	-0.0426	0.0259	0.000105
	(0.0994)	(0.0885)	(0.0566)	(0.0723)
y_{it}	0.226***	0.431***	-0.0835***	-0.0189
	(0.0417)	(0.0589)	(0.0213)	(0.0292)
imf_{it}	-0.000664	-0.0340***	0.0164	-0.0547**
	(0.0261)	(0.00676)	(0.0206)	(0.0274)
$post\_s_{it}$	0.169***	0.115	0.287***	0.286***
	(0.0500)	(0.217)	(0.0497)	(0.0477)
Constant	-4.349***	-5.929***	-1.250***	-1.687***
	(0.335)	(0.454)	(0.108)	(0.173)
Sargan Test (p-value)	1.0000	1.0000	1.0000	1.0000
2nd order autocorrelation (p-value)	0.2374	0.1672	0.5534	0.3683
Observations	807	736	899	824
Number of countries	65	61	66	62

Column (1) and (2) report estimates from the Arellano and Bond (1991) system GMM estimator of equat
Columns(3) and (4) report estimates from the Blundell and Bond (1998) system GMM estimator of equati
Sargan overidentifying test p-values and tests of 2nd order autocorrelation reported below regression result
Two step GMM standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1