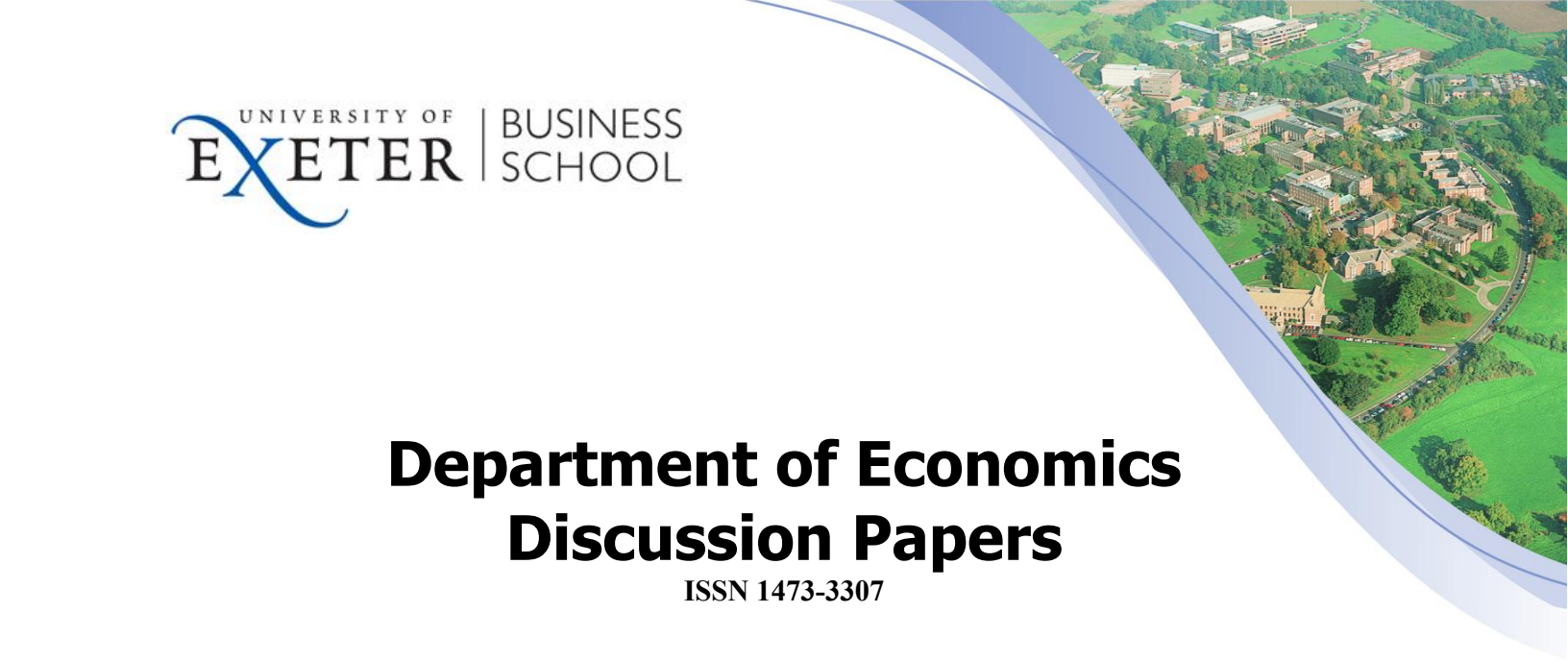

Department of Economics Discussion Papers

ISSN 1473-3307

How and Why Dictators Forestall Democratization Using International Trade Policy

Kishore Gawande and Ben Zissimos

Paper number 24/01

RePEc page: https://ideas.repec.org/s/exe/wpaper.html

How and Why Dictators Forestall Democratization Using International Trade Policy[1]

Kishore Gawande[2]

McCombs School of Business, University of Texas, Austin

Ben Zissimos[3]

University of Exeter Business School

October 11th, 2023

Abstract: On 'how' dictatorships use international trade policy to forestall democratization, our theory endogenizes the threat of revolution in a dictatorship to a world food price shock. The dictatorship then aim to neutralize the threat and forestall democratization using trade taxes. On 'why', we show that if a dictatorship were to introduce domestic redistributive fiscal capacity, they would make it more difficult to forestall democratization, hence undermining their own rule. The data and econometric results show that dictatorships do indeed follow this logic, while liberal democracies behave differently. We also find 'partial democracies' behave like dictatorships and not like liberal democracies.

Keywords: dictatorship, political institutions, political survival, redistributive fiscal capacity, trade policy.

JEL Classification Numbers: D74, F11, F13, F14, P16.

[1]For useful comments and conversations about this paper, we thank our editor, two anonymous referees, Jim Anderson, Pol Antràs, Sam Asher, Mostafa Beshkar, Rick Bond, Filipe Campante, Lizzie Dipple, Sabrina Eisenbarth, Matt Grant, Beata Javorcik, Ben Kett, Sebastian Krautheim, Pravin Krishna, James Lake, Jérémy Lucchetti, Kalina Manova, Anna Maria Mayda, Simone Meraglia, Peter Neary, Casey Petroff, Joel Rodrigue, Georg Schaur, Brian Wright, and seminar participants at the Central European University, SAIS Johns Hopkins, University of Oxford, University of Warwick, Vanderbilt University, a Midwest International Meeting, an InsTED Workshop, a Cal Poly International Trade Workshop, a UECE Lisbon Meeting in Game Theory and Applications, and a Conference on Commodities, Volatility, and Risk Management at University of Paris-Dauphine.

[2]Department of Business, Government and Society, McCombs School of Business, University of Texas, Austin, TX 78712, USA.

E-mail: kishore.gawande@mccombs.utexas.edu

[3]Corresponding Author: Dept of Economics, University of Exeter Business School, Exeter, EX4 4ST, UK.

Tel: ++44 1392 726466.

E-mail: b.zissimos@exeter.ac.uk

1 Introduction

Despite many countries having successfully transitioned to democracy throughout three waves of democratization, much of the world remains under dictatorship. Freedom House (2018) report that 49 countries are dictatorships, representing nearly 2.7 billion people, which is 37 percent of the global population. Moreover, Freedom House (2015) document that, at the time of publication, there had been no democratic forward progress for over a decade.[4] Therefore, while an extensive literature exists to explain democratization, the most pressing challenge now is to deepen our understanding of how countries remain entrenched in dictatorship. That is the challenge taken up in the present paper.[5]

The literature on dictatorship and democratization concentrates on who has the power to tax whom and why.[6] Acemoglu and Robinson (2000, henceforth AR), a cornerstone paper in this literature, argue that the purpose of democratization is to enable the ruling elite to make a credible commitment to the rest of society (ROS) using domestic taxation, on a sufficient scale to defuse a threat of revolution. When the elite are in power through dictatorship, they can only credibly commit to make transfers while they face the threat of a revolution. And any threat of revolution will dissipate over time. If the elite do not have sufficient resources at hand to compensate the ROS for what they could obtain through revolution, then the ROS will choose to mount a revolution while they can. Through democratization however, the elite hand over the power to set taxation to the ROS. In doing so, the elite make a credible commitment to continue payments to the ROS even after the threat of revolution has dissipated, thus neutralizing the threat of revolution.

[4]These numbers are for the Freedom House category of 'Not Free', as opposed to their two other categories of 'Free' and 'Partly Free'. The Freedom House measure of Not Free corresponds closely to Polity IV scores indicating dictatorship. The use of Polity IV scores to measure dictatorship will be discussed further below.

[5]This is not intended as a defense of dictatorship at a normative level but as an attempt to better understand how dictatorships entrench their positions of power. The extant literature on how dictatorship works takes two approaches. The first examines 'the problem of authoritarian control', and focuses on the threat to the ruling regime from outside of the elite. The work of Acemoglu and Robinson (2000, 2006) is influential in this approach. According to their view, dictatorship is of course 'dictatorship of the elite' while democracy is 'dictatorship of the poor and/or middle class'. Income redistribution by the elite may represent a way for the elite to defuse the threat of revolution and maintain power. But they may have to extend the franchise in order to defuse the threat of revolution, thus losing control. The second approach considers 'the problem of authoritarian power sharing', focusing on the threat to the ruling regime from within the elite. Bueno de Mesquita et al (2002) are the first to model accountability in a framework applicable to an authoritarian regime. In their theory, the dictatorial regime must maintain the support of a 'selectorate', a group drawn from the elite, in order to remain in power. Once again income redistribution plays a critical role, but this time within the groups of the selectorate. (Their framework can be used to consider democracy as well, where the selectorate equates to the electorate.)

[6]Another focus is on land reform. See Horowitz (1993), and Bhattacharya, Mitra and Ulubaşoğlu (2019).

Although AR provide a path-breaking insight into the purpose of democratization, they do not account for an empirical regularity that has come to light in subsequent research. This regularity is that the capacity for domestic progressively redistributive taxation is not installed until after democratization. Aidt and Jensen (2009) show this in the data for a sample of seventeen countries from western Europe, North America, Oceania and Japan between 1815 and 1939. To this day, for the purposes of redistribution, dictatorships tend to rely not on domestic taxation but instead on relatively inefficient trade taxes (Dodlova and Lucas 2021).[7]

Responding to this point, Zissimos (2017) combines AR's model of democratization with Mayer's (1984) Heckscher-Ohlin (H-O) model of international trade policy to produce a new theory of trade policy under dictatorship and democratization. The logic of democratization is based on AR, but the redistributive instrument is international trade policy and not domestic taxation. The paper characterizes when a dictator will have to democratize as a way to neutralize the threat of revolution, and when they will be able to forestall democratization using trade policy.[8]

The first objective of this paper is to examine whether the predictions of Zissimos (2017) over how dictators use trade policy to forestall democratization when they face the threat of revolution are borne out in the data. To do this, we develop a new theoretical model that endogenizes the trade policy responses of dictatorships to a plausibly exogenous phenomenon observed in the data that then triggers the threat of a revolution. Since the prior literature (starting with AR, and including Zissimos 2017) assumes that the threat of revolution arises exogenously, developing an approach that links the threat of revolution to an observable cause represents a significant innovation. Our theoretical innovation opens the door to our econometric implementation, which does indeed provide evidence that dictators use trade policy as the model predicts, and liberal democracies do not.

The exogenous phenomenon to which we endogenize the threat of revolution is a world food price shock. Throughout history food price shocks, especially shocks to food staples, have been a key trigger of political unrest. As Brown (2011) notes, "for the planet's poorest 2 billion

[7]Dodlova and Lucas (2021) assemble a detailed dataset of 105 dictatorships over the period 1950 to 2004. These data show that, on average, more government revenue is raised from trade taxes than any other form of taxation, at 30 percent, while redistributive income taxation raises less than 1 percent of tax revenues on average in dictatorships.

[8]Acemoglu and Robinson (2006) present a model of globalization and trade liberalization (see Chapter 10). But, since globalization is exogenous in their model, they do not consider the choice by the ruling elite over trade policy that is central to our analysis.

people, who spend 50 to 70 percent of their income on food, soaring prices may mean going from two meals a day to one. Those who are barely hanging on to the lower rungs of the global economic ladder risk losing their grip entirely. This can contribute - and it has - to revolutions and upheaval." Our model shows that a world food price shock (henceforth a 'world price shock') creates the threat of a revolution, which in turn prompts dictatorships to respond using trade policy in an attempt to defuse the threat of revolution.[9]

The structure of society in our model mirrors that of AR, in that society is divided into two groups: the ruling elite who form the dictatorship, and the rest of society (ROS). The political-economy of the model is linked to the underlying economic structure of H-O in our model, as in Zissimos (2017), by the assumption that the elite are large landowners while the ROS, while they can have smallholdings of land, derive most of their income from labor. Food is land-intensive, while manufactures are labor intensive.

In a dictatorship with a comparative advantage in agriculture, the model predicts that a world price shock will trigger increased food exports chasing higher world prices, lowering real incomes of the ROS. If the world price shock is sufficiently large, with no policy response by the dictatorship the ROS would find a costly revolution worthwhile. This is because it would give the ROS control over export taxes, which they could raise to prevent food exports, thereby preventing food prices from rising and restoring their real incomes. But the dictatorship can implement export taxes itself to defuse the threat of revolution, saving ROS the cost of revolution and achieving an acceptable policy outcome.

We model democracy as distinct from dictatorship, and show that a democracy is not predicted to respond to a world price shock in the same way as a dictatorship. To do this, we follow the literature in modeling democracy as a menu auction in the style of Grossman and Helpman (1994, henceforth GH). We embed this into our underlying H-O model of production to develop a new model, which we refer to as the Grossman-Helpman-Heckscher-Ohlin (GHHO) model.

The key difference between our GHHO model and the original GH model is that in their model, the factor rewards that vary with trade policy are derived from specific factors, while those in our model come from labor and land. Our GHHO model has in common with GH

[9]Bellemare (2015) shows that food price shocks cause social unrest. He also reviews the relevant literature, which links food price shocks to attempted and successful revolutions throughout history.

that, under democracy, interest groups are able to lobby the government in order to try to sway policy in the direction they would like to see it go. For a democracy with a comparative advantage in agricultural products, agricultural producers have an incentive to lobby for an export subsidy. Consequently, if exporters are organized into a lobby group and governments intervene in export markets, they will do so using an export subsidy. Importantly, domestic redistributive fiscal capacity is installed under GHHO, and this can be used for the purposes of redistribution between groups. So, just as in GH, this leaves the government free to use trade policy to respond to the influence of lobbyists.

Hence, our GHHO model's prediction of how liberal democracies will respond to a world price shock contrasts with our prediction of how dictatorships will respond. In a liberal democracy, the government simply passes higher world prices onto consumers and so export subsidies do not change. Therefore, our overall model (incorporating GHHO to model democracy and AR to model dictatorship) predicts no change in export subsidies by democracies in response to a world price shock, while at the same time it predicts an increase in export taxes by dictatorships. As we explain below, we find support for these predictions in our empirical implementation.

The second purpose of this paper is to demonstrate formally why dictatorships use trade policy and not domestic redistributive taxation to defuse the threat of revolution. Classified in terms of Rodrik's (1995) review of the literature, Zissimos (2017) presents a theory of redistribution using trade policy to defuse the threat of revolution, but omits a theory of why dictatorships choose to use trade policy in preference to more efficient domestic taxation. The present paper rectifies that omission by introducing to our new model the option to install domestic redistributive fiscal capacity. We then show that having this more efficient tax instrument available would make it more difficult for the elite to forestall democratization, hence undermining their own rule. So they choose not to install this capacity and use trade taxes instead. At a theoretical level, this is a significant further step beyond Zissimos (2017) because it provides a complete theory of why, as well as how, dictators use trade policy to forestall democratization.

Our empirical implementation covers the period 1969-2010. This period is broken down into two sub-periods, of 1969-1978 and 2003-2010. We then think of the world price shocks that occurred in each of these sub-periods, 1973-74 and 2006-08 respectively, as quasi-experiments, where dictatorships are predicted to behave differently from democracies in the way that they respond to these shocks. In line with the predictions of our model, we find that dictatorships

respond to the world price shocks by raising export taxes. For liberal democracies in the period 2006-08 we find no change in export subsidies, as predicted by our GMMO model. For the period 1973-74 we find that export subsidies decline in liberal democracies, suggesting there were forces at work during this period that go beyond the scope of our model.[10]

In our dataset, if countries are not classified as dictatorships or liberal democracies then they are classified as 'partial democracies'. This approach follows that of the Polity IV project. Our working hypothesis at the outset is that dictatorships behave differently from democracies broadly defined. However, our results show that partial democracies respond to the world food price shocks of 1973-74 and 2006-08 in a way that is indistinguishable from dictatorships: they too increase export taxes. Thus our results show that, from an export-policy standpoint, partial democracies have more in common with dictatorships than they have with liberal democracies.

We can use our theoretical framework to interpret this result. First, based on the foundations we have laid for explaining how dictatorships and democracies differ in their trade-policy responses to a world price shock, we can say in concrete terms that partial democracies 'behave like dictatorships'. Our theoretical framework shows that the ROS will have an incentive to install domestic fiscal capacity when they gain the power to do so through democratization, and will use this in preference to trade taxes. On the other hand, the elite will always do worse from the installation of domestic fiscal capacity and so under dictatorship they will not install it, resorting to trade taxes instead. Hence, viewed through the lens of our model, the fact that partial democracies use trade policy for the purposes of redistribution is an anomaly.

Viewed through the lens of our model, this anomaly could arise for one of two reasons. Partial democracies might want to install domestic redistributive capacity but do not as yet have the resources to do so, and hence they are constrained to respond to shocks as dictators do, using trade policy to respond to shocks in a bid to remain in power. Or, following Zakaria (1997), it could be that some of these countries are 'illiberal democracies'. In such countries, although power may notionally change hands at the ballot box, to the extent that incumbents are able to curtail such liberties as political representation, they may in fact aim to act as dictators, with the institutions of democracy being little more than a sham. Our econometric analysis provides evidence of the former explanation. While partial democracies do increase

[10]Buttel (1989) argues that fiscal contractions across many developed countries, starting in 1974 with the first oil price shocks, precipitated reductions in agricultural subsidies across many developed countries. It is these fiscal contractions that are beyond the scope of our model.

export taxes in response to price shocks, this tendency declines as income increases; a tendency that is absent for dictatorships.

Our paper contributes to the literature in four ways. First, it contributes to the literature on how dictatorships manipulate economic policy to trade off the rents they collect from power against their likelihood of survival in office, and how this trade-off in turn affects economic performance (Bueno de Mesquita, Smith, Siverson and Morrow 2002, Overland, Simons and Spagat 2005, Acemoglu and Robinson 2006, Besley and Kudamatsu 2008, Zissimos 2017). At a theoretical level, as mentioned above, we are the first to endogenize the threat of revolution to world price shocks; the prior literature assumes that the opportunity to mount a revolution or coup d'état arrives with an exogenous probability. As our empirical investigation shows, endogenizing the threat of revolution to world price shocks opens the door to a consideration of how challenges to dictatorial regimes arise in practice, and in turn provides evidence and a more nuanced understanding of how dictators address these challenges.

Our second contribution is to provide a new theory and evidence of how dictators operate trade policy, and show that this is distinct from the way that liberal democracies operate trade policy, but may explain how partial democracies do so. The implications of this new theory are quite far reaching. Ricardo (1817) argues that opening to trade serves as an insurance mechanism against crop failure at home, because the resulting high domestic prices induce an increase in supply through imports. This logic forms part of the foundations of our thinking about the benefits of trade liberalization. In turn, it informs policy recommendations made by multilateral institutions such as the World Bank, in advocating that developing countries remove economic distortions including those introduced by trade policy. Accordingly, the World Bank's reaction to countries who raised their export taxes in response to the world food price shocks of 2006-08 was to urge the perpetrators to remove these measures (e.g. World Bank 2008). However, an implication of our analysis and findings is that dictatorial regimes are unlikely to heed calls to remove export-restrictive measures if they are instrumental in their political survival. Moreover, their introduction of export restrictions may actually increase the volatility of world agricultural prices, undermining or even reversing the insurance-based gains from trade that Ricardo describes. If so, this suggests the need for a reevaluation of our expectations regarding the gains from trade, as well as the way that multilateral institutions such as the World Bank should respond to world price shocks.

Our third contribution is to the literature on international trade and economic development. This literature shows that common features of less developed countries interact with international trade in ways overlooked by standard models of international trade. (For comprehensive reviews of the literature, see Nunn and Trefler 2014, Rodrik 2018, Zissimos 2019, Atkin and Donaldson 2022, and Atkin et al 2022.) These features include weak institutions such as poor contracting institutions, poor enforcement of property rights, and an absence of institutions designed to ensure that markets function properly, especially capital markets. Yet this literature has paid scant attention to the interaction between international trade and the form of government that allows poor institutions to persist. On the other hand, the literature on institutions and economic development argues that such weak institutions persist because the ruling elite gain by monopolizing political power and hence structuring economic institutions not to support economic development but instead to maximize the rents that they capture (Acemoglu, Johnson and Robinson 2005). Rather than looking at the proximate links between international trade and specific weak institutions that undermine economic development, our paper considers the interaction between international trade and the survival of the political institution of dictatorship, explaining how a weak economic institutional environment persists.

The fact that we use the nominal rate of assistance (NRA) to measure the effect of trade policy on producer and consumer incentives represents our fourth contribution to the literature. NRAs recognize and incorporate multiple sources of policy distortion that governments have used to affect the price of food, beyond explicit trade taxes. They enable us to also capture the effects on local prices of policies that affect exchange rates and input markets, for example. Our use of them in our context is not just novel but also appropriate, because dictatorships with unfettered power over all areas of policy are likely to use such policy to maintain power if they are threatened.[11]

The paper proceeds as follows. Section 2 sets out the basic economic model. Section 3 extends the basic model to incorporate ongoing world price shocks. Section 4 then formalizes the way that a world price shock can endogenously create a threat of revolution, and how the elite will attempt to forestall democratization using international trade policy. Section 5 characterizes equilibrium of the game. Section 6 develops our GHHO model and uses it to characterize democracy in the overall model. Section 7 demonstrates that a dictatorship do not

[11] See Section 9.2 for a full description of the data and its sources.

have an incentive to install domestic fiscal capacity, thus relying only on trade taxes. Section 8 uses the equilibrium characterization to develop testable predictions of trade policy. Section 9 introduces the data, econometric design and models. Section 10 discusses our econometric results. Conclusions are drawn in Section 11. Some analytical proofs, further details of our quasi-experimental design, and robustness checks, are discussed in the appendixes.

2 The Basic Model

Consider a single small country that takes world prices as given. The model has an infinite time horizon to capture the commitment problem faced by a ruling elite under the threat of revolution. Variation in economic outcomes over time comes entirely from variation in world prices, and policy choices of the group that holds power: the ruling elite under dictatorship or the ROS under democracy. To abstract from issues of domestic taxation, in our basic model we will assume there is no domestic fiscal capacity and trade taxes are the only fiscal policy instruments available.

There is a continuum of risk neutral agents in the economy, whose measure is normalized to one, allocated either to the ruling elite, ε, or the ROS, ρ. Populations of the elite and the ROS are fixed, at measure θ and $1-\theta$ respectively. The elite are assumed to be in a minority: $1-\theta \gg \theta$. The land endowment is normalized to unity, and shared equally among all members of the elite. The total labor endowment is also normalized to unity and shared equally among the ROS. All members of each group are identical to one another, and each group differs from the other only by its factor endowment. We will assume that this country is land abundant relative to its trading partners. For concreteness, we will assume that the land endowment in trade partners is less than 1.

2.1 Production and Preferences

The production structure is that of a 2×2 H-O economy. The two goods, agriculture and manufactures, are intensive in land and labor respectively. Agriculture is referred to as good ε because the elite own most of the land. Manufactures are referred to as good ρ accordingly. The price of good ε relative to good ρ in period t is denoted by p_t, where $t = 0, 1, ..., \infty$. The autarky and world prices of good ε relative to ρ in period t are denoted by p^a and p_t^w

respectively. If the economy is open then goods may be traded internationally. Factors are not mobile internationally. Output of good $i \in \{\varepsilon, \rho\}$ in period t is denoted by x_{it}.

There is free entry into both sectors so profits are driven to zero. Under these assumptions, given initial endowments, population shares and production technology, outputs and factor prices are determined by p_t, so we may write the wage as $w_t = w(p_t)$, the return to land as $r_t = r(p_t)$, and output as $x_{it} = x_i(p_t)$ in period t.[12] Accordingly, the factor income of a representative member of the elite, y_t^{ε}, is given by the function $y^{\varepsilon}(p_t) = r(p_t)/\theta$, and, analogously for y_t^{ρ}, $y^{\rho}(p_t) = w(p_t)/(1-\theta)$.

Agents $j \in \{\varepsilon, \rho\}$ are identical in terms of their preferences and discount factor, $\beta \in (0,1)$. Agent j's expected utility at time 0 is $U_0^j = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u\left(c_{\varepsilon t}^j, c_{\rho t}^j\right)$, where $\mathbb{E}_t$ is the expectations operator conditional on information available at time t, and c_{it}^j is demand for good $i \in \{\varepsilon, \rho\}$ by agent j in period t. The instantaneous utility function, $u\left(c_{\varepsilon t}^j, c_{\rho t}^j\right) = c_{\varepsilon t}^j - \left(c_{\varepsilon t}^j\right)^2/2 + c_{\rho t}^j$, is of quasi-linear form. Under this functional form, all price effects are placed on $c_{\varepsilon t}^j$, whereby the demand function takes the form $c_{\varepsilon t}^j = d_{\varepsilon}^j(p_t) = 1 - p_t$, with all income effects channeled through $c_{\rho t}^j$. This functional form enables us to undertake a comparison of trade policy arising under democracy and dictatorship.[13]

2.2 Payoffs to Policy

We will assume that trade policy is applied to good ε. This could be either the country's exportable or its import-competing good, depending on its comparative advantage. We will follow the international trade policy literature in assuming that the government sets p_t directly, and rebates any revenue collected from trade policy to each individual j in lump sum. Then the net revenue function for an individual j, $tr^j(p_t)$, is $tr^j(p_t) = (p_t - p_t^w) m_{\varepsilon}(p_t)$, where imports of good ε, $m_{\varepsilon t}$, are given by the function $m_{\varepsilon}(p_t) = (d_{\varepsilon}(p_t) - x_{\varepsilon}(p_t))$. For a comparative advantage in good ε, $p_t < p_t^w$ implies an export tax. For a comparative advantage in good ρ, $p_t > p_t^w$ implies an import tariff.

Aggregate income Y_t, measured in terms of the numeraire good ρ, is the sum of income

[12] For compactness, where not relevant we will suppress the dependence of x_{it} on factor endowments.

[13] Specifically, this specification of preferences matches Grossman and Helpman (1994), which forms the basis of our GHHO model of democracy below. At an interior solution, which we will assume throughout, all price effects travel through good ε while all income effects travel through good ρ. However, the results of our model of dictatorship do not depend on this specification, and are unchanged qualitatively under homothetic preferences.

from factors and trade policy revenue. Analogously, total income of a member of group j in period t, Y_t^j, is the sum of their income from factors and trade policy revenue. Since in each period income from factors and trade policy can be written as a function of p_t, we may write $Y_t^j = Y^j(p_t) = y^j(p_t) + tr^j(p_t)$.

The welfare of a member of group $j \in \{\varepsilon, \rho\}$ in period t, W_t^j, is measured using the indirect utility function:

$$W_t^j = W^j(p_t) = Y^j(p_t) + s_\varepsilon(p_t), \ j \in \{\varepsilon, \rho\}, \tag{1}$$

where $s_\varepsilon(p_t) \equiv u_\varepsilon[d_\varepsilon(p_t)] - p_t d_\varepsilon(p_t) = \frac{1}{2}(1-p_t)^2$ is the consumer surplus derived from consumption of good ε. Given our specification of the model, since $W^j(p_t)$ is strictly concave in p_t, each group's preferred trade policy can be determined from this equation and expressed as a unique value of p_t. Overall national welfare in period t is given by

$$W_t = \theta W_t^\varepsilon + (1-\theta) W_t^\rho. \tag{2}$$

2.3 Elite and ROS Preferred Price Levels

We will say that 'group j's preferred price level' in period t, $\hat{p}_t^j$, is the value of p_t that maximizes the function $W^j(p_t)$: $W^{j\prime} = 0$ is the first order condition from which an interior solution for $\hat{p}_t^j$ is obtained.[14] The solution for $\hat{p}_t^j$ trades off the factor income gain through the 'Stolpher-Samuelson effect' and trade policy revenue gain against individual j's share of the aggregate distortion resulting from the policy. It may imply a trade tax or trade subsidy.

The solution for $\hat{p}_t^j$ takes the form

$$\hat{p}_t^j = p_t^w + \left(\gamma_t^j - 1\right) \frac{x_{\varepsilon t}}{-m'_{\varepsilon t}} \tag{3}$$

where $\gamma_t^j = y_t^{j\prime}/x_{\varepsilon t}$ measures the responsiveness of income Y_t^j to a change in the price level and may be positive or negative. This solution is unique because $W^j(p_t)$ is strictly concave in p_t. Note that $\hat{p}_t^j$ is larger in absolute value the larger the agricultural sector in terms of output, and the smaller the slope of the import demand function. Also, $-m'_{\varepsilon t} > 0$ regardless of comparative advantage. And if the solution for $\hat{p}_t^j$ given by (3) implies a trade subsidy then, by

[14] We use a 'prime' to denote the first derivative of a variable. For now we are assuming that the second order condition for this problem is satisfied. In due course, we will be able to check that it is indeed satisfied for the specific functional form of the H-O model that we specify.

our assumption that domestic fiscal capacity is absent, we have a corner solution of free trade: $\hat{p}_t^j = p_t^w$. This applies whatever the good for which the country has a comparative advantage.

To evaluate the sign of γ_t^j, first recall from Jones (1965) that we can express the main implication of the Stolper-Samuelson theorem as $r_t^* > p_t^* > 0 > w_t^*$, where a superscript-$*$ on a variable denotes proportional change, e.g. $r_t^* = dr_t/r_t$.

We regard $\hat{p}_t^\varepsilon \geq p_t^w$ to be the natural case for $\hat{p}_t^\varepsilon$ since it is underpinned by a trade-policy-induced increase in the price of food that raises elite welfare through an increase in their land rent. By (3), this requires $\gamma_t^\varepsilon > 1$. All else equal, given the definition of $y^\varepsilon(p_t)$ above, $\gamma_t^\varepsilon > 1$ is guaranteed by assuming that the elite are a sufficiently small share of the population: θ is sufficiently small. We will assume this to be the case throughout.[15]

Analogously, we regard $p_t^w \geq \hat{p}_t^\rho$ as the natural case since it is underpinned by a trade-policy-induced fall in food prices that raises ROS welfare through an increase in their real wages. By (3), this requires $\gamma_t^\rho < 1$. All else equal, given the definition of $y^\rho(p_t)$ above, $\gamma_t^\rho < 1$ is guaranteed by the fact that $w_t^* < 0$ and hence $y_t^{\rho\prime} < 0$.

2.4 Trade Policy and the Cost of Revolution

To understand the elite's decision to extend the franchise, we must be able to evaluate the cost of revolution since an extension of the franchise is undertaken to avoid this cost. In addition, we must know how trade policy will be set in the event of a revolution to evaluate the payoff of this course of action. In general, we might expect all the components of (3) to be affected by revolution, and hence $\hat{p}_t^j$ to be affected as well, making evaluation of the payoff to revolution relative to maintaining the status quo very complicated. We will simplify both problems by introducing a set of assumptions that will make $\hat{p}_t^j$ invariant to the occurrence of a revolution.

Our approach extends that of Zissimos (2017). In that paper, the cost of revolution is represented as a radial contraction of the production possibility frontier by a factor $\psi \in (0,1)$ in the period when the revolution occurs . This brings about a proportional reduction in income to a level $\psi Y(p_t)$, where $Y(p_t)$ is the aggregate income level in the absence of revolution as described above. Since Zissimos (2017) assumes preferences are homothetic, demands are reduced in proportion to the negative shock to income, i.e. proportional to ψ, as well. As a consequence,

[15] This would follow immediately under the assumption of homothetic preferences: see Zissimos (2017).

all relevant variables are reduced in the same proportion and the calculation of $\hat{p}_t^j$ is unaffected.

In the model of this present paper we adopt the same approach of assuming that the cost of revolution implies a radial contraction of the production possibility frontier. However, we introduce the additional assumption that revolution reduces demand for food to $\psi d_\varepsilon(p_t)$. We must add this assumption because, unlike in Zissimos (2017), preferences are non-homothetic and so demand does not fall automatically in response to the fall in income under revolution. Our approach draws on the idea developed by Collier (1999), that one of the costs of revolution is to disrupt all economic activity, both on the production and consumption sides of the economy.[16] Under these assumptions, $y_t^{j\prime}$, $x_{\varepsilon t}$, and $-m'_{\varepsilon t}$ are all reduced by the same proportion, ψ, in the period of revolution. Hence $\hat{p}_t^j$ is invariant to the occurrence of a revolution. Under these assumptions, the payoff of revolution to group $j \in \{\varepsilon, \rho\}$ at price level p_t, denoted by $W_R^j(p_t)$, amounts to $W_R^j(p_t) = \psi W^j(p_t)$.

3 World Price Shocks

In this section, we undertake a further extension of Zissimos (2017), to incorporate random world price shocks over time. We will say that p_t^w can take one of two values: low and high, or p_L^w and p_H^w respectively. In period t, With probability $1-\kappa$, $p_t^w = p_L^w$, while with probability κ, $p_t^w = p_H^w$, where $\kappa \in [0,1]$ and $p_L^w < p_H^w$. The concept of equilibrium is Markov Perfection, where each agent's strategy is conditioned on the outcome of the state $s \in \{L, H\}$, which corresponds to the world price level $p_s^w \in \{p_L^w, p_H^w\}$.[17]

Since the focus of our analysis is on the implications of p_s^w fluctuating over time between p_L^w and p_H^w, we are interested in how a change in p_s^w affects each group's preferred price level, $\hat{p}_s^j$. Define $\hat{p}_s^j$ as the value of $\hat{p}_t^j$ corresponding to $p_s^w \in \{p_L^w, p_H^w\}$. It is immediate from (3) that $\hat{p}_L^j < \hat{p}_H^j$, whether we are at an interior solution involving a trade tax, or a corner solution involving free trade.[18] For future reference, we will formalize this result as follows.

[16] Collier (1999) characterizes three types of economic cost arising from conflict: diversion, whereby resources are diverted to armament instead of other things; destruction, whereby resources are destroyed; disruption, whereby conflict disrupts the normal allocation of resources to productive uses. In our formalization we will focus on the 'disruption cost' arising from revolution. Note that this approach implies not that peoples' demand for food itself falls during revolution, but instead that their ability to leave home and buy food during a revolution falls.

[17] Each agent's strategy will also be conditioned on the form of government, as explained below.

[18] The situation where $\hat{p}_s^j$ goes from being at an interior solution initially to a corner solution after a world price shock, or vice versa, can be analyzed as a convex combination of the two cases just outlined. The outcome is qualitatively the same because the direction of change is the same in both cases.

Lemma 1. *Given state* $s \in \{L, H\}$*, with corresponding world price level* $p_s^w \in \{p_L^w, p_H^w\}$*, the preferred price level* $\hat{p}_s^j$ *of a member of group* $j \in \{\varepsilon, \rho\}$ *is such that* $\hat{p}_L^j < \hat{p}_H^j$.

3.1 Stolpher-Samuelson Consistency

It will be helpful to impose some further structure on the relationship between world prices and group welfare. We will say that $W^j(p_t)$ is 'Stolper-Samuelson consistent' if the following two properties hold:

$$\hat{p}_s^\varepsilon \geq p_s^w \geq \hat{p}_s^\rho \text{ for given } p_s^w \in \{p_L^w, p_H^w\};$$
$$W^\varepsilon\left(\hat{p}_H^j\right) > W^\varepsilon\left(\hat{p}_L^j\right) \text{ while } W^\rho\left(\hat{p}_H^j\right) < W^\rho\left(\hat{p}_L^j\right).$$

Ignoring trade tax revenue and using p_s^w as a benchmark, the Stolper-Samuelson theorem implies that group ε gain an increase in their real factor income from an increase in p_t above p_s^w because r_t increases relative to p_t, while it takes a decrease in p_t below p_s^w for group ρ to gain an increase in their factor income. Therefore, if the Stolper-Samuelson theorem holds, a sufficient condition for $\hat{p}_s^\varepsilon \geq p_s^w \geq \hat{p}_s^\rho$ is that trade policy revenue is a sufficiently small share of total income that its change in response to changes in p_t does not overturn the Stolper-Samuelson effect on factor income. Note that trade policy revenue can always be made a sufficiently small share of total income. One way is to adjust technology so that the degree of comparative (dis)advantage, and hence trade policy revenue, is sufficiently small. This establishes the first property directly.

Turning to the second property, we established in Lemma 1 that $\hat{p}_H^j > \hat{p}_L^j$. Invoking the Stolper-Samuelson theorem again, factor income for group ε will be higher under $\hat{p}_H^j$ than under $\hat{p}_L^j$ because r_t is higher. The reverse is true for group ρ because w_t is lower. We can see by inspection of (1) that $W^j(p_t)$ is monotonically increasing in factor incomes.[19] Therefore, once again, providing factor income is a sufficiently large share of total income, its direction of change will determine the direction of change in group welfare. A feature of Stolper-Samuelson consistency is that the larger the difference between p_L^w and p_H^w, the lager the difference between $W^i\left(\hat{p}_L^j\right)$ and $W^i\left(\hat{p}_H^j\right)$, $i, j \in (\varepsilon, \rho)$. This establishes the second property.

Taking p_s^w as given, we will now provide a complete characterization of preferred price levels $\hat{p}_s^j$, under a comparative advantage in good ε and ρ respectively. This characterization

[19] In the model of Zissimos (2017), $W^j(p_t)$ is monotonically increasing in factor incomes by homotheticity.

will extend Proposition 1 of Zissimos (2017) to our present setting where the world price p_s^w fluctuates between p_L^w and p_H^w. We will discuss the case of a comparative advantage in good ε in detail. The case of good ρ is analogous.

With a comparative advantage in good ε, $p^a < p_s^w$. Thinking of free trade, p_s^w, as a reference point, the elite would ideally like to raise domestic prices above that level because their factor income is increasing in openness. But note that $p_s^w < \hat{p}_s^\varepsilon$ implies an export subsidy on good ε, which is not feasible in the absence of domestic fiscal capacity. Therefore, the solution to $\hat{p}^\varepsilon$ implies a corner solution $\hat{p}_s^\varepsilon = p_s^w$. Turning to $\hat{p}_s^\rho$, if this is at an interior solution, $p^a < \hat{p}_s^\rho < p_s^w$ then it implies the ROS would ideally like an export tax on good ε that allows some openness. But, depending on their relative preferences for goods ε and ρ, it could equally be that the ROS would prefer an export subsidy on good ρ, in which case in the absence of fiscal capacity the solution to $\hat{p}^\rho$ would imply a corner solution at autarky, $\hat{p}_s^\rho = p^a$. Therefore, for the ROS, in the absence of domestic fiscal capacity, $p^a \leq \hat{p}_s^\rho < p_s^w$. The analysis can be summarized as follows.

Proposition 1. *Taking p_s^w as given, in the absence of domestic fiscal capacity:*
(i) with a comparative advantage in good ε, $\hat{p}_s^\varepsilon = p_s^w$ while $p^a \leq \hat{p}_s^\rho < p_s^w$;
(ii) with a comparative advantage in good ρ, $\hat{p}_s^\rho = p_s^w$ while $p_s^w < \hat{p}_s^\varepsilon \leq p^a$.

From this result we can see that world prices, factor ownership, and comparative advantage co-determine the level of openness preferred by the respective groups. The conflict of interest between groups over trade policy is of course more general than the framework we are using here, which is constructed to focus on trade policy. Moreover, the conflict of interest over trade policy would carry over to a situation where domestic fiscal capacity were available for trade subsidies.

4 Dynamic Game with World Price Shocks

The approach to characterization of equilibrium follows Zissimos (2017), but extends the approach to accommodate random world price shocks. To examine which outcome will arise in equilibrium, we will first formalize the payoffs to the respective groups under the various possible outcomes of elite rule, E, democracy (through an extension of the franchise), D, or (democracy through) revolution, R. Note that the form of government, F, is either D or E.

The concept of equilibrium is Markov Perfection, wherein each player's strategy depends only on the state (F, s), $s \in \{H, L\}$ in a given period. The game has an infinite time horizon. In any period $t \in \{0, \infty\}$, the probability that the state is H, and hence the world price is p_H^w, is $\kappa \in (0, 1)$.

The game is initialized with the assumption that at the beginning of period 0 there is elite rule, E. Within a period, t, the sequence of events proceeds in the following stages. First, the world price level, $p_s^w \in \{p_L^w, p_H^w\}$, is revealed. Second, the elite decide whether or not to extend the franchise: if they do then there is democracy; if they do not, they set trade policy, $p_t = p_t^\varepsilon$. Third, if the elite have not extended the franchise then the ROS decide whether or not to mount a revolution: if they do so it is successful for sure, leading to democracy. Fourth, if there is democracy then trade policy p_t is set by the median voter (a member of the ROS because they are in the majority). Fifth, production takes place, demands are realized, markets clear and consumption takes place.[20]

If democracy does not arise in period t, then in period $t+1$ the sequence of events starts again at the first stage, and proceeds through all stages. If in period t democracy does arise then in $t+1$, $p_s^w \in \{p_L^w, p_H^w\}$ is determined in the first stage as before, but the second and third stages are skipped, moving straight to the fourth stage where the median voter sets trade policy.[21] The assumption that all members of each of group $j \in \{\varepsilon, \rho\}$ are identical to one another means that we can model the members of each group as a single player. So the game between the elite and the ROS can be modeled as a two-player game. A best response by the elite is their welfare-maximizing choice for all F, p_s^w, given the strategy of the ROS, and vice versa. Then a pure strategy MPE is a set of mutual best responses.[22]

4.1 Payoffs to Democracy, Revolution, and the Status Quo

First consider democracy. Let $V^j(D; s)$ represent the value function under democracy for $j \in \{\varepsilon, \rho\}$ and $p_s^w \in \{p_L^w, p_H^w\}$, where $\hat{p}_s^\rho$ reflects the fact that the ROS determine trade policy under democracy and use this to set their preferred price level. For a member of group j, the payoff

[20] In general, Markov Perfect Equilibria (MPE) are a subset of Subgame Perfect Equilibria (SPE). However, we will show in our characterization of equilibrium that in our model they coincide.

[21] Democracy is assumed to be an absorbing state, enabling us to focus the analysis on whether or not it is possible to set trade policy to forestall democratization. Acemoglu and Robinson (2001) present a model where democracy may fail to consolidate, and the present model could straight-forwardly be extended in that direction.

[22] In this paper, we do not consider mixed strategy MPE. The implications of allowing for mixed strategies will be discussed informally in the characterization of equilibrium.

to democracy via an extension of the franchise takes the form:

$$V^j\left(D|\,\kappa;s\right)\equiv W^j\left(\hat{p}_s^\rho\right)+\frac{\beta\kappa}{1-\beta}W^j\left(\hat{p}_H^\rho\right)+\frac{\beta\left(1-\kappa\right)}{1-\beta}W^j\left(\hat{p}_L^\rho\right). \tag{4}$$

The fact that the first term depends on $\hat{p}_s^\rho$ is an extension of the form used in Zissimos (2017) that allows for the possibility that in the current period p_s^w is either p_L^w or p_H^w. The weight on the second term, $\beta\kappa/\left(1-\beta\right)$, provides the net present value of $W^j\left(\hat{p}_H^\rho\right)$, weighted by the probability that $p_s^w=p_H^w$ in any future period, denoted by κ. The weight on the third term, $\beta\left(1-\kappa\right)/\left(1-\beta\right)$ provides the same thing for $W^j\left(\hat{p}_L^\rho\right)$, given a corresponding probability of $1-\kappa$ that $p_s^w=p_L^w$ in any future period.

The functional form of (4) allows p_s^w to vary randomly over time, because by Lemma 1 there is a unique mapping between p_s^w and $\hat{p}_s^j$, and each term in the value function can be completely characterized in terms of $W^j\left(\hat{p}_s^\rho\right)$, $s\in\{L,H\}$. It is this feature that allows us to tractably extend the characterization of equilibrium in Zissimos (2017) to the present setting where world prices vary randomly.

Next, consider revolution. The value function for revolution is given by

$$V^j\left(R|\,\kappa;s\right)\equiv W_R^j\left(\hat{p}_s^\rho\right)+\frac{\beta\kappa}{1-\beta}W^j\left(\hat{p}_H^\rho\right)+\frac{\beta\left(1-\kappa\right)}{1-\beta}W^j\left(\hat{p}_L^\rho\right). \tag{5}$$

The second and third terms are the same as in (4), based on our assumption that the cost of revolution is incurred entirely within the period that the revolution takes place. Clearly, given that the continuation payoffs are the same under democracy achieved through an extension of the franchise and revolution, while $W_R^j\left(\hat{p}_s^\rho\right)<W^j\left(\hat{p}_s^\rho\right)$, both groups would prefer an extension of the franchise because this avoids the cost of revolution. Therefore, extension of the franchise always has the potential to defuse revolution.

Finally, consider the status quo of elite rule. Let $V^j\left(E,p_L^\varepsilon,p_H^\varepsilon;s\right)$ denote the value function for agent j under the status quo of elite rule. This is given by

$$V^j\left(E,p_L^\varepsilon,p_H^\varepsilon;s\right)=W^j\left(p_s^\varepsilon\right)+\frac{\beta\kappa}{1-\beta}W^j\left(p_H^\varepsilon\right)+\frac{\beta\left(1-\kappa\right)}{1-\beta}W^j\left(p_L^\varepsilon\right). \tag{6}$$

This function captures the value to agent j of elite rule under a stationary equilibrium where the elite set the same price p_L^ε whenever $s=L$, and the same price p_H^ε whenever $s=H$, where p_L^ε and p_H^ε will be determined in equilibrium. We will use this expression to show that the elite can use trade policy to defuse the threat of revolution instead of extending the franchise if the ROS's expected payoff under trade policy set by the elite is at least as high as under revolution.

5 Characterization of Equilibrium in the Basic Model

In our characterization of equilibrium, we will focus on the issue of whether the elite can forestall democratization using trade policy. At the heart of this issue is the question of whether the ruling elite can credibly commit to compensate the ROS using trade policy for what they could gain from a revolution. If not, we will say that they face a commitment problem. We will then show that, when the elite face a commitment problem, democratization offers the only way to avoid a revolution; when they do not, the elite can forestall democratization using trade policy.

To facilitate characterization, we begin by assuming that when $p_s^w = p_L^w$ the ROS cannot threaten to mount a revolution, while when $p_s^w = p_H^w$ they can. An interpretation of this assumption is that news of $p_s^w = p_H^w$, in and of itself, allows the ROS to resolve the collective action problem involved in mounting a revolution. Because $p_s^w = p_H^w$ with probability κ, this directly parallels the assumption made in the prior literature that the threat of revolution arises with exogenous probability κ. Having characterized equilibrium under this assumption we will then relax it, and show that the same characterization of equilibrium holds under the assumption that the threat of revolution depends endogenously on the world price level.

The characterization of equilibrium can be illustrated in terms of Figure 1. The vertical axis measures the infinitely discounted sum of payoffs to the ROS. The horizontal axis shows the probability of a high world price in a given period, κ. The short-dashed line shows the payoff to ROS from voluntary extension of the franchise by the elite (followed by democracy), $V^\rho(D|\,\kappa; H)$, given by (4). The long-dashed line gives the payoff to revolution (followed by democracy), $V^\rho(R|\,\kappa; H)$, given by (5). The (constant) vertical difference between this and the payoff from voluntary extension of the franchise is proportional to the cost of revolution, $(1-\psi)\,Y^\rho\left(\hat{p}_H^\rho\right)$. They have the same slope, given by the reduction in welfare from an increased probability that p_H^w occurs in the future. The solid line shows the maximum welfare that the elite can feasibly induce for the ROS, given the threat of revolution. This is obtained by setting $p_L^\varepsilon = \hat{p}_L^\varepsilon$ and $p_H^\varepsilon = \hat{p}_H^\rho$ in (6), to obtain $\widetilde{V}^\rho(E|\,\kappa; H) \equiv V^\rho\left(E, \hat{p}_L^\varepsilon, \hat{p}_H^\rho, ; H\right)$.

Three features of this set-up are critical. The first is that the slope of $\widetilde{V}^\rho(E|\,\kappa; H)$ is shallower than that of $V^\rho(D|\,\kappa; H)$ and $V^\rho(R|\,\kappa; H)$. The slope of $V^\rho(D|\,\kappa; H)$ and $V^\rho(R|\,\kappa; H)$ is $-\beta\left(W^\rho\left(\hat{p}_L^\rho\right) - W^\rho\left(\hat{p}_H^\rho\right)\right)/(1-\beta)$, whereas the slope of $\widetilde{V}^\rho(E|\,\kappa; H)$ is $-\beta\left(W^\rho\left(\hat{p}_L^\varepsilon\right) - W^\rho\left(\hat{p}_H^\rho\right)\right)/(1-\beta)$. The fact that the slope of $\widetilde{V}^\rho(E|\,\kappa; H)$ is shallower follows because, by Stolper-Samuelson con-

sistency, $W^{\rho}\left(\hat{p}_L^{\rho}\right) > W^{\rho}\left(\hat{p}_L^{\varepsilon}\right)$.

The second is that $\widetilde{V}^{\rho}\left(E|\,1;H\right) = V^{\rho}\left(D|\,1;H\right)$. This arises because if $\kappa = 1$, which implies that $p_s^w = p_H^w$ every single period, then the elite could feasibly set $p_H^{\varepsilon} = \hat{p}_H^{\rho}$ in every single period, which is the same outcome as democracy.

5.1 The Revolution Constraint and the Commitment Problem

The third feature critical to this set-up is that the intercept of $V^{\rho}\left(R|\,\kappa;H\right)$ is greater than the intercept of $\widetilde{V}^{\rho}\left(E|\,\kappa;H\right)$. As a result, there must exist a value $\overline{\kappa} \in (0,1)$ at which $\widetilde{V}^{\rho}\left(E|\,\kappa;H\right) = V^{\rho}\left(R|\,\kappa;H\right)$, and hence ranges of κ for which $\kappa \lessgtr \overline{\kappa}$. This third feature entails a restriction either on β or on p_H^w, which we will call the 'revolution constraint'. Formally, using (5) and (6), at the intercept $\kappa = 0$ we have

$$V^{\rho}\left(R|\,0;H\right) > \widetilde{V}^{\rho}\left(E|\,0;H\right)$$

or equivalently

$$W_R^{\rho}\left(\hat{p}_H^{\rho}\right) + \frac{\beta}{1-\beta}W^{\rho}\left(\hat{p}_L^{\rho}\right) > W^{\rho}\left(\hat{p}_H^{\rho}\right) + \frac{\beta}{1-\beta}W^{\rho}\left(\hat{p}_L^{\varepsilon}\right). \tag{7}$$

Even though $W^{\rho}\left(\hat{p}_H^{\rho}\right) > W_R^{\rho}\left(\hat{p}_H^{\rho}\right)$ because revolution is costly, we also have $W^{\rho}\left(\hat{p}_L^{\rho}\right) > W^{\rho}\left(\hat{p}_L^{\varepsilon}\right)$ by Stolper-Samuelson consistency. So we only have to make β sufficiently large to ensure that $V^{\rho}\left(R|\,0;H\right) > \widetilde{V}^{\rho}\left(E|\,0;H\right)$. In the absence of this restriction on β, we would have $\widetilde{V}^{\rho}\left(E|\,\kappa;H\right) > V^{\rho}\left(R|\,\kappa;H\right)$ for all $\kappa \in [0,1]$, and the elite could always feasibly induce a higher level of welfare for ROS using trade policy, and so they would never face a commitment problem.

What is the significance of this restriction on β? Intuitively, a relatively high value of β means the ROS care enough about the future that the higher welfare implied by $\hat{p}_L^{\rho}$ relative to $\hat{p}_L^{\varepsilon}$ is worth the cost of revolution in the short run. Hence why we refer to (7) as the revolution constraint. Note that there exists a value of β sufficiently large for the revolution constraint to bind. This parallels the set-up in Zissimos (2017), extending it to the present one where the world price p_s^w fluctuates between p_L^w and p_H^w.

Now consider the elite's options for $s = H$. For $\kappa < \overline{\kappa}$, it is not feasible for the elite to use trade policy to maintain the status quo because they cannot feasibly induce a level of welfare for the ROS that is at least as great as from revolution: $\widetilde{V}^{\rho}\left(E|\,\kappa;H\right) < V^{\rho}\left(R|\,\kappa;H\right)$ over this

range. The reason is that the expected number of periods in the future for which the elite can set $\hat{p}_H^{\rho}$ as opposed to $\hat{p}_H^{\varepsilon}$ is not sufficiently large to raise the payoff from $\widetilde{V}^{\rho}(E|\,\kappa;H)$ above $V^{\rho}(R|\,\kappa;H)$. This situation represents a commitment problem for the elite in the sense that they cannot credibly commit to raise the ROS payoff using policy above the level that they could obtain from revolution. For $\kappa > \overline{\kappa}$, $\widetilde{V}^{\rho}(E|\,\kappa;H) > V^{\rho}(R|\,\kappa;H)$ because the expected number of periods in the future for which the elite can set $\hat{p}_H^{\rho}$ is sufficiently large. Hence, the elite face a commitment problem for $\kappa < \overline{\kappa}$, but not for $\kappa > \overline{\kappa}$. We can now see that the revolution constraint is necessary and sufficient for the commitment problem to arise.

5.2 The Status Quo Price

Having established the range of $\kappa > \overline{\kappa}$ over which it is feasible for the elite to use trade policy to maintain the status quo, we will now examine the trade policy that the elite actually set in equilibrium. Over this range of κ, all the elite need do to maintain the status quo is to set a value of p_H^{ε} that leaves the ROS just indifferent between mounting a revolution and maintaining the status quo. We call this value of p_H^{ε} the status quo price, and denote it by p^{sq}.

To find p^{sq}, first define the function

$$G(p_H^{\varepsilon}) \equiv V^{j}(E, p_L^{\varepsilon}, p_H^{\varepsilon}; H) - V^{\rho}(R|\,\kappa;H) \tag{8}$$

Then by definition, for a given p_L^{ε}, $\kappa > \overline{\kappa}$, and $s = H$, the elite set the status quo price, $p_H^{\varepsilon} = p^{sq}$ to solve $G(p^{sq}) = 0$. This specification formalizes the idea that to maintain the status quo the elite set p^{sq} so that the ROS are indifferent between mounting a revolution and not doing so.

We can now establish the conditions for p^{sq} to exist. The set-up is qualitatively the same as in Zissimos (2017), so the same approach can be used to prove the following result on the existence of p^{sq}.

Proposition 2. *Assume that, with probability κ, $p_s^w = p_H^w$ and so the elite face the threat of revolution; with probability $1-\kappa$, $p_s^w = p_L^w$ and so they do not. Also, assume a combination of values of β and p_H^w sufficiently large that the revolution constraint binds for $s = H$. In state $p_s^w = p_H^w$, for $\kappa > \overline{\kappa}$, there exists a unique status quo price, p^{sq}, that entails a compromise between the two groups in the sense that: (i) $\hat{p}_H^{\varepsilon} > p^{sq} > \hat{p}_H^{\rho}$; (ii) $W^{\rho}\left(\hat{p}_H^{\rho}\right) > W^{\rho}(p^{sq}) > W^{\rho}(\hat{p}_H^{\varepsilon})$; and (iii) $W^{\varepsilon}(\hat{p}_H^{\varepsilon}) > W^{\varepsilon}(p^{sq}) > W^{\varepsilon}\left(\hat{p}_H^{\rho}\right)$.*

This result extends Proposition 3 of Zissimos (2017) to the present setting where the world price p_s^w fluctuates between p_L^w and p_H^w. It shows that we can characterize the status quo price strictly in terms of the world price, p_H^w, and corresponding preferred price levels, $\hat{p}_H^\varepsilon$ and $\hat{p}_H^\rho$; that is, strictly in terms of outcomes in state $s = H$. The fact that p_s^w varies gives us an extra degree of freedom relative to Proposition 3 of Zissimos (2017) that we can introduce to ensure that the revolution constraint binds. This will be useful in endogenizing the threat of revolution to a world price shock.

Proposition 2 says that p^{sq} involves a compromise in the following sense. Feasibility establishes that over $\kappa > \overline{\kappa}$ the elite could induce an even higher level of welfare for the ROS than they could attain under revolution, by setting $p_H^\varepsilon = \hat{p}_H^\rho$. But in fact the elite only have to set $p_H^\varepsilon = p^{sq}$ to make the ROS just indifferent between living with the status quo and mounting a revolution. Moreover, these two alternatives leave the ROS better off than if the elite simply set trade policy at their own preferred level, $p_H^\varepsilon = \hat{p}_H^\varepsilon$. Hence $\hat{p}_H^\varepsilon > p^{sq} > \hat{p}_H^\rho$ and $W^\rho\left(\hat{p}_H^\rho\right) > W^\rho\left(p^{sq}\right) > W^\rho\left(\hat{p}_H^\varepsilon\right)$. And, by Stolper-Samuelson consistency, any improvement in ROS welfare through lower agricultural prices comes at a cost to the elite. Hence $W^\varepsilon\left(\hat{p}_H^\varepsilon\right) > W^\varepsilon\left(p^{sq}\right) > W^\varepsilon\left(\hat{p}_H^\rho\right)$.

5.3 Endogenizing the Threat of Revolution to a World Price Shock

We will now relax the assumption that news of the world price shock, in and of itself, enables the ROS to resolve their collective action problem and mount a revolution. Let us revert to our original assumption that ROS can mount a revolution in any period, and if they do so then it will be successful for sure. Our aim in reverting to our original assumption is to attain conditions for the same characterization of equilibrium as already established, while endogenizing the threat of revolution to $p_s^w \in \{p_L^w, p_H^w\}$. Our approach will be to attain conditions under which the revolution constraint binds only if $p_s^w = p_H^w$, and not if $p_s^w = p_L^w$.

We already know that the condition for the revolution constraint to bind when $s = H$ is given by $V^\rho\left(R|\, 0, H\right) > \widetilde{V}^\rho\left(E|\, 0; H\right)$: see (7). At the same time, for the revolution constraint *not* to bind for $s = L$, we require that,

$$\widetilde{V}^\rho\left(E|\, 0; L\right) > V^\rho\left(R|\, 0, L\right), \tag{9}$$

In the appendix, which contains the proof of the following lemma, we show that for $p_s^w = p_L^w$

and revolution sufficiently costly, the revolution constraint does not bind and so the elite do not face a commitment problem. On the other hand, for $p_s^w = p_H^w$ and p_H^w sufficiently high, the revolution constraint does bind, and so the elite do face a commitment problem. The key to this result is that we can set β sufficiently small that (9) holds, while at the same time setting p_H^w sufficiently high that (7) holds. Hence, if and only if $p_s^w = p_H^w$ the elite do face a commitment problem and can credibly commit to set $p_H^\varepsilon = \hat{p}_H^\rho$ in order to defuse the threat of revolution. Our analysis is summarized as follows.[23]

Lemma 2. *Fix a value of ψ sufficiently small that the left hand side of (9) is positive. Then there exists a value of β sufficiently small that (9) holds, and a value of p_H^w sufficiently large that (7) holds.*

Now equilibrium can be characterized, as in the next result.

Proposition 3. *Assume values for β, ψ, and $p_L^w < p_H^w$, such that (7) and (9) hold. For $\kappa \neq \overline{\kappa}$ there exists a unique pure strategy MPE with the following characteristics. For any value of $\kappa \neq \overline{\kappa}$:*
(i) If $p_s^w = p_L^w$, the elite face no threat of revolution and so adopt their preferred price level, $\hat{p}_L^\varepsilon$;
(ii) If $p_s^w = p_H^w$ then the elite do face a threat of revolution and
(a) if $\kappa < \overline{\kappa}$ then the elite face a commitment problem, and so will respond by extending the franchise;
(b) if $\kappa > \overline{\kappa}$ then the elite do not face a commitment problem, and so will respond to the threat by temporarily setting the status quo price, p^{sq}, using trade policy.

This result extends Proposition 5 of Zissimos (2017) to the present setting. It shares with the earlier result the feature that a high threat state requires the elite to respond in order to avoid a revolution. In case (iia), $\kappa < \overline{\kappa}$ so the elite do face a commitment problem. Hence they must respond to the threat of revolution by extending the franchise. In case (iib), $\kappa > \overline{\kappa}$ and so the elite do not face a commitment problem and hence can neutralize the threat of revolution by setting p^{sq}; they can use trade policy to maintain the status quo.

There is, however, a significant innovation in this result over and above that of Proposition 5 of Zissimos (2017). In the present result, the threat of revolution is endogenous to the world

[23] For a proof of Lemma 2, see Appendix A.1.

food price shock. This can be understood using Figure 1. The fact $\widetilde{V}^{\rho}(E|\,0;L) > V^{\rho}(R|\,0,L)$ for $s = L$ says that the intercept of $\widetilde{V}^{\rho}(E|\,\kappa;L)$ lies above the intercept of $V^{\rho}(R|\,\kappa,L)$, and so $\widetilde{V}^{\rho}(E|\,\kappa;L)$ lies everywhere above $V^{\rho}(R|\,\kappa,L)$. Thus, the commitment problem never arises for $s = L$, and there is no threat of revolution. It is only when $s = H$ and hence $V^{\rho}(R|\,0;H) > \widetilde{V}^{\rho}(E|\,0;H)$ that the threat of revolution can arise, in turn creating the commitment problem for the elite.[24] This is significant since the prior literature (starting with AR, and including Zissimos 2017) assumes that the threat of revolution arises exogenously. Our approach offers a way to link the threat of revolution to observable causes, where this was impossible previously.[25]

It is also worth noting a further difference between Proposition 3 of this paper and Proposition 5 of Zissimos (2017). In Zissimos (2017), policy is the only source of variation in welfare, and the low threat state is associated with a low level of welfare because in that state the elite can set with impunity a policy that is relatively bad for the ROS. In the present setting, differently from Zissimos (2017), there are two sources of variation: the world price level itself, and the policy response to the world price level.

Here, differently from Zissimos (2017), the ROS's welfare may be higher in $s = L$ than in $s = H$ because the world price level is more favorable to them. Surprisingly, the fact that the ROS's welfare may be lower in $s = H$ than $s = L$ turns out not to change the basic logic of the argument. The logic of the argument rests, instead, on how relative levels of welfare under democracy, revolution, and the status quo of elite rule vary with κ, and this relationship is found to be the same in the present setting as it is in Zissimos (2017) despite the variation in world

[24] From this we can also see why the MPE and SPE coincides. Suppose to the contrary that there were also a set of trigger strategy equilibria under which a dictatorship might commit to export taxes even in low price periods. But from the discussion, we can see that the elite cannot credibly commit to set anything other than $\hat{p}_L^{\varepsilon}$ in low threat states. Only in a high threat state can the elite credibly commit to set an export tax. It follows that only state dependent strategies are viable on the equilibrium path, which by definition are those that support MPE.

[25] Acemoglu and Robinson (2017) show, in the same model as AR, that there also exists a mixed strategy MPE. They are perfectly up-front about the fact that they overlooked this possibility in AR; Zissimos (2017) overlooked it as well. The mixed strategy MPE relies on the possibility of a Markovian deviation from the pure strategy MPE whereby, when the elite are faced with the threat of revolution and a commitment problem, they renege on their promise to extend the franchise with some probability, promising instead to extend the franchise next time the threat of revolution arises. If the ROS can also play a mixed strategy, it is rational for them only to go through with the revolution with some probability. The same logic would carry over to the present setting as well. Then, there would exist a range of the parameter space immediately below $\overline{\kappa}$ over which a revolution could occur with some probability on the equilibrium path. However, if we assume that there is sufficient momentum behind the threat of revolution that, in the face of a commitment problem, revolution can only be stopped by an extension of the franchise, then the elite's Markovian deviation does not arise on the pure strategy MPE path. We adopt this assumption to simplify the characterization of equilibrium because the main focus of our theoretical and econometric analysis is on the region of the parameter space above $\overline{\kappa}$.

prices.[26]

6 Democracy with Protection for Sale

We will now consider an extension to the above model whereby the outcome under democracy follows GH's approach to the determination of trade policy. We adopt the GH framework because it captures the interaction between the influence of voters and interest groups over the determination of trade policy, in a model where democracy is assumed to be consolidated. But, for consistency with the framework developed above, we adapt the GH model to incorporate the above underlying H-O structure, thus developing our GHHO model.

Assume that the economy is the same as in Section 2, reflecting in particular the structure set out in Sections 2.1 and 2.2. But instead of the policy outcome under democracy reflecting the preferred price level for ROS, $\hat{p}_t^{\rho}$, as determined by (3), we will adopt GH's use of a menu auction to determine the price level that arises under democracy. We will refer to this as $\hat{p}_t^{GH}$.[27]

Under GHHO, we will make two alternative assumptions to those made above. First, we will assume that democratization implies the installation of domestic fiscal capacity. In contrast to the set of outcomes that we consider above, this revised set-up will make trade policy subsidies possible because they can be funded using domestic taxation. Domestic fiscal capacity also facilitates direct redistribution between groups ε and ρ.

Second, we will assume that the elite have privileged access to government, and they use this access to lobby the government over trade policy. The ROS will have no such access and hence cannot lobby. This assumption reflects widespread recognition that a former ruling elite are able to manipulate political institutions to maintain the division of economic rents in their favor even after democratization has taken place (Acemoglu and Robinson 2008).[28]

[26] To see this, compare Figure 1 above to Figure 3 of Zissimos (2017). This comparison shows that the relative relationships between ROS payoffs to democracy, revolution, and the level of welfare that the elite can feasibly induce for ROS are the same. The difference is that whereas here the payoffs to extending the status quo and revolution are decreasing in κ, in Zissimos (2017) they are constant. The reason is that here the payoffs to ROS of both outcomes are decreasing in p_H^w, the probability of which is increasing in κ, whereas in Figure 3 of Zissimos (2017) p^w does not change. Moreover, Figure 1 shows that the maximum expected welfare that the elite can feasibly induce for the rest of society is decreasing in κ while in Figure 3 of Zissimos (2017) it is increasing. In fact here it can be increasing or decreasing, depending on the relationship between $\hat{p}_L^{\varepsilon}$ and $\hat{p}_H^{\rho}$.

[27] This economic structure is different to that of GH. They characterize the economy as a specific-factors model.

[28] Our assumption that a land-owning elite transcends dictatorship and democracy is of course stylized, in order to focus on the role of the form of government in policy formation. At the same time, it is a reasonable characterization for some old world democracies such as England. Shrubsole (2019) finds that half of the land

6.1 Trade Policy under Democracy as Protection for Sale

Using (1) and (2), trade policy under GMMO takes the form

$$\hat{p}_t^{GH} = p_t^w + \frac{\theta}{\theta + \alpha}\left(\gamma_t^{\varepsilon} - 1\right)\frac{x_{\varepsilon t}}{-m'_{\varepsilon t}}.$$

As can be seen by comparison with (3), the terms in $x_{\varepsilon t}$, $-m'_{\varepsilon t}$ and γ_t^{ε} are common to $\hat{p}_t^{\varepsilon}$ and $\hat{p}_t^{GH}$, facilitating comparison between the outcomes of the two models. The first key difference between $\hat{p}_t^{\varepsilon}$ and $\hat{p}_t^{GH}$ is that for the latter, the size of the trade policy is increasing in the elite population share, θ, because this results in an increase in lobby contributions in favor of that policy. But, the second key difference is that the size of the policy is reduced by an increase in the weight placed on national welfare, α, because national welfare is maximized at free trade. We will resume our assumption that in any period t, the state is $s \in \{L, H\}$ with world price $p_s^w \in \{p_L^w, p_H^w\}$. Accordingly, we have $\hat{p}_s^{GH} \in \{\hat{p}_L^{GH}, \hat{p}_H^{GH}\}$.

It may seem surprising that for GMMO, $\hat{p}_s^{GH}$ is similar to $\hat{p}_s^{\varepsilon}$ while, by assumption, in our specification above the preferred price level under democracy is $\hat{p}_s^{\rho}$. This reflects our assumption under GMMO, that it is the elite who are able to lobby government while the ROS cannot. Moreover, under GMMO and all else equal, with domestic fiscal capacity the elite may realize a trade policy outcome $\hat{p}_s^{GH}$ that is even more favorable to them than under dictatorship. This happens because, by Proposition 1(i), in the absence of domestic fiscal capacity and with a comparative advantage in good ε, $\hat{p}_s^{\varepsilon} = p_s^w$ will be implemented as free trade, while $\hat{p}_t^{GH} > p_s^w$ will be implemented as an export subsidy.

However, in the presence of domestic redistributive taxation, the fact that $\hat{p}_t^{GH} > p_s^w > \hat{p}_s^{\rho}$ does not necessarily imply that the elite are better off under GMMO than elite rule. And, crucially, it does not imply that the ROS are worse off than under elite rule. It is possible that domestic redistributive taxation, facilitated by domestic fiscal capacity, leaves the ROS better off overall, and the elite worse off, than under elite rule.

To model domestic redistributive taxation, we follow AR. We will say that, with domestic fiscal capacity installed, the government can impose a lump-sum tax (measured in units of the numeraire) on the income of either group and transfer part of the proceeds to the other group. Given that the median voter is a member of ROS in our model, in equilibrium such transfers

mass of England is owned by 25,000 landowners, which is less than 1 percent of the population. He concludes: "Land ownership is astonishingly unequal, heavily concentrated in the hands of a tiny elite."

would always be from the elite to ROS. The rest of the proceeds from lump-sum taxation are used to fund any trade policy subsidies, as is standard in models of trade policy.

Following AR, we will say that there is a ceiling to the lump-sum tax. This is based on the assumption that the elite can and will hide or obfuscate their income if tax is above the ceiling. We will assume that the maximum income tax is such that $W^{\rho}\left(\hat{p}_s^{GH}\right) > W^{\rho}\left(\hat{p}_s^{\rho}\right) > W^{\rho}\left(\hat{p}_s^{\varepsilon}\right)$. That is, even though food is more expensive under $\hat{p}_s^{GH}$ than $\hat{p}_s^{\rho}$, the income transfers through domestic redistributive taxation are more than enough to compensate. So the ROS have an incentive to set the income tax at the ceiling under GMMO.

We will further assume that $W^{\varepsilon}\left(\hat{p}_s^{\varepsilon}\right) > W^{\varepsilon}\left(\hat{p}_s^{GH}\right)$. That is, even though $\hat{p}_s^{GH}$ implies a higher level of gross factor income than $\hat{p}_s^{\varepsilon}$ for the elite, domestic redistributive taxation brings elite net income and welfare below the level they would obtain under dictatorship. So the elite are unambiguously better off under dictatorship and hence resist extending the franchise unless forced to by the threat of revolution.

6.2 Characterization of Equilibrium with Democracy as Protection for Sale

Characterization of equilibrium follows the same basic approach as in Section 5, except that here we substitute the features of GMMO in all circumstances where the outcome is democracy. This approach alters the sequence of events as follows. Within a period, the first and second stages are the same as those set out in Section 5, but the third and fourth stages are extended as follows. At the third stage, it is still the case that if the elite have not extended the franchise then the ROS decide whether or not to mount a revolution: if they do so it is successful for sure, leading to democracy. But now, as soon as democracy is established, domestic fiscal capacity is installed and is available for use by the government. At the fourth stage, if there is democracy then not only trade policy p_t is set by the median voter (a member of the ROS because they are in the majority) but domestic fiscal policy is set by the median voter as well, as described in the previous subsection.

Reflecting these changes to the sequence of events, in the payoffs to extension of the franchise and revolution, (4) and (5), we will replace every occurrence of $\hat{p}_s^{\rho}$, $W^{\rho}\left(\hat{p}_s^{\rho}\right)$ and $W_R^{\rho}\left(\hat{p}_s^{\rho}\right)$ with $\hat{p}_s^{GH}$, $W^{\rho}\left(\hat{p}_s^{GH}\right)$ and $W_R^{\rho}\left(\hat{p}_s^{GH}\right)$ respectively. There is no change to the payoff to elite rule (6), because nothing has changed about the policy environment under elite rule. Under GHHO, we

will denote democracy achieved through an extension of the franchise by D^{GH}, and democracy achieved through revolution by R^{GH}. The corresponding payoffs to a member of group j in state s are then denoted by $V^j\left(D^{GH}\middle|\,\kappa;s\right)$ and $V^j\left(R^{GH}\middle|\,\kappa;s\right)$, respectively.

Figure 2 characterizes equilibrium when democracy is represented by GHHO, and compares this to the equilibrium outcome under our original specification of democracy. The original lines, $V^\rho\left(R|\,\kappa;H\right)$ and $\widetilde{V}^\rho\left(E|\,\kappa;H\right)$ are shown, and define the location of $\bar{\kappa}$ as in Figure 1. In addition, the new lines $V^\rho\left(D^{GH}\middle|\,\kappa;H\right)$ and $V^\rho\left(R^{GH}\middle|\,\kappa;H\right)$ are shown. Note that $V^\rho\left(D|\,\kappa;H\right)$ has been removed to avoid clutter. From this figure, we can see that $V^\rho\left(D^{GH}\middle|\,\kappa;H\right) > V^\rho\left(D|\,\kappa;H\right)$ and $V^\rho\left(R^{GH}\middle|\,\kappa;H\right) > V^\rho\left(R|\,\kappa;H\right)$. We can also see that $\widetilde{V}^\rho\left(E|\,\kappa;H\right)$ is unaffected.

Figure 2 illustrates the key insight that arises from specifying democracy using the GHHO model. Denoting the value of κ at which $V^\rho\left(R^{GH}\middle|\,\kappa;H\right) = \widetilde{V}^\rho\left(E|\,\kappa;H\right)$ by $\overline{\kappa}^{GH}$, we can see that $\overline{\kappa}^{GH} > \overline{\kappa}$. That is, the parameter range for which the commitment problem exists is larger under GHHO than under our original specification of democracy. This stands to reason. Because GHHO entails a higher payoff to the ROS than under our original specification of democracy, the parameter space for which the elite can forestall it is smaller. The broader implication is that, the better democracy is for ROS, the harder it is for the elite to forestall.

Figure 2 does not show the key feature of trade policy under GHHO that will be important in our econometric examination of the model's predictions. As discussed above, if the country has a comparative advantage in good ε, trade policy under GHHO is characterized by an export subsidy, because trade policy subsidies are possible in the presence of domestic fiscal capacity. This contrasts with our original specification of democracy where, in the absence of domestic fiscal capacity, export policy is either at free trade or entails an export tax. We will see that the specification of export subsidies under democracy predicted by GHHO is reflected in the data.

7 Endogenous Absence of Domestic Fiscal Capacity

We can now show that the absence of domestic redistributive fiscal capacity is an endogenous outcome under dictatorship. To do so, go back to the basic economic model that we introduced in Section 2, but introduce to this the domestic redistributive fiscal capacity for lump-sum taxation that featured in our GHHO model of Section 6.

In Section 4, we assumed that the game is initialized with the assumption that in period 0

there is elite rule, E. Now assume that in stage 0 the elite can decide whether or not to introduce domestic redistributive fiscal capacity through which lump-sum transfers can be made between the elite and the ROS more efficiently than using trade policy. To all subsequent stages of the game, wherever a policy-maker gets the opportunity to set tariffs, allow them to use the domestic redistributive fiscal capacity to set a lump-sum tax as well. Assume for simplicity that under democracy there is domestic redistributive fiscal capacity, either because the elite have installed it already or because the ROS install it as soon as democratization takes place.

If the elite choose to install domestic redistributive fiscal capacity in stage 0, there are three effects on the payoffs of the game, two of which are illustrated in Figure 2, the third going beyond Figure 2. First, the payoff to the ROS under democracy is now even higher than under GHHO. This is because there is the same lump-sum redistribution between the elite and the ROS but, since there is no lobbying, there is no trade policy favorable to the elite, and the ROS do not bear any costs that would have been associated with this.[29] The payoff to revolution increases in a way that is proportional to the higher level of income under democracy. Hence, both the payoff to democracy and revolution are shifted up relative to the payoffs associated with no domestic fiscal capacity, in the same qualitative way as is illustrated in Figure 2.

The third effect, not illustrated in Figure 2, relates to the payoff to ROS from maintaining the status quo of elite rule. With domestic redistributive fiscal capacity installed under dictatorship, the elite can now feasibly offer to raise the payoff to the ROS under a world price shock. So, differently to the case illustrated in Figure 2, the payoff to maintaining the status quo shifts up as well. However, by construction, it cannot shift up by as much as the payoff to democracy and revolution.

As a result of these effects, the value of $\bar{\kappa}$ necessarily shifts to the right, increasing the range of the parameter space over which the elite would face a commitment problem in the event of a world price shock. Recall that the value of $\bar{\kappa}$ is determined by the intersection between the payoff to revolution and the payoff to maintaining the status quo. It is the fact that the payoff to revolution increases by more than the payoff to maintaining the status quo that implies $\bar{\kappa}$ must shift right. This in turn increases the range of the parameter space for which the elite will not be able to forestall democratization using trade policy, leaving them no option but to

[29] There is no lobbying because there is no menu auction under this specification of the game.

extend the franchise.[30]

Since the elite are unambiguously worse off under democracy than under elite rule, they will never undertake an action that would increase the probability of this outcome. Hence, even if the elite have the option to install domestic redistributive fiscal capacity, they will always choose not to do so. Hence, even though we have changed the game to introduce the possibility of the elite introducing the installation of domestic fiscal capacity, the characterization of equilibrium will be identical to that of Proposition 3, whereby domestic fiscal capacity is not installed and the elite only use trade policy on the equilibrium path.

We can now characterize the endogenous absence of domestic redistributive fiscal capacity under dictatorship as follows.

Proposition 4. *Assume values for β, ψ, and $p_L^w < p_H^w$, such that (7) and (9) hold. In addition, assume that in Stage 0 the ruling elite can choose to install domestic redistributive fiscal capacity. On the equilibrium path, the elite choose not to install domestic redistributive fiscal capacity, and the characterization of equilibrium is identical to that of Proposition 3.*

This result is significant because it relaxes our assumption that the ruling elite use only trade policy and establishes this as an endogenous outcome. It defines more starkly the dichotomy in institutional environments between dictatorship under democracy. Given the potential threat to elite rule under a world price shock, it is clear that an absence of domestic fiscal capacity is instrumental to dictatorship because it helps them sustain their rule. This draws a more clearly defined distinction between the institutional environments of dictatorship and democracy respectively.

8 Comparative Advantage and Policy Responses

Observe that the above characterizations of equilibrium are independent of the good for which the country has a comparative advantage. In this section we first characterize equilibrium policy for the case of a comparative advantage in good ε. For concreteness and simplicity, we will do this for our original characterization of equilibrium, under the assumption of no domestic fiscal

[30]Note that during periods where there is no world price shock, and the elite face no threat of revolution, they could use the fiscal capacity to tax the ROS. In principle, this effect could be large enough to shift the ROS payoff lower than without domestic redistributive capacity, giving rise to a shift of $\bar{\kappa}$ to the left. We rule out this possibility by assuming that ROS per-capita income is sufficiently small to be hidden easily.

capacity. Based on the same equilibrium characterization, we will then discuss an ambiguity over policy that arises for a comparative advantage in good ρ. We will focus on trade policy under dictatorship since trade policy under democracy is well understood in the literature.

8.1 Comparative Advantage in Good ε

Recall that, without loss of generality, trade policy is applied to good ε. So with a comparative advantage in good ε, the trade policy is either an export tax or an export subsidy. We will obtain clear indicative predictions by restricting attention to a situation where there is no domestic fiscal capacity. Recall from Proposition 1(i) that, in the absence of domestic fiscal capacity, with a comparative advantage in good ε, $\hat{p}^{\varepsilon} = p^{w}$ while $p^{a} \leq \hat{p}^{\rho} < p^{w}$. In other words, the elite's preferred price level implies free trade while that of the ROS implies an export tax. We will use this result in conjunction with the characterization of equilibrium that we obtained in Proposition 3. Also, because in our econometric implementation we want to examine elite policy responses to a world price shock, the discussion in this section will focus on the situation where the elite do not face a commitment problem and so they can use trade policy to maintain the status quo. Accordingly, we restrict the parameter space to the range where $\kappa > \overline{\kappa}$.

Now let us consider how the equilibrium price levels predicted by Proposition 3 will translate into trade policies. With group ε in power, the formula for an ad valorem export tax set in state s takes the form $\tau_{s}^{EX} = \left(p_{s}^{\varepsilon} - p_{s}^{w}\right)/p_{s}^{w}$. We know from Proposition 3 that: if $p_{s}^{w} = p_{L}^{w}$, the elite set $\hat{p}_{L}^{\varepsilon} = p_{L}^{w}$; if on the other hand $p_{s}^{w} = p_{H}^{w}$ then while the elite's preferred price level is $\hat{p}_{H}^{\varepsilon} = p_{H}^{w}$, they must set the status quo price, p^{sq}, in order to prevent a revolution. And we know from Proposition 2 that $\hat{p}_{H}^{\varepsilon} > p^{sq} > \hat{p}_{H}^{\rho}$, so $p_{H}^{w} > p^{sq}$. Using the equilibrium values determined above in the formula for an export tax, we therefore have $\tau_{L}^{EX} = 0$ and $\tau_{H}^{EX} = \left(p^{sq} - p_{H}^{w}\right)/p_{H}^{w} < 0$. This implies there will be free trade in the low threat state, and an export tax in the high threat state.

Proposition 5. *Assume parameter values as in Proposition 3, $\kappa > \overline{\kappa}$, and a comparative advantage in good ε. There exists a unique pure strategy MPE with the following characteristics: if $p^{w} = p_{L}^{w}$, then the elite face no threat of revolution and so adopt their preferred trade policy of free trade, $\tau_{L}^{EX} = 0$; if $p^{w} = p_{H}^{w}$ then the elite do face the threat of revolution and prevent revolution by setting p^{sq} using an export tax, $\tau_{H}^{EX} = \left(p^{sq} - p_{H}^{w}\right)/p_{H}^{w} < 0$.*

We see from Proposition 5 that, with a comparative advantage in good ε, trade policy will switch between free trade and an export tax, according to whether $p_s^w = p_L^w$ or p_H^w.

It is worth noting a qualification to the prediction arising from Proposition 3 that will be relevant when we take our model to the data. The assumption we have been maintaining here is that the elite do not need to raise any fiscal revenues for public finance purposes.

The model could easily be extended to accommodate the need to raise a fixed amount of revenue for these purposes. In that case, instead of $\hat{p}_H^\varepsilon$ being at a corner solution of free trade as in Proposition 3, the prediction would be that $\hat{p}_H^\varepsilon$ is at a corner solution that implies an export tax sufficient to raise just enough revenue to cover the public finance requirements. The solution for $\hat{p}_H^\rho$ would be adjusted correspondingly.

Providing the fiscal revenue requirement was sufficiently small, the basic feature of Proposition 2 that $\hat{p}_H^\varepsilon > p^{sq} > \hat{p}_H^\rho$ would be preserved. Accordingly, the prediction would be that, in the low threat state the export tax would be positive but relatively low (but not free trade as in Proposition 5), and there would be an increase in the export tax from that level in the high threat state. Thus, the basic prediction obtained from Proposition 5, that the elite increase export taxes in the high threat state to prevent a revolution, is preserved when the elite use export taxes to raise revenues for public finance purposes.

8.2 Comparative Advantage in Good ρ

With a comparative advantage in good ρ, the trade policy is either an import tariff or subsidy. To obtain clear cut predictions, we will continue to assume that there is no domestic fiscal capacity. Then by Proposition 1(ii), with a comparative advantage in good ρ, $\hat{p}_s^\rho = p_s^w$ while $p_s^w < \hat{p}_s^\varepsilon \leq p^a$. In this case, it is the ROS's preferred price level that implies free trade, whereas that of the elite implies an import tariff. As in the previous subsection, our approach will be to combine this result with the characterization of equilibrium in Proposition 3, while restricting the parameter space to the range where $\kappa > \overline{\kappa}$.

From the characterization of equilibrium in Proposition 3: if $p_s^w = p_L^w$, the elite set the import tariff consistent with $\hat{p}_L^\varepsilon$; if on the other hand $p_s^w = p_H^w$ then while the elite's preferred price level is $\hat{p}_H^\varepsilon$, they must set the status quo price, p^{sq}, in order to defuse the threat of revolution. And we know from Proposition 2 that $\hat{p}_H^\varepsilon > p^{sq} > \hat{p}_H^\rho$. With the elite in power,

the formula for an ad valorem import tariff set in state s takes the form $\tau_s^{IM} = (p_s^{\varepsilon} - p_s^w)/p_s^w$. Using the equilibrium values determined above, we therefore have $\tau_L^{IM} = (\hat{p}_L^{\varepsilon} - p_L^w)/p_L^w$ and $\tau_H^{IM} = (p^{sq} - p_H^w)/p_H^w$, which in general implies positive import tariffs in both high and low threat states.

Note that, unlike for a comparative advantage in good ε, for a comparative advantage in good ρ we cannot say anything about the relative sizes of import tariffs τ_L^{IM} and τ_H^{IM}. Ambiguity is introduced because, although we know that $\hat{p}_H^{\varepsilon} > p^{sq}$, we do not know the relationship between $\hat{p}_L^{\varepsilon}$ and p^{sq}. And even if we did know this, we would need to know how p^{sq} changes relative to p_H^w and p_L^w in order to determine the relationship between τ_L^{IM} and τ_H^{IM}. Therefore, although the analysis provides us with an understanding of how τ_L^{IM} and τ_H^{IM} are determined, it cannot tell us about their relative magnitudes. The analysis is summarized as follows.

Proposition 6. *Assume parameter values as in Proposition 3, $\kappa > \overline{\kappa}$, and a comparative advantage in good ρ. There exists a unique pure strategy MPE with the following characteristics: if $p_s^w = p_L^w$, then the elite face no threat of revolution and so adopt their preferred trade policy of $\hat{p}_L^{\varepsilon}$, by setting a positive import tariff $\tau_L^{IM} = (\hat{p}_L^{\varepsilon} - p_L^w)/p_L^w$; if $p_s^w = p_H^w$ then the elite do face the threat of revolution and defuse this by setting p^{sq} using an import tariff, $\tau_H^{IM} = (p^{sq} - p_H^w)/p_H^w$. The size of τ_L^{IM} relative to τ_H^{IM} is ambiguous.*

As a result of the ambiguity in the size of τ_L^{IM} relative to τ_H^{IM} brought to light by this result, we do not have a clear cut testable prediction to take to the data for the case of import tariffs.

9 Data and Econometric Design

9.1 From Theory to Empirics

Our econometric implementation focuses on the range of the parameter space where the elite do not face a commitment problem. As discussed above, in this range, although a world price shock gives rise to the threat of revolution, the elite are able to use trade policy to defuse this threat and forestall democratization. In formal terms, we maintain the assumption from Section 8 that $\kappa > \overline{\kappa}$. As we learned from Propositions 5 and 6, the model's predictions for how the elite set trade policy are distinctly different for a comparative advantage in goods ε and ρ respectively. Proposition 5 dealt with good ε, and showed that the elite will respond to the threat of revolution

in a clear cut way, by increasing export taxes. Proposition 6 dealt with good ρ, and showed that in this case the elite's response using import tariffs is ambiguous. Therefore, our econometric implementation will focus on dictatorships that export food products. Following Proposition 5 we will look for evidence in the data that, in response to a world food price shock, these countries increase export taxes.[31]

9.2 Data

The dependent variable in our analysis is the nominal rate of assistance (NRA) afforded by governments to agricultural exports. This is apt for a study focused on export taxes in agriculture. The NRA for an agricultural product is the percent difference, due to policies, in gross returns to producers compared to what they would have been without the government's intervention. Taking the world price as a reference, a product's NRA is positive when a policy raises the product's price above the world price and negative when a policy lowers the product's price below the world price. Net exports determine whether a good is an exportable for the purpose of inclusion in the NRA. Then the overall NRA is a production-weighted average of individual exports.[32] For an exported good, a positive NRA amounts to subsidizing the export, while a negative NRA to taxing it.

We draw on the ambitious measurement of NRAs spanning over seventy countries and six decades, 1960-2010, by Anderson and Valenzuela (2008) and Anderson et al. (2008). The NRA price distortion measures are theoretically encompassing, and include a range of instruments: domestic and trade policy instruments such as border price supports, exchange rate distortions, production subsidies and taxes, and input price distortions. However, the predominant distorting influences contained in the nominal rates of assistance (NRAs) are border distortions and not domestic distortions (Anderson et al. 2008).

Suppose the government of Egypt taxes its exports of rice with an ad valorem tax. This is measured as a negative value of the subsidy, s_x. The subsidy would be precisely measured by

[31] We have undertaken econometric analysis on import tariffs that parallels our analysis of export taxes. For import tariffs, we fail to obtain clear-cut results. We interpret this outcome as reflecting the ambiguity in the theoretical predictions concerning import tariffs exhibited in Proposition 6.

[32] For food products such as grains, cereals and tuberous vegetables, if a country is a net exporter then its imports of that product are minimal, and vice versa for imports. Anderson and Valenzuela (2008) carefully determine whether a particular product is an export or an import.

the NRA, operationally defined as

$$NRA = \frac{E \times P(1 + s_x) - E \times P}{E \times P}, \tag{10}$$

where E is the Egyptian pound (or Livre Égyptienne, shortened to LE) per US dollar (USD) rate and P is the price in LE of Egyptian rice on the international market. Taking this formula to the field requires determining the domestic LE price received by the Egyptian rice producer at the farmgate, $P(1 + s_x)$. Anderson et al.'s (2008) NRA measures are the product of detailed field studies used to determine the domestic price of agricultural products at the farmgate. In our example, if the tax is the sole distortion, the NRA on rice exports computes to $s_x < 0$. The ad valorem equivalent of a government-imposed ban on exports of a commodity may be computed using (10) once field work determines the farmgate price $P(1 + s_x)$. If rice exports were subsidized instead, then $s_x > 0$.

Anderson et al. carefully account for exchange rate distortions which have often been used by developing countries as a redistributive policy instrument. Domestic prices are converted to US dollars using market foreign exchange rates, or multi-tiered exchange rates, or shadow exchange rates estimated in other studies to take into account any distortions to the foreign exchange market.[33] Input and other supply chain distortions are also taken into account in their computations. Details of the methodology are in Anderson (2009, Appendix A). In sum, our dependent variable is a country's overall export NRA, computed by Anderson et al. as the production-weighted average of the country's NRAs on products it exports. They represent the best available border measures imposed by countries on their exports of agricultural products.

Table 1 presents statistics on export NRAs over the 2003-10 period for the countries in our sample. Countries are organized into three categories according to their political institutions, as measured by their Polity IV score (Marshall, Gurr and Jaggers 2013). Polity IV scores measuring the quality of democracies and dictatorships were introduced by Marshall et al. (2002), and remain the most widely used measure of political institutions. Following Marshall et al., a country is classified as belonging to one of three regime types based on its mean Polity IV score over the ten years preceding the sample: for the 2003-10 sample, scores are averaged over 1993-2002. Polity IV scores vary from -10 to +10. A country is assigned to type DEM1 or

[33] Where a country has distortions in its domestic market for foreign currency, the exchange rate relevant for calculating the NRA for a particular tradable product depends, in the case of a dual exchange rate system, on whether the product is an importable or an exportable, while in the case of multiple exchange rates it depends on the specific rate applying to that product each year (Anderson et al. 2008, p. 684).

dictatorship if its mean score lies between -10 and 0, to type DEM2 or partial democracy if its mean is between 1 and 8, and to type DEM3 or liberal democracy if its mean is either 9 or 10. These categorizations are described in greater detail below. A feature of Table 1 is the substantial within-country variation in country NRAs.

9.3 Econometric Design

The quasi-experiment that we focus on is the policy reaction by dictatorships faced with the 2006-08 world food price shock. The 3-year increase in the price of food products started in 2006 (Sumner 2009, Figs. 2, and 3) when corn and wheat prices rose 30%, continuing into 2007, at which point rice prices began their rapid rise, peaking in 2008. The Food and Agriculture Organization (FAO) monthly cereals price index, a weighted average of the international price of corn, rice and wheat using 2002 exports as weights, rose 36% between 12/2005 and 11/2006, then another 36% until 11/2007, and yet another 27% during the six months ending 6/2008 before beginning its descent.[34] We maintain the small-country assumption, a viable assumption given the small size of agricultural exporting nations ruled by dictatorships relative to the world market. We therefore treat the world price shock as exogenous and are interested in whether governments responded as our theory predicts.[35] Specifically, we think of the world price shock as a treatment that occurs in the years 2006-08. We are interested in the population average effect of the world price shock in the population of dictatorships in the first decade of the 2000s (as stated in Appendix B).

We complement this with an analysis of a second quasi-experiment provided by the 1973-74 world food price shocks.[36] Again, we are interested in the population average effect of that world price shock in the population of dictatorships from 1969-78. The fact that the form of

[34] These percentage increases are based on our calculations from the FAO's (2011) monthly Food Price Index (FPI).

[35] Another reason why world price shocks can be taken as exogenous (even if prices may not be) is that they are unpredictable. In a comprehensive study of wheat prices in the US market using monthly price data on wheat futures over 1991-2011, Janzen et al (2014) show that price shocks are driven by fundamentals, largely shocks to current supply. Supply is susceptible to weather-related shocks, and compounded by expectations about future shocks reflected in demand for inventories. They also find little evidence of a co-movement of wheat shocks with shocks in non-agricultural markets, specifically crude oil market shocks. An implication for our study is that predicting food price shocks requires predicting shocks to world market fundamentals – for example, the 2006-08 drought that greatly reduced Australian wheat output. World price shocks may therefore be treated as exogenous to domestic policy, which is a reaction to these shocks.

[36] Sumner (2009, Fig. 4) shows the surprisingly close correspondence in corn price movements during this time period with how corn prices moved during the 2006-08 span. Martin and Anderson (2012) study the widespread imposition of export taxes during both these shocks.

government in some countries changed between the end of the 1970s and the beginning of the 2000s makes the two populations fundamentally different. The populations of countries from which, and circumstances during which, these samples are drawn could produce very different policy responses to the world price shocks. Remarkably, we find the average effect of the world price shock treatments to be qualitatively similar in both populations, in line with the predictions of Proposition 5.

Figures 3 and 4 anticipate the econometric results. Figure 3 depicts the time series of mean NRAs over the sample period 2003-2010, for dictatorships (DEM1) as the blue solid line, partial democracies (DEM2) as the red long-dashed line, and liberal democracies (DEM3) as the green short-dashed line. Figure 3 shows that dictatorships already had a negative mean NRA in the years immediately prior to the 2006-08 world price shock, so they were setting export taxes. Yet, once the world price shocks began, their mean NRA dropped sharply, indicating a sharp increase in export taxes. The case of Pakistan's export restrictions on rice is illustrative. In 2004, Pakistan's exports of rice suffered few distortions. The 2006 world price shock led Pakistan to set low procurement prices for rice, thus heavily taxing the exports of this sector (Dorosh and Salam 2009, and Salam 2009), just as predicted by Proposition 5.

Liberal democracies had an export subsidy regime (NRA > 0) in place. The figure shows a slight decline in export subsidies during the world price shock which turn out to be statistically insignificant. This is in line with the prediction of our GHHO model. The response of partial democracies lay between those of the other two regime types. In the period immediately prior to the shock, they set export subsidies like the liberal democracies. In response to the world price shock, the partial democracies began taxing exports in a way qualitatively similar to dictatorships, but the size of their export taxes was smaller.[37]

Figure 4 shows that similar patterns were observed in the 1970s data, an era when more dictatorships existed than in the 2000s. The export tax responses by the respective regimes to the shock of 1973-74 was similar to those for the 2006-08 shock. A notable feature is that export subsidies by liberal democracies declined sharply in response to the 1973-74, and resumed quickly

[37] At first sight, it is surprising to see export subsidies in place for agricultural products over this period. That is because export subsidies were a key focus of the Agreement on Agriculture that formed part of the Uruguay Round of the GATT, concluded in 1994. However, OECD (2001) notes that among Organisation of Economic Cooperation and Development countries (which overlap extensively with our liberal democracies) even as agreements to reduce export subsidies were reached, the value of exemptions grew to be greater than the value of subsidies that were supposed to be reduced. Our NRA measure captures these exemptions.

afterwards. Therefore, differently from the 2006-08 shock, the behavior of liberal democracies in response to the 1973-74 shock was not what our GHHO model would predict. As we discussed in the Introduction, we interpret this as arising from forces at work during this period that go beyond the scope of our model. In particular, fiscal contractions across many developed countries, starting in 1973 with the first oil price shocks, precipitated reductions in agricultural subsidies across many developed countries (Buttel 1989).

10 Econometric Models and Results

10.1 Econometric Models

In this baseline model, we estimate the treatment effect, τ, to test the hypothesis that governments in dictatorships respond to a world price shock by raising export taxes. We employ the following model with fixed effects to estimate the treatment effect:

$$NRA_{i,t} = \phi NRA_{i,t-1} + \tau I_t^{HIGH} + X_{i,t}B + \eta_i + e_{i,t},$$

where $NRA_{i,t}$ is country i's overall export NRA in year t, η_i are country fixed effects (FE), and panel dynamics are accounted for by the lagged dependent variable $NRA_{i,t-1}$. The vector $X_{i,t}$ includes three control variables: (log) per capita GDP, (log) exchange rates and a linear trend. The assignment indicator is I_t^{HIGH} which equals one for the years during which the world price shock occurred. We are interested in its coefficient τ. With fixed effects, τ equals the within-country mean difference between policy when the world price shock occurred versus when prices were normal, conditional on the regressors. As discussed, we analyze the effect of shocks in two distinct eras: the 2006-08 shock and the 1973-74 shock. Our hypothesis, based on Proposition 5, is that in both eras $\tau < 0$.

The design we have specified to measure treatment effects, even with FE, has been subject to the critique that it lacks a control group that captures the counterfactual. Since the world price shock was experienced by all countries, the counterfactual – dictatorships not subject to the shock – cannot be constructed. But since, according to our GHHO model, liberal democracies should not respond to the world price shock using trade policy, they form a credible comparison group. On the other hand, contrary to the prediction of our GHHO model, democratic governments might also respond in a way similar to dictatorships, perhaps because they fear a loss of political power at the polls.

To account for these possibilities, we explicitly estimate the treatment effect τ for three forms of government: dictatorships, partial democracies and liberal democracies, from the model:

$$NRA_{i,t} = \phi NRA_{i,t-1} + \sum_{d=1}^{3} \tau^d (\text{DEM}d_i \times I_t^{HIGH}) + X_{i,t}B + \eta_i + e_{i,t}.$$

In the econometric model $\text{DEM1}_i = 1$ if country i is a dictatorship, $\text{DEM2}_i = 1$ if i is a partial democracy, and $\text{DEM3}_i = 1$ if i is a liberal democracy. We posit that dictatorships are different from democracies in their response to a world price shock: $\tau^1 < 0, \tau^2 = \tau^3 = 0$.[38] The robustness of these results to different definitions of democracy - based on the foundations upon which Polity IV scores are built - is further explored below. We also test the theory's predictions from the model in first differences (FD) to remove the unobserved effects. These are reported in the Appendix.

Errors are clustered at the country level. This is a fundamental aspect of the econometric model's design. The approach to clustering follows Abadie et al (2023) and its relevance to our model is fully described in Appendix B. To summarize, based on the predictions of Proposition 5, our main hypothesis posits that world price shocks incentivize dictatorships to raise export taxes on agricultural products, which use land intensively in their production. In doing so, their aim is to defuse the threat of revolution.

10.2 Core Results

Table 2 reports coefficient estimates from the OLS-FE models of NRAs to exports from the 2003-10 sample. The first two columns restrict the sample to only dictatorships. The first column includes the lagged dependent variable, log per capita GDP, and a linear trend as regressors and controls for fixed effects. The second column includes the log nominal exchange rate (home currency per dollar indexed to 1995 as the base year). The average treatment effect – the difference between the world price shock and non-price shock NRA, conditional on fixed effects and regressors – is negative and statistically significant in both columns. NRAs in the sample of dictatorships were lower by 9.3 percentage points (second column), on average, during the price-shock years. That is, export taxes were 9.3 percentage points higher than in non-shock years.

[38] As can be seen from this econometric specification, we capture the average treatment effect (the NRA effect) of the world price shock. There is potential heterogeneity of treatment effects across countries if the goods exported by some countries were subject to the world price shock while others were not. However, United Nations (2011) argue that the 2006-08 shock was pervasive across most food staples. They go further and argue that the price of foods more generally were affected by the shock: see Table IV.1.

The FD model yields a stronger response by dictatorships to the world price shock. According to this model, export taxes on agricultural products were 12.5 percentage points higher, on average, during the world price shock years than in non-shock years (see Appendix Table A1) .

Estimates from the full sample of democracies and dictatorships in the third and fourth columns of Table 2 show that the treatment effect for partial democracies was no different from that for dictatorships. Specifically, the interaction of I_t^{HIGH} with the partial democracy indicator shows no statistically significant difference. Moreover, the interaction of I_t^{HIGH} with the liberal democracy indicator shows that here there is a statistically significant difference in export tax-setting behavior between dictatorships and liberal democracies. These differences are confirmed in the final two rows of Table 2, which show the total effects. The penultimate row shows that the shock resulted in a decrease in NRAs, or increase in export taxes, of approximately 8 percentage points for partial democracies, similar in magnitude to the dictatorial policy response. The final row shows that for liberal democracies there was no statistically significant response.

The econometric results for dictatorships and liberal democracies are in line with the predictions of our basic theoretical model of dictatorship, and our GHHO model of democracy. But the result for partial democracies goes against our working hypothesis that liberal democracies and partial democracies respond similarly, and that both respond differently from dictatorships. We find, in fact, that partial democracies and dictatorships respond similarly to the world price shock by raising export taxes, significantly differently from the liberal democracy response.

Table 3 examines the dictatorial response to the world price shocks in 1973-74. The estimates in the second column indicate that dictators increased export taxes by 7.3 percentage points, on average, during the world price shocks. The treatment effect for partial democracies is of a similar magnitude, although it is measured with less precision and not significantly different from zero. The FD model results also show smaller total effects for partial democracies that are statistically insignificant (see Appendix Table A2). The behavior of liberal democracies was different. Although their NRAs dropped substantially, by 20.0 percentage points, this was the result of reducing export *subsidies*, not increasing export taxes. As we discussed in the Introduction, this finding for liberal democracies is not predicted by our GHHO model, and may have arisen due to balance-of-payments considerations that are beyond the scope of our model.

Note that the patterns in our data cannot be explained fully by a terms-of-trade motivation for export policy (Johnson 1953-4, Broda, Limão and Weinstein 2008). The clearest distinction

arises for the case of export bans. While a large exporter could leverage a world price shock to the good that it exported, by increasing its export taxes to increase world prices further still, the terms-of-trade gains would necessarily have to be realized through a positive trade volume. That is, any terms-of-trade gain could only be realized through each unit exported to the world market. Accordingly, an export ban cannot be optimal. Yet numerous studies of the 2006-08 world price shock identify export bans as the modal policy response, shutting down exports completely. (See for example Mitra and Josling 2009, Sharma 2011, Estrades, Flores and Lezama 2017.) Our model can motivate an export ban as a way to defuse the threat of revolution, and so it can be used to rationalize the export bans that were widely observed throughout the 2006-08 world price shock.

10.3 Actual Price as Treatment

Until this point, following our theoretical model, the econometric implementation reflects the feature of equilibrium that there are just two levels of export policy: either free trade or a positive export tax. However, while for $s = L$ the equilibrium policy will always be at the corner solution of free trade, an extension of the theoretical model would allow for the fact that in the high threat state, p^{sq} would respond to fluctuations in the world price level. To see the effect of fluctuations in world prices when $s = H$, we use the FAO FPI but replace I_t^{HIGH} with $FPI_t^{HIGH} = FPI_t \times I_t^{HIGH}$ in the econometric specification.[39] The results, presented in Appendix Table A3, are qualitatively similar to Tables 2 and 3. At the point of the shock, the discontinuity in how elites set policy reflects the threshold in the model, whereby the world price is sufficiently high that mounting a revolution becomes worthwhile for the ROS. The results show evidence of this threshold effect, regardless of whether the world price shock is measured as I^{HIGH} or FPI^{HIGH} (that is, results with I^{HIGH} do not overstate the treatment effect in either 1973-74 or 2006-08).

[39]FPI data are available at: FAOdata. The FPI consists of the average of five commodity group price indices, weighted with the average export shares of each of the groups. In total, 73 price quotations – considered by FAO commodity specialists as representing the international prices of the food commodities – make up the overall index. Each of the five commodity group sub-indices is a weighted average of the price relatives of the commodities included in the group.

10.4 Income or the Form of Government?

Our finding that the response of partial democracies to world price shocks is indistinguishable to that of dictatorships raises the question of whether this is because of something that is common to them, such as lower incomes. Could it be that it is not the form of government, but instead income level, that determines trade policy response to the world price shock?

In Table 4 we investigate the alternative hypothesis that income is the main driver of the trade policy response to a world price shock. We use the three regime-type sub-samples that we have been using so far. In the 2003-10 sample, the mean log incomes were 6.36 (dictatorship), 7.26 (partial democracies) and 9.57 (liberal democracies).[40] We can leave aside the liberal democracies because our GHHO model predicts that they will not respond to the world price shock using trade policy, and that corresponds to our findings for the 2006-08 shock. Two main features emerge from our results.

The first is that dictatorships use trade policy as the model predicts even after the role of income is taken into account in responding to the shock. For reference, the first column of Table 4 is the same as in Table 2 (column 2). The second column in Table 4 shows that the poorer the median citizen, the higher the export tax (i.e. the lower the domestic price) that the elite set in the face of a world price shock. Our model predicts that this response is ambiguous. The intuition for the ambiguity can be grasped from equation (8).[41] Recall that this equation shows the status quo price must be set so that the expected gains from mounting a revolution are equal to zero. One might expect that the lower is ROS income, the more they have to gain from revolution, mandating a higher export tax giving rise to a lower status quo price. But a lower income can also mean that, even after a revolution ROS income would be relatively low and this would mandate a relatively high status quo price. These effects interact in the second term of equation (8). Also, a lower ROS income means a lower payoff from living with the status quo, which mandates a relatively high status quo price. Our results offer a resolution to this ambiguity. Our findings suggest that when ROS income is relatively low, the effects of relatively high gains from revolution and relatively low payoff from living with the status quo tend to dominate, which is what one might expect.

[40] Log incomes ranged between 4.17 to 7.81 (dictators) 5.41 to 9.28 (part dems) and 6.24 to 10.66 (lib dems).

[41] A formal analysis of this ambiguity is somewhat involved, so we do not undertake it in this paper. We pursue this fully in Gawande and Zissimos (2023)

Second, the response of partial democracies is different to that of dictatorships in that the interaction term for the sample of partial democracies is statistically no different from zero. This is what we might expect of countries moving towards creating domestic redistributive fiscal capacity. With such capacity in place, a partial democracy will not need to use inefficient trade policy and handicap their exporters. Furthermore, while the use of export taxes in partial democracies varies with income, the relationship is positive and does not respond to price shocks. This suggests that export policies tend to move from being export taxes, a legacy of dictatorship, towards being export subsidies, a feature of liberal democracy, as income increases. This effect is absent for dictatorships, who only vary trade policy to respond to world price shocks, consistent with our interpretation that they use trade policy primarily to defuse the threat of a revolution.

10.5 Democracy Measures

Are the results in Tables 2 and 3 special to the particular measure of democracy we have adopted? Polity IV scores are built around three latent concepts: executive recruitment, executive constraints, and political competition. We use each of the latent concepts of democracy to provide three further categorizations of countries into dictatorship, partial democracy and liberal democracy. Appendix C describes this exercise in detail.

The results for the 2000s sample are reported in Table 5. Our finding that during the years of the world price shock, dictatorships raise export taxes is robust to these alternative regime-type classification of countries. This indicates the resilience of the finding that the elite in dictatorships do indeed use trade policy to maintain their grip on power. The results are weaker for partial democracies and absent for liberal democracies. When partial democracies are classified according to political competition, one measure affirms the result (classification according to Competitiveness of Participation) while the other (classification according to Political Competition) does not. The total effect for partial democracies, reported in the lower part of the Table 5, is statistically insignificant in the latter classification. Classification of countries according to Competitiveness in Executive Recruiting or according to Executive Constraints also do not produce statistically significant effects for partial democracies. We interpret these results as lending support to our argument that our model of dictatorships predicts behavior that distinct from that of democracies.

11 Conclusion

In addressing the question of 'how' dictators use trade policy to forestall democratization, we have developed a framework that makes it possible to consider the role of exogenous world food price shocks in triggering a threat of revolution, and how dictatorships will respond to the threat using trade policy. The model predicts that when a dictatorship has a comparative advantage in agricultural products and the elite are land owners, they have an incentive to forestall democratization by increasing export taxes. The model also predicts that a democracy with the same underlying economic structure will not have an incentive to change export taxes in the face of a world price shock. We find supportive evidence of these predictions for the world price shocks of 2006-08. We find that democracies change export subsidies in the world food price shocks of 1973-74, and argue that this happened due to balance of payments considerations that go beyond the scope of our model.

In addressing the question of 'why' dictators use trade policy to forestall democratization, we show that given the option to install domestic redistributive fiscal capacity they would choose not to do so, leaving themselves with only trade taxes for this purpose. The surprising insight we gain from our analysis is that increasing the efficiency of redistributive taxation increases the range of the parameter space where the elite face a commitment problem, and hence would be forced to relinquish power and democratize in response to a world price shock. We reach this insight by taking the novel approach of giving the elite the option of installing domestic redistributive fiscal capacity, and then framing their choice in terms of the range of the parameter space for which they face a commitment problem.

A significant feature of our framework is that we are able to characterize policy responses in terms of being 'dictatorial' on the one hand, and 'democratic' on the other. This arises from the fact that we incorporate AR's canonical model of dictatorship and GH's canonical model of democracy within a single economic framework. We can then interpret the responses of the respective regimes as optimizing their choices subject to the constraints that they face from the different groups whose interests they represent: the land-owning elite on the one hand, and the workers on the other. This is a new approach that could usefully be adopted in the wider literature on dictatorship and democratization.

One area where our approach proves useful is in seeking to understand the behavior of

governments who do not fit neatly into the categorization of dictatorship or democracy. In our case, we can use our approach to analyze the partial democracies in our dataset. The theoretical predictions that we derive for dictatorships also seem to predict the actual trade policy responses to world price shocks of partial democracies as well. Based on our analysis, we have a concrete basis in which to say that even though these countries have sufficient characteristics to be characterized as democratic in Polity IV, they behave like dictatorships in the way that they respond to world price shocks. This could be because they truly are democracies in the sense that power changes hands at the ballot box, but that they have been constrained in their ability to install domestic redistributive fiscal capacity and so have to use trade policy instead. Or it could be that they are not true democracies, and their dictatorial approach to shocks reveals this. Either way, our approach points the way towards a fundamental way to assess policy behavior as dictatorial or democratic, in terms of the political constraints faced by the policymakers who undertake the actions we observe in the data.

Even countries that are fully fledged democracies behave in a way that is considered dictatorial under certain circumstances, and our framework offers a new approach to understanding this type of behavior as well. For example, during the recent Covid-19 pandemic, freedoms normally associated with democracy were eroded across a wide range of countries, including those where it is well established such as the United States (Economist 2020). At the same time, countries like the US were significantly more interventionist in their approach to international trade policy during the pandemic than we would normally expect, for example banning the export of respirators to Canada and Mexico (Bown 2022).[42] Viewed in terms of our framework, we would characterize this approach to trade policy as dictatorial in the sense that we would normally expect a democracy like the US to be able to use the domestic fiscal capacity that they already have installed to address this kind of issue more efficiently. This would then point the way to an examination of the constraints that the US faced in the pandemic, perhaps in terms of the threat to human life imposed by the pandemic together with the limits to industrial capacity to scale up production at that time, as a way to rationalize why a dictatorial approach was appropriate under those circumstances.

[42]Bond (2023) provides a theoretical analysis of why many governments imposed unilateral trade policy actions on pandemic-essential products in response to the COVID-19 pandemic. His analysis shows that a shift in government priorities from those of producers towards those of consumers is the explanation most consistent with the stylized facts.

References

[1] Abadie, A., S. Athey, G.W. Imbens, and J.M. Wooldridge, (2023); "When Should You Adjust Standard Errors for Clustering?" *Quarterly Journal of Economics*, 138(1): 1-35.

[2] Acemoglu, D., S. Johnson, and J. A. Robinson, (2005); "Institutions as a Fundamental Cause of Long-Run Growth." Published in *Handbook of Economic Growth*, ed. Philippe Aghion and Steven Durlauf, 384–473. Amsterdam: North Holland.

[3] Acemoglu, D., and J.A. Robinson, (2000); "Why Did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective." *Quarterly Journal of Economics*, 115: 1167-1199.

[4] Acemoglu, D., and J.A. Robinson, (2001); "A Theory of Political Transitions." *American Economic Review*, 91(4): 938-963.

[5] Acemoglu, D., and J.A. Robinson, (2006); *Economic Origins of Dictatorship and Democracy*, Cambridge University Press, New York, NY.

[6] Acemoglu, D., and J.A. Robinson, (2008); "Persistence of Power, Elites, and Institutions." *Journal of Political Economy*, 98(1): 267-93.

[7] Acemoglu, D., and J.A. Robinson, (2017); "Why Did the West Extend the Franchise? A Correction." Massachusetts Institute of Technology and University of Chicago mimeograph.

[8] Aidt, T.S., and P.S. Jensen, (2009); "Tax Structure, Size of Government and the Extension of the Voting Franchise in Western Europe, 1860–1938." *International Tax and Public Finance*, 16: 160-175.

[9] Anderson, K., ed. (2009); *Distortions to Agricultural Incentives, A Global Perspective, 1955 to 2007.* Washington, DC: The World Bank and Palgrave Macmillan.

[10] Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela, (2008); "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7(4): 675-704.

[11] Anderson, K., and E. Valenzuela, (2008); *Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007.* World Bank, Washington D.C. (Available at www.worldbank.org/agdistortions website).

[12] Atkin, D., and D. Donaldson, (2022); "The Role of Trade in Economic Development." Chapter 1 in G. Gopinath, E. Helpman, and K. Rogoff (eds) *Handbook of International Economics*, Volume 5. Amsterdam, The Netherlands: Elsevier.

[13] Atkin, D., A. Khandelwal, L. Boudreau, R. Dix-Carneiro, I. Manelici, P. Medina, B. McCaig, A. Morjaria, L. Mascali, B. Rijkers and M. Startz (2022); "International Trade." VoxDevLit 4(1), October.

[14] Bellemare, M.F., (2015); "Rising Food Prices, Food Price Volatility, and Social Unrest." *American Journal of Agricultural Economics*, 97(1): 1–21.

[15] Besley, T., and M. Kudamatsu, (2008); "Making Autocracy Work." Chapter 11 in E. Helpman (ed.) *Institutions and Economic Performance*, MIT Press, Cambridge, MA.

[16] Bhattacharya, S., D. Mitra, and M.A. Ulubaşoğlu, (2019); "The Political Economy of Land Reform Enactments: New Cross-National Evidence (1900-2010)." *Journal of Development Economics* 139: 50-68.

[17] Bond, E., (2023); "Pandemics and Trade Policy." Typescript.

[18] Bown, C.P., (2022); "How COVID-19 Medical Supply Shortages Led to Extraordinary Trade and Industrial Policy." *Asian Economic Policy Review* 17: 114–135.

[19] Broda, C., N. Limão, and D. Weinstein, (2008); "Optimal Tariffs and Market Power: The Evidence." *American Economic Review* 98, 5: 2032-65.

[20] Brown, L.R. (2011); "The New Geopolitics of Food." *Foreign Policy*, April 25th, 2011. Available at https://foreignpolicy.com/2011/04/25/the-new-geopolitics-of-food/.

[21] Bueno de Mesquita, B., J.D. Morrow, R.M. Siverson, and A. Smith, (2002); "Political Institutions, Policy Choice and the Survival of Leaders." *British Journal of Political Science* 32: 559-590.

[22] Buttel, F.H., (1989); "The US Farm Crisis and the Restructuring of American Agriculture: Domestic and International Dimensions." Chapter 3 in D. Goodman and M. Redclift (eds.) *The International Farm Crisis*. New York, NY, Palgrave McMillan.

[23] Collier, P., (1999); "On the Economic Consequences of Civil War." *Oxford Economic Papers*, 51(1): 168-183.

[24] Dodlova, M., and V. Lucas (2021); "Regime Security and Taxation in Autocracies: Who is Taxed and How?" *European Journal of Political Economy*, 67: 101998.

[25] Dorosh P.A., and A. Salam, (2009); "Distortions to Agricultural Incentives in Pakistan." In K. Anderson and W. Martin (eds.) *Distortions to Agricultural Incentives in Asia*. Washington DC: World Bank.

[26] Economist, (2020); "The Pandemic has Eroded Democracy and Respect for Human Rights." Published in the print edition on October 17th, 2020.

[27] Estrades, C., M. Flores, and G. Lezama, (2017); "The Role of Export Restrictions in Agricultural Trade." International Agricultural Trade Research Consortium Commissioned Paper 20.

[28] Food and Agriculture Organization (2011); *The State of Food Insecurity in the World, 2011*. Rome: Food and Agriculture Organization of the United Nations. Available online at http://www.fao.org/3/i2330e/i2330e00.htm.

[29] Freedom House, (2015); "Freedom in the World. Discarding Democracy: Return to the Iron Fist." https://freedomhouse.org/sites/default/files/01152015_FIW_2015_final.pdf

[30] Freedom House, (2018); "Freedom in the World. Democracy in Crisis." https://freedomhouse.org/sites/default/files/FH_FITW_Report_2018_Final_SinglePage.pdf

[31] Gawande, K., and B. Zissimos, (2023); "The Role of Land Inequality in Trade Policy under Dictatorship and Democratization." Typescript.

[32] Grossman, G., and E. Helpman, (1994); "Protection for Sale." *American Economic Review* 84(4): 833-850.

[33] Horowitz, A., (1993); "Time Paths of Land Reform: A Theoretical Model of Reform Dynamics." *American Economic Review* 83(4): 1003-1010.

[34] Janzen, J., C.A. Carter, A. Smith, and M. Adjemian, (2014); "Deconstructing Wheat Price Spikes: A Model of Supply and Demand, Financial Speculation, and Commodity Price Comovement." United States Dept of Agriculture - Economic Research Service Report No. 165, 44 pages.

[35] Jones, R.W., (1965); "The Structure of Simple General Equilibrium Models." *Journal of Political Economy*, 73(6): 557-72.

[36] Martin, W., and K. Anderson, (2012); "Export Restrictions and Price Insulation During Commodity Price Booms. " *American Journal of Agricultural Economics*, 94(2): 422-427.

[37] Marshall M.G., T.R. Gurr, C. Davenport, and K. Jaggers, (2002); "Polity IV Project: 1800-1999." *Comparative Political Studies* 35(1): 40-45.

[38] Marshall, M.G., T.R. Gurr., and K. Jaggers, (2013); *Polity IV Project: Political Regime Characteristics and Transitions, 1800-2012. Dataset users' manual* http://www.systemicpeace.org/inscr/p4manualv2012.pdf.

[39] Mayer, W., (1984); "Endogenous Tariff Formation." *American Economic Review,* 74(5): 970-985.

[40] Mitra, S., and T. Josling, (2009); "Agricultural Export Restrictions: Welfare Implications and Trade Disciplines." International Food & Agricultural Trade Policy Council, IPC Position Paper: Agricultural and Rural Development Policy Series, January 2009.

[41] Nunn, N., and D. Trefler, (2014); "Domestic Institutions as a Source of Comparative Advantage." Chapter 5 of G. Gopinath, E. Helpman, and K. Rogoff (eds.) *Handbook of International Economics*, Volume 4. Amsterdam, The Netherlands: Elsevier.

[42] OECD (2001); *The Uruguay Round Agreement on Agriculture: An Evaluation of its Implementation in Developed Countries.* Paris, Organisation of Economic Cooperation and Development.

[43] Overland, J., K. Simons, and M. Spagat, (2005); "Political Instability and Growth in Dictatorships." *Public Choice*, 25(3-4): pp. 445-470.

[44] Ricardo, D., (1817); *On the Principles of Political Economy and Taxation.* John Murray, London.

[45] Rodrik, D., (1995); "Political Economy of Trade Policy. " Chapter 28 in G.M. Grossman and K. Rogoff (Eds.) *Handbook of International Economics Volume 3.* Elsevier, North Holland.

[46] Rodrik, D., (2018); "New Technologies, Global Value Chains, and the Developing Countries." Background Paper 1. Pathways for Prosperity Commission Background Paper Series. Oxford: Blavatnik School, University of Oxford.

[47] Salam, A., (2009); "Distortions in Incentives to Production of Major Crops in Pakistan: 1991- 2008." *Journal of International Agricultural Trade and Development* 5(2): 185-208.

[48] Sharma, R., (2011); "Food Export Restrictions: Review of the 2007-2011 Experience and Considerations for Disciplining Restrictive Measures." FAO Commodity and Trade Policy Research Working Paper 32, Food and Agriculture Organization.

[49] Shrubsole, G., (2019); *Who Owns England? How We Lost Our Land and How to Take It Back.* London: William Collins.

[50] Sumner, D.A., (2009); "Recent Commodity Price Movements in Historical Perspective." *American Journal of Agricultural Economics* 91:1250-56.

[51] United Nations, (2011) "The Global Food Crisis." Chapter 4 of *The Global Social Crisis: Report on the World Social Situation 2011.* New York: United Nations. Available online at https://www.un.org/esa/socdev/rwss/docs/2011/rwss2011.pdf.

[52] World Bank, (2008); "Rising Food Prices: Policy Options and World Bank Response." Washington D.C., World Bank.

[53] Zakaria, F., (1997); "The Rise of Illiberal Democracy." *Foreign Affairs*, 76: 22-43.

[54] Zissimos, B., (2017); "A Theory of Trade Policy under Dictatorship and Democratization." *Journal of International Economics* 109: 85-101.

[55] Zissimos, B. (2019); "Introduction" to Zissimos (ed) *The WTO and Economic Development.* Boston, Massachusetts: MIT Press.

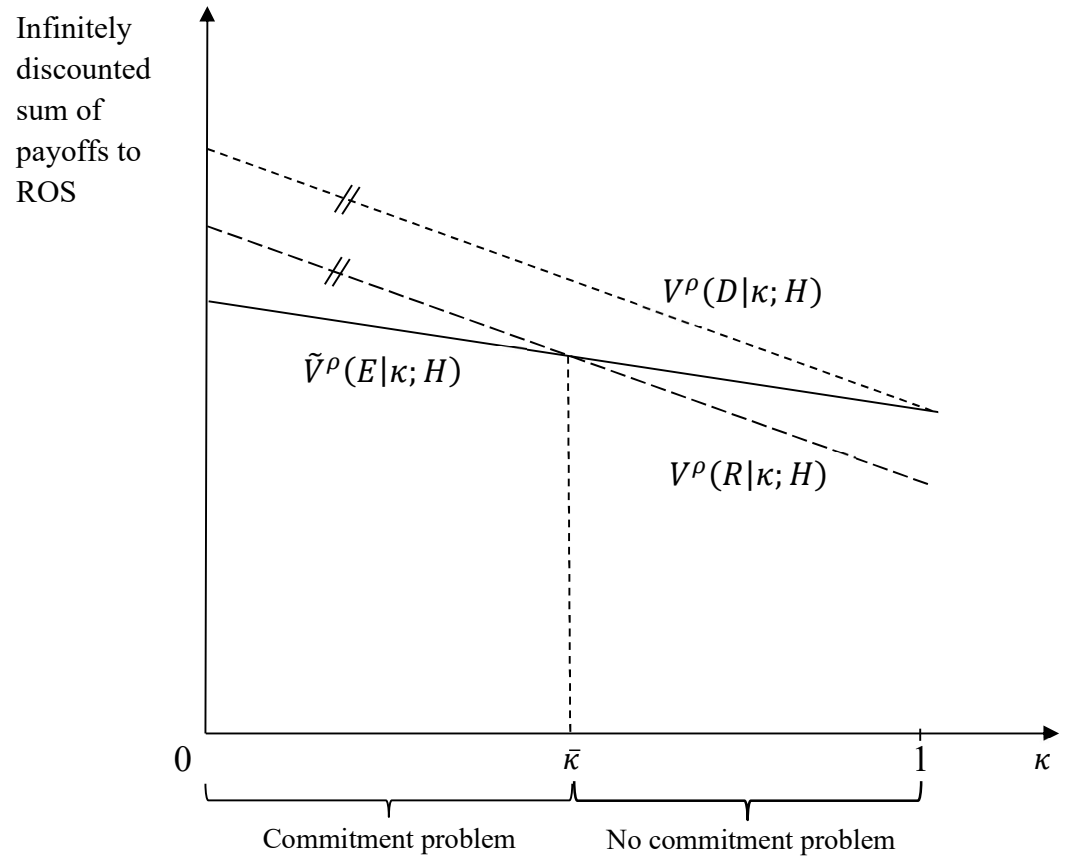

Figure 1: Characterization of Equilibrium

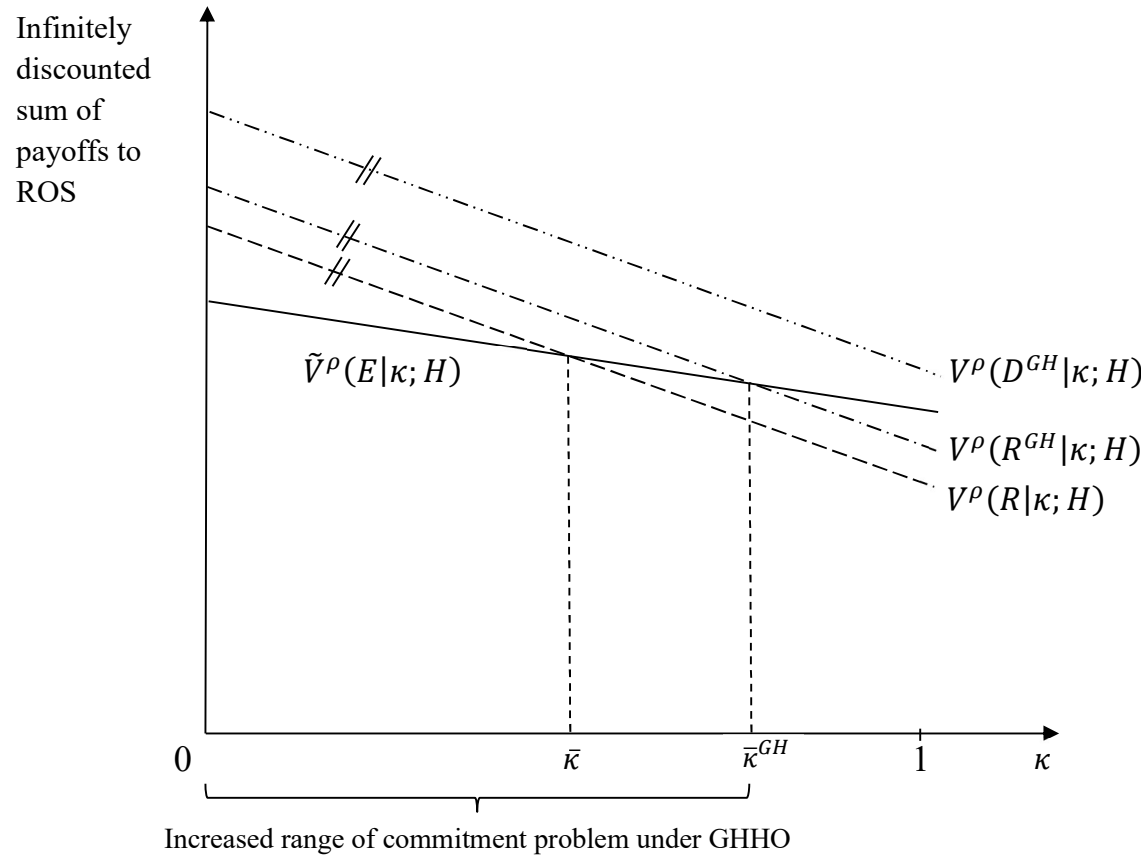

Figure 2: Characterization of Equilibrium under GHHO

Table 1: NRA on **Exports** (2003-10), By Country

Dictatorships				
country	*N*	*Mean*	*Min*	*Max*
Burkina Faso	8	0.009	-0.334	0.382
Cameroon	7	-0.082	-0.215	0.052
Chad	3	0.086	-0.262	0.369
China	8	0.051	-0.075	0.304
Cote D Ivoire	7	-0.553	-0.578	-0.519
Egypt	8	-0.237	-0.464	-0.091
Ethiopia	7	-0.160	-0.270	0.020
Kazakhstan	8	-0.033	-0.304	0.119
Morocco	7	0.174	0.043	0.471
Pakistan	8	-0.194	-0.481	-0.087
Sudan	8	-0.050	-0.394	0.411
Tanzania	8	-0.352	-0.620	0.061
Togo	8	-0.252	-0.543	0.060
Uganda	8	-0.158	-0.351	-0.002
Vietnam	3	0.178	0.084	0.266
Zimbabwe	3	-0.484	-0.837	-0.224

Partial Democracies				
country	*N*	*Mean*	*Min*	*Max*
Argentina	8	-0.296	-0.382	-0.229
Bangladesh	7	-0.376	-0.494	-0.249
Benin	3	0.023	-0.174	0.146
Brazil	8	0.017	0.002	0.045
Bulgaria	8	-0.006	-0.162	0.076
Colombia	8	0.243	0.086	0.386
Dominican Re	8	-0.313	-0.524	-0.095
Ecuador	8	-0.353	-0.509	0.001
Estonia	8	0.194	0.021	0.871
Ghana	8	-0.201	-0.385	-0.009
Indonesia	8	0.017	-0.089	0.191
Kenya	8	-0.006	-0.137	0.096
Latvia	8	0.083	0.001	0.462
Madagascar	8	0.027	-0.719	1.150
Malaysia	7	-0.197	-0.555	0.051
Mali	8	-0.072	-0.491	0.432
Mexico	8	0.001	-0.274	0.284
Mozambique	8	0.452	0.214	0.893
Nicaragua	8	-0.287	-0.434	-0.134
Nigeria	7	-0.094	-0.418	0.295
Philippines	8	0.004	-0.051	0.087
Romania	8	0.051	-0.254	0.510
Russia	8	-0.129	-0.336	0.003
Senegal	3	0.002	-0.122	0.160
Sri Lanka	8	0.089	-0.044	0.205
Thailand	8	0.008	-0.116	0.148
Turkey	8	0.214	0.054	0.360
Ukraine	8	-0.087	-0.195	0.025
Zambia	3	-0.289	-0.481	0.080

Liberal Democracies				
country	*N*	*Mean*	*Min*	*Max*
Australia	8	0.000	0.000	0.000
Austria	8	0.007	0.000	0.015
Belgium	8	0.013	0.000	0.023
Canada	8	0.005	0.000	0.014
Chile	8	0.016	-0.003	0.103
Cyprus	6	0.023	0.005	0.052
Czech Rep.	8	0.108	0.028	0.374
Denmark	8	0.004	0.000	0.017
Finland	8	0.003	0.000	0.016
France	8	0.007	0.002	0.016
Germany	8	0.005	0.001	0.015
Greece	8	0.025	0.003	0.053
Hungary	8	0.136	0.038	0.322
India	8	0.040	-0.174	0.380
Ireland	8	0.005	0.000	0.018
Israel	8	0.055	-0.061	0.225
Italy	8	0.019	0.005	0.042
Lithuania	8	0.131	0.024	0.524
Netherlands	8	0.021	0.000	0.058
New Zealanc	8	0.005	0.000	0.009
Norway	8	1.573	0.935	2.269
Poland	8	0.131	-0.188	0.486
Portugal	8	0.022	0.004	0.059
Slovakia	8	0.116	0.021	0.303
Slovenia	8	0.381	0.051	1.047
South Africa	8	0.076	-0.076	0.311
Spain	8	0.016	0.004	0.031
Sweden	8	0.004	0.000	0.017
Switzerland	3	1.195	0.763	1.600
UK	8	0.005	0.000	0.018
USA	8	0.034	0.001	0.093

Notes:

1. Dictatorships: Mean Polity4 Score ≤ 0; Partial Democracies: Mean Polity4 Score between 1 and 8.

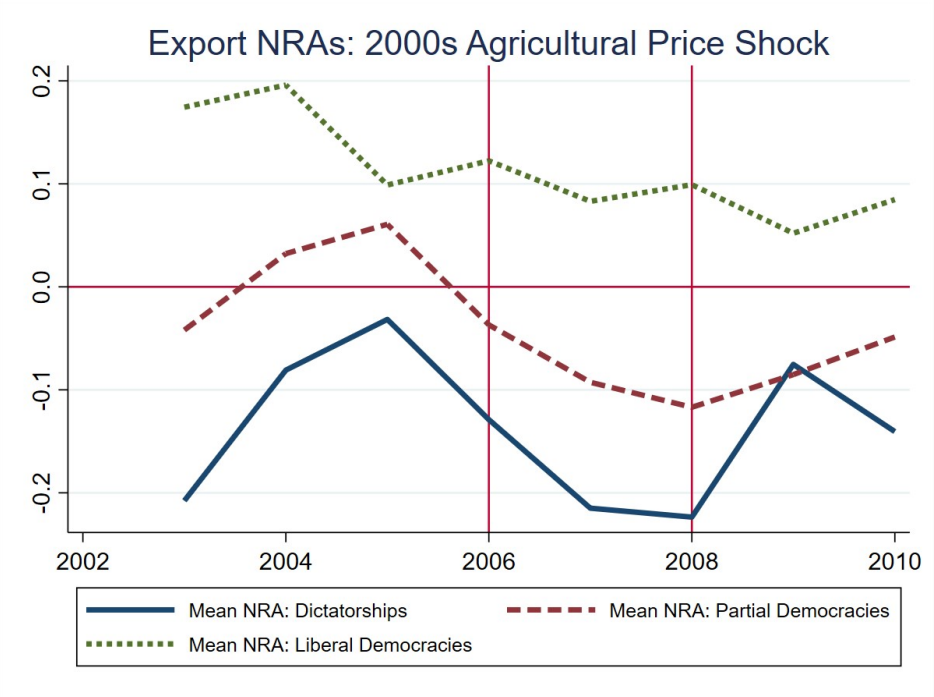

Figure 3: NRA on Exports during 2006-08 Price Spike

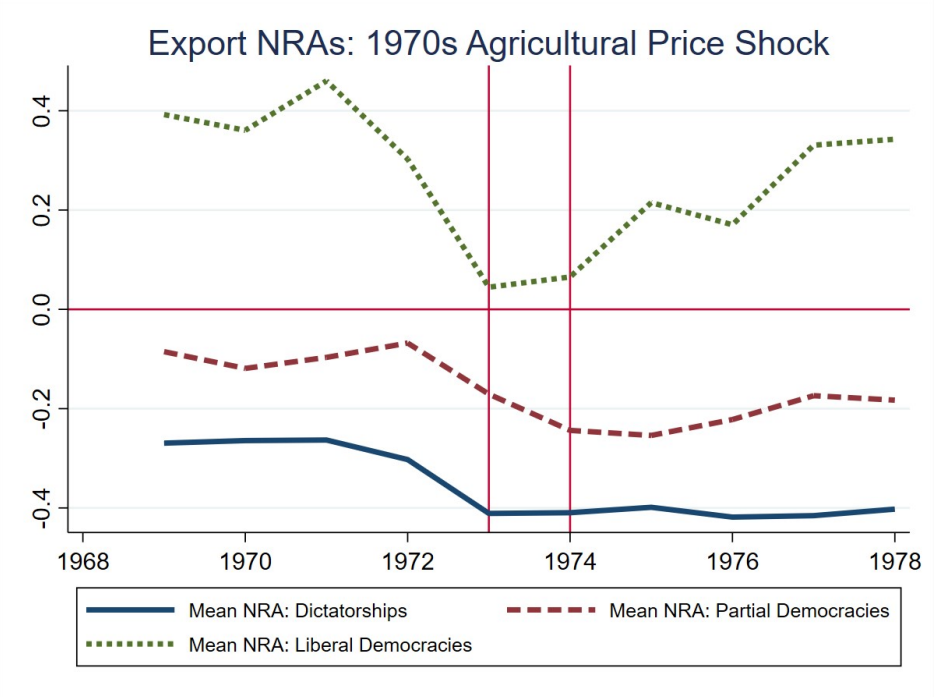

Figure 4: NRA on Exports during 1973-74 Price Spike

Table 2: Agricultural Trade Policy Response to Price Shock, **2003-10.**
Dependent variable : Nominal Rate of Assistance to Exports (NRA)

	OLS-FE Models			
	Dictatorship Sample		Full Sample	
NRA_{t-1}	0.174**	0.147	0.294**	0.268**
Lagged Dep. Var.	(0.068)	(0.090)	(0.119)	(0.113)
I_{HIGH}	−0.088**	−0.093**	−0.083***	−0.081***
$I_{\text{Price Spike: 2006-08}}$	(0.031)	(0.035)	(0.028)	(0.027)
Partial Democracy × I_{HIGH}			0.005	0.004
(8≥Polity≥1)× $I_{\text{Price Spike}}$			(0.045)	(0.047)
Liberal Democracy × I_{HIGH}			0.076***	0.076***
(Polity≥9)× $I_{\text{Price Spike}}$			(0.029)	(0.028)
Log Per Capita GDP	0.299	0.302	0.195*	0.224**
ln(per capita GDP)	(0.245)	(0.254)	(0.103)	(0.106)
Log ExRate Index		−0.041		0.011
ln(Nominal FX rate index)		(0.038)		(0.009)
Year	−0.009	−0.012	−0.013**	−0.011**
Trend	(0.014)	(0.015)	(0.005)	(0.005)
N	109	108	560	549
within-R^2	0.100	0.117	0.139	0.128
#Countries	16	16	76	75
Total Effects:				
Partial Democracy			−0.078**	−0.077*
Liberal Democracy			−0.007	−0.005

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. In the full sample, the base category comprises Dictatorship, so I_{HIGH} is the total effect for Dictatorships, while (Partial Democracy × I_{HIGH}) and (Liberal Democracy × I_{HIGH}) are additional effects for partial and liberal liberal democracies, respectively.
3. There are 16 Dictatorships, 29 Partial Democracies and 30 Liberal Democracies in the full sample.

Table 3: Agricultural Trade Policy Response to Price Shock, **1969-78.**
Dependent variable : Nominal Rate of Assistance to Exports (NRA)

	OLS−FE Models			
	Dictatorship Sample		Full Sample	
NRA_{t-1}	0.351***	0.348***	0.386***	0.378***
Lagged Dep. Var.	(0.083)	(0.084)	(0.043)	(0.045)
I_{HIGH}	−0.071***	−0.073***	−0.069***	−0.071***
$I_{\text{Price Spike: 1973-74}}$	(0.017)	(0.017)	(0.017)	(0.017)
Partial Democracy × I_{HIGH}			−0.002	−0.002
(8≥Polity≥1)× $I_{\text{Price Spike}}$			(0.047)	(0.046)
Liberal Democracy × I_{HIGH}			−0.129**	−0.129**
(Polity≥9)× $I_{\text{Price Spike}}$			(0.056)	(0.056)
Log Per Capita GDP	0.393**	0.372**	0.357***	0.290**
ln(per capita GDP)	(0.149)	(0.147)	(0.131)	(0.128)
Log ExRate Index		−0.020		−0.026*
ln(Nominal FX rate index)		(0.041)		(0.013)
Year	−0.015***	−0.014**	−0.013***	−0.010**
Trend	(0.005)	(0.005)	(0.004)	(0.004)
N	240	240	434	434
within-R^2	0.312	0.316	0.415	0.425
#Countries	26	26	48	48
Total Effects:				
Partial Democracy			−0.0709	−0.0730
Liberal Democracy			−0.199***	−0.200***

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. In the full sample, the base category comprises Dictatorship, so I_{HIGH} is the total effect for Dictatorships, while (Partial Democracy × I_{HIGH}) and (Liberal Democracy × I_{HIGH}) are additional effects for partial and liberal liberal democracies, respectively.
3. There are 26 Dictatorships, 9 Partial Democracies and 13 Liberal Democracies in the full sample.

Table 4: Income and Trade Policy Reponse to Price Shock, **2003-10.**
Dependent variable : Nominal Rate of Assistance to Exports (NRA)

	OLS-FE Models			
	Dictatorships		Partial Democracies	
NRA_{t-1}	0.147	0.135	0.363***	0.372***
Lagged Dep. Var.	(0.090)	(0.091)	(0.109)	(0.120)
I_{HIGH}	−0.093**	−0.495**	−0.089**	−0.321
$I_{\text{Price Spike: 2006-08}}$	(0.035)	(0.195)	(0.043)	(0.422)
Log Per Capita GDP	0.302	0.265	0.481**	0.404***
ln(per capita GDP)	(0.254)	(0.259)	(0.220)	(0.142)
Log per capita GDP × I_{HIGH}		0.063**		0.032
		(0.028)		(0.053)
Log ExRate Index	−0.041	−0.042	0.007	0.006
ln(Nominal FX rate index)	(0.038)	(0.038)	(0.007)	(0.006)
Year	−0.012	−0.010	−0.025*	−0.023**
Trend	(0.015)	(0.015)	(0.013)	(0.010)
N	108	108	208	208
within-R^2	0.117	0.140	0.199	0.205
#Countries	16	16	29	29

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. See notes to **Table 2.**

Table 5: Agricultural Trade Policy Response to Price Shock, **2003-10**.
Regime-type Measured Using POLITY Sub-Dimensions.

Dependent variable : Nominal Rate of Assistance to **Exports** (NRA)

	Countries partitioned into Regime-type based on:				
	PARCOMP	POLCOMP	XRCOMP	XCONST	EXCONST
	Competitiveness of Participation	**Political Competition**	**Competitiveness of Exec. Recruiting**	**Executive Constraints Rules**	**Executive Constraints**
	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE
NRA_{t-1}	0.269**	0.265**	0.265**	0.273**	0.273**
Lagged Dep. Var.	(0.117)	(0.113)	(0.112)	(0.115)	(0.115)
I_{HIGH}	−0.071*	−0.069*	−0.082***	−0.109**	−0.088***
$I_{\text{Price Spike: 2006-08}}$	(0.041)	(0.040)	(0.030)	(0.047)	(0.028)
Partial Democracy × I_{HIGH}	−0.014	0.023	0.050	0.030	0.010
(8≥Polity≥1)× $I_{\text{Price Spike}}$	(0.045)	(0.049)	(0.064)	(0.059)	(0.056)
Liberal Democracy × I_{HIGH}	0.063	0.025	0.041	0.095**	0.075**
(Polity≥9)× $I_{\text{Price Spike}}$	(0.040)	(0.042)	(0.034)	(0.047)	(0.029)
Log Per Capita GDP	0.248**	0.228**	0.222**	0.209**	0.210**
ln(per capita GDP)	(0.104)	(0.102)	(0.104)	(0.098)	(0.098)
Log ExRate Index	0.011	0.012	0.012	0.012	0.012
ln(Nominal FX rate index)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Year	−0.012**	−0.012**	−0.011**	−0.011**	−0.011**
Trend	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)
country FE	YES	YES	YES	YES	YES
N	535	542	542	542	542
within-R^2	0.136	0.118	0.120	0.128	0.128
#Countries	73	74	74	74	74
#Dictatorships	7	7	14	6	15
#Partial Democracies	40	22	9	33	24
#Liberal Democracies	26	45	51	35	35
Total Effects:					
Partial Democracy	−0.085***	−0.046	−0.033	−0.079**	−0.078
Liberal Democracy	−0.008	−0.044	−0.041*	−0.014	−0.014

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%. Errors clustered at the country level.
2. Sample partitioned into {**Dictatorship**}, {**Partial democracy**}, {**Liberal democracy**} as follows: **PARCOMP**: {1,2}, {3,4}, {5}. **POLCOMP**: {1,2,3,4}, {5,6,7,8}, {9,10}. **XRCOMP**: {0,1}, {2}, {3}. **XCONST**: {1,2}, {3,4,5,6}, {7}. **EXCONST**: {1,2,3}, {4,5,6}, {7}.
3. I_{HIGH} is the total effect for Dictatorships. (Partial Democracy × I_{HIGH}) and (Liberal Democracy × I_{HIGH}) are additional effects for partial and liberal democracies, respectively.

Appendix

A Analytical Results (For publication in supplementary appendix)

A.1 Proof of Lemma 2.

First we must show that (9) holds when $p_s^w = p_L^w$. Formally, this involves showing that $\widetilde{V}^\rho(E|\,\kappa;L) > V^\rho(R|\,\kappa,L)$ for all $\kappa \in [0,1]$. Note that $\widetilde{V}^\rho(E|\,0;L) > V^\rho(R|\,0,L)$ guarantees $\widetilde{V}^\rho(E|\,\kappa;L) > V^\rho(R|\,\kappa,L)$ for all $\kappa \in [0,1]$. Using (5) and (6), $\widetilde{V}^\rho(E|\,0;L) > V^\rho(R|\,0,L)$ can equivalently be written,

$$W^\rho(\hat{p}_L^\varepsilon) + \frac{\beta}{1-\beta} W^\rho(\hat{p}_L^\varepsilon) > W_R^\rho(\hat{p}_L^\rho) + \frac{\beta}{1-\beta} W^\rho(\hat{p}_L^\rho).$$

So there exists no value of $\kappa \in [0,1]$ at which $V^\rho(R|\,\kappa;L) > \widetilde{V}^\rho(E|\,\kappa;L)$; there can be no threat of revolution when $p_s^w = p_L^w$.

Two parameter restrictions ensure that (9) holds. First, consider what would be required to make the first term on the left hand side larger than the first term on the right hand side. Although $W^\rho(\hat{p}_L^\rho) > W^\rho(\hat{p}_L^\varepsilon)$, we can ensure $W^\rho(\hat{p}_L^\varepsilon) > W_R^\rho(\hat{p}_L^\rho) = \psi W^\rho(\hat{p}_L^\rho)$ by making ψ sufficiently small. That is, the cost of revolution must be sufficiently high. Next, compare the second terms on each side. While $W^\rho(\hat{p}_L^\varepsilon) < W^\rho(\hat{p}_L^\rho)$, each is pre-multiplied by $\beta/(1-\beta)$ so we can assume that β is sufficiently small that the inequality holds. This is, in effect, the opposite condition to the one we assumed for $s = H$. We are assuming that when $p_s^w = p_L^w$, the ROS are not sufficiently patient for the net gain from revolution to be worthwhile, partly because the cost is relatively high, and partly because the ROS discount the future at a relatively high rate.

Next we must establish that (9) will hold for $s = L$, while simultaneously (7) holds for $s = H$? Recall from our discussion of the revolution constraint that, fixing β, we can always find a value of p_H^w sufficiently large that (7) holds. So (7) will hold at the same time as (9) providing the world price shock is sufficiently large. □

A.2 Set-up of the GHHO Model

Following GH, the government's objective function under democracy in period t is given by $C_t^\varepsilon + \alpha W_t$, where C_t^ε represents total campaign contributions received by the government from the elite in period t, and α is a parameter that represents the marginal rate of substitution

between national welfare and contributions. Both contributions and national welfare depend on p_t, and the government sets p_t to maximize its political objective function.

The elite's purpose is to maximize $W_t^{\varepsilon}(p_t) - C_t^{\varepsilon}(p_t)$. They know that if they do not lobby, the government will choose p_t to maximize political welfare, $H_{-\varepsilon}(p_t) = \max_{p_t} \alpha W_t(p_t)$. If the elite wish to affect policy, they must offer a contribution that induces a policy change and provides the government with at least $H_{-\varepsilon}(p_t)$. Formally, the elite's contribution function must satisfy

$$C_t^{\varepsilon}(p_t) \geq H_{-\varepsilon}(p_t) - \alpha W_t(p_t)$$

in order to implement p_t. At the elite's optimum, this is satisfied with equality. Assuming a price level exists for which contributions are made that satisfy this constraint, the following maximization problem will deliver a preferred price level, $\hat{p}_t^{GH}$, that satisfies the elite's objective function: $\hat{p}_t^{GH} = \arg\max_{p_t} W_t^{\varepsilon}(p_t) + \alpha W(p_t)$. The solution to this problem for our model yields the equation for $\hat{p}_t^{GH}$ shown in Section 6.1.

B Econometric Designs

B.1 The Quasi-Experimental Design and Clustering

Abadie, Athey, Imbens and Wooldridge (2023, AAIW henceforth) carefully draw the distinction between when there is a need to cluster standard errors and when clustering makes a difference in inference. Just because clustering errors is conservative does not mean we should cluster. Their main message is that the need for clustering must be assessed at the stage of the econometric design, rather than in any formulaic manner. Here we expand upon the study design and consider the role of clustering alongside.

Consider the population of country-years between 2003 and 2010. The population is partitioned into C countries. For each country-year i-t there are two potential outcomes, $NRA_{it}(0)$ and $NRA_{it}(1)$, corresponding to a control and treated outcome. Our interest lies in the popu-

lation average effect of the treatment

$$\begin{aligned}\tau &= \frac{1}{CT}\sum_{c=1}^{C}\sum_{t=1}^{T}\left(NRA_{it}(1) - NRA_{it}(0)\right) \\ &= \frac{1}{C}\sum_{i=1}^{C}\left(\overline{NRA}_i(1) - \overline{NRA}_i(0)\right) \\ &= \overline{NRA}(1) - \overline{NRA}(0).\end{aligned}$$

There are equal number of years T (=8) for each country in this population. The second equality takes the average of the mean counterfactual difference across countries. There is heterogeneity in individual treatment effects if, for one or more i-t, $NRA_{it}(1) - NRA_{it}(0) \neq \tau$. At the level of cluster i, heterogeneity in treatment effects further implies that $\overline{NRA}_i(1) - \overline{NRA}_i(0) \neq \tau$ for at least some i.[43] The presence of heterogeneity at the cluster level is a key consideration in deciding whether one should cluster standard errors, especially in models with fixed effects.

The reason we expect heterogeneity in treatment effects at the country level is that different countries export different agricultural products. Atkin (2013), for example, shows habit formation as a basis for why food consumption baskets vary across countries. The extent of persistence in food habits may determine the extent to which consumption baskets remain the same even in the face of food price shocks. The impact on consumption, measured in calories, of the same price shock may be heterogeneous across countries due to their different food baskets, leading governments to use different (potential) policy responses to the shock (treatment effects).

In addition to heterogeneous treatment affects, AAIW show two sources of uncertainty in the estimated treatment effect, which are also important in determining whether to cluster errors: stochastic variation in sampling and in assignment. In the context of our study, every country-year i-t in the population receives a stochastic binary treatment $W_{it} \in \{0, 1\}$. In addition, we observe a subset of the population, selected according to a stochastic sampling indicator R_{it}. Consider the sample first and then the outcome. In our sample we observe the triple $(NRA_{it}, W_{it}, C_{it})$, where C_{it} indicates the country (cluster) to which observation i-t belongs.

[43] It is useful to define the residuals for treated and untreated as

$$\epsilon_{it}(1) = NRA_{it}(1) - \overline{NRA}(1), \qquad \epsilon_{it}(0) = NRA_{it}(0) - \overline{NRA}(0),$$

and, at the cluster level,

$$\bar{\epsilon}_i(1) = \sum_{t=1}^{T}\epsilon_{it}(1), \qquad \bar{\epsilon}_i(0) = \sum_{t=1}^{T}\epsilon_{it}(0).$$

For cluster i, heterogeneity in treatment effects implies that $\bar{\epsilon}_i(1) - \bar{\epsilon}_i(0) \neq 0$.

The triple is observed only if $R_{it} = 1$, and the sample size $N = \sum_{i=1}^{C} \sum_{t=1}^{T} R_{it}$. For country-years that we observe in our data, we know the outcome to be $NRA_{it}(W_{it})$ and the residual to be $\epsilon_{it}(W_{it})$.

The sample process determining R_{it} is independent of potential NRA outcomes and assignments. It is done in two stages. In the first stage, countries are sampled with country sampling probability P_i. $P_i = 1$ implies all countries are in the sample, while P_i closer to zero means the treatment effect is being inferred about countries (clusters) not in the sample. In the second stage we sample all years (2003-10) in the population from the sampled countries. In panel data parlance we have a balanced panel.

Assignment: Pre vs. Post design

We investigate two assignment processes, both consistent with our theory. In the pre-versus-post design, every country is subject to 3 years of world price shocks. The assignment process determining W_{it} is a year-specific assignment, or $W_{it} = I_t^{HIGH}$, so the world price shock is experienced simultaneously by all countries. In our population of countries spanning 8 years, assignment to treatment W_{it} occurs with probability $q_i = 3/8$ in every country i.[44] Recall that the econometric model for the pre-post design is

$$NRA_{i,t} = \phi NRA_{i,t-1} + \sum_{d=1}^{3} \tau^d (\text{DEM}d_i \times I_t^{HIGH}) + X_{i,t}B + \eta_i + e_{i,t}.$$

In the AAIW framework, it is

$$NRA_{i,t} = \phi NRA_{i,t-1} \sum_{d=1}^{3} \tau^d \left(\text{DEM}d_i \times W_{it}\right) + X_{i,t}B + \eta_i + e_{i,t},$$

where $W_{i,t} = I_t^{HIGH}$.

[44] Ours is a specific case of the more general assignment process in AAIW. There, W_{it} is a draw from a two-stage process as follows: in the first stage, units (years, in our case) within cluster i are assigned a probability of treatment $q_i \in [0, 1]$ drawn from a distribution f(.) with mean μ and variance σ^2. For example, $\mu = 0.5$ implies that exactly half of the observations in the cluster are subject to treatment. Alternatively, $\sigma^2 = 0$ implies there is no within-cluster correlation in treatment, and assignment is random. This implies exchangeability, as well. When $\sigma^2 > 0$, clusters experience correlated treatment. In our case, we assume $\sigma^2 = 0$, implying that for each country, the three years of the treatment are exchangeable. That is, they could occur anywhere in the 8 year period with no change in potential outcomes. This is important because if there were no heterogeneity in treatment effects, then $\sigma^2 = 0$ would imply no need to cluster errors (even if doing so would result in conservative standard errors). In our sample, the world price shocks occur over three contiguous years, and if there is reason to believe that potential outcomes with contiguous shocks are different from potential outcomes with non-contiguous shocks, then assignment is correlated and $\sigma^2 > 0$. In this case, there is a compelling reason to cluster errors, even without heterogeneous treatment effects.

Additional References for Appendix B

[1] Atkin, D., (2013); "Trade, Tastes, and Nutrition in India." *American Economic Review*, 103(5): 1629-1663.

C Political Regime Measures: Polity IV Pillars

The idea behind Polity IV scores is to map democracy into three latent concepts that have precise quantitative measures: executive recruitment, executive constraints, and political competition. The latent concept of executive recruitment, which seeks to measure how open and competitive is the process of selection and recruitment of people who will assume executive power, is then measured by the variables XRCOMP and XROPEN, respectively. XRCOMP scores countries on a 3-point scale based on whether executive recruitment is based on elections (score of 2) through to selection by a highly restricted group (score of 0). XROPEN is a binary measure of whether the executive is elected (=1) or determined by hereditary selection (=0). The latent concept of executive constraints seeks to measure checks and balances on the executive powers. The variable XCONST maps this concept to a 7-point scale based on whether the executive is subordinate to a parliament or the judiciary (=7), has greater power than but is constrained by parliament or judiciary (5,6), is subject to a few limited constraints (3,4), is unconstrained or has unlimited authority (1,2). The latent concept of political competition seeks to measure the degree to which political participation is competitive and open. Two variables, PARCOMP and PARREG are operationalized and combined to form this measure. PARCOMP measures competitiveness on a 5-point scale based on whether formation of political parties is totally repressed (=1), restricted (=2), factional or represents an electoral transitional (=3,4) or unfettered (=5). PARREG uses a 5-point scale to measure openness based on whether formation of political parties is restricted or regulated (=4,5), sectarian or identity-based (=2,3) or unregulated (=1).[45]

[45] Countries are partitioned into {dictatorship}, {partial democracy}, {liberal democracy} as follows: PARCOMP: {1,2}, {3,4}, {5}. POLCOMP: {1,2,3}, {4,5,6,7,8}, {9,10}. XRCOMP: {0,1}, {2}, {3}. XCONST1: {1,2}, {3,4,5,6}, {7}. XCONST2: {1,2,3}, {4,5,6}, {7}. Note that POLCOMP is the latent concept that is measured on a 10-point scale on the basis of its components PARCOMP and PARREG.

Table A1: Agricultural Trade Policy Response to Price Shock, **2003-10.**
Dependent variable : Nominal Rate of Assistance to Exports (NRA)

	First-Differenced (FD) Models			
	Dictatorship Sample		Full Sample	
NRA_{2003}	−0.104	−0.116	−0.071**	−0.072**
Intitial Period NRA	(0.065)	(0.082)	(0.031)	(0.032)
ΔI_{HIGH}	−0.122**	−0.125**	−0.120***	−0.119***
$\Delta(I_{Price\ Spike:\ 2006\text{-}08})$	(0.046)	(0.047)	(0.044)	(0.044)
Partial Democracy × ΔI_{HIGH}			0.054	0.055
(8≥Polity≥1)× $\Delta I_{Price\ Spike}$			(0.056)	(0.056)
Liberal Democracy × ΔI_{HIGH}			0.140**	0.142**
(Polity≥9)× $\Delta I_{Price\ Spike}$			(0.055)	(0.055)
ΔLog Per Capita GDP	0.402	0.256	0.099	0.115
Δln(per capita GDP)	(0.449)	(0.512)	(0.184)	(0.188)
ΔLog ExRate Index		−0.081*		0.007
Δln(Nominal FX rate index)		(0.042)		(0.010)
N	109	108	556	549
R^2	0.094	0.130	0.043	0.045
#Countries	16	16	76	75
Total Effects:				
Partial Democracy			−0.066*	−0.064*
Liberal Democracy			0.021	0.022

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. In the full sample, the base category comprises Dictatorship, so I_{HIGH} is the total effect for Dictatorships, while (Partial Democracy × I_{HIGH}) and (Liberal Democracy × I_{HIGH}) are additional effects for partial and liberal democracies, respectively.

Table A2: Agricultural Trade Policy Response to Price Shock, **1969-78.**
Dependent variable : Nominal Rate of Assistance to Exports (NRA)

	First-Differenced (FD) Models			
	Dictatorship Sample		Full Sample	
NRA_{2003}	−0.039*	−0.034*	−0.056***	−0.048***
Intitial Period NRA	(0.020)	(0.020)	(0.013)	(0.014)
ΔI_{HIGH}	−0.069***	−0.071***	−0.069***	−0.070***
$\Delta(I_{\text{Price Spike: 2006-08}})$	(0.015)	(0.014)	(0.015)	(0.014)
Partial Democracy × ΔI_{HIGH}			0.029	0.025
$(8 \geq \text{Polity} \geq 1) \times \Delta I_{\text{Price Spike}}$			(0.041)	(0.039)
Liberal Democracy × ΔI_{HIGH}			−0.139***	−0.141***
$(\text{Polity} \geq 9) \times \Delta I_{\text{Price Spike}}$			(0.051)	(0.051)
ΔLog Per Capita GDP	0.512**	0.467**	0.445**	0.356**
Δln(per capita GDP)	(0.185)	(0.172)	(0.175)	(0.155)
ΔLog ExRate Index		−0.096		−0.089*
Δln(Nominal FX rate index)		(0.099)		(0.050)
N	240	240	434	434
within-R^2	0.312	0.316	0.415	0.425
#Countries	26	26	48	48
Total Effects:				
Partial Democracy			−0.0397	−0.0450
Liberal Democracy			−0.208	−0.210

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. In the full sample, the base category comprises Dictatorship, so I_{HIGH} is the total effect for Dictatorships, while (Partial Democracy × I_{HIGH}) and (Liberal Democracy × I_{HIGH}) are additional effects for partial and liberal democracies, respectively.
3. There are 26 Dictatorships, 9 Partial Democracies and 13 Liberal Democracies in the full sample.

Table A3: Food Prices and Trade Policy, **2003-10.**
Dependent variable: Nominal Rate of Assistance to Exports (NRA)

	OLS-FE Models			
	Dictatorship sample		Full sample	
NRA_{t-1}	0.162**	0.134	0.289**	0.263**
Lagged Dep. Var.	(0.067)	(0.092)	(0.118)	(0.112)
FPI_{HIGH}	−0.070***	−0.074**	−0.063***	−0.062***
Food Price Index × $I_{Price\ Spike:\ 2006-08}$	(0.023)	(0.026)	(0.021)	(0.020)
Partial Democracy × I_{HIGH}			0.004	0.003
(8≥Polity≥1)× $I_{Price\ Spike}$			(0.033)	(0.035)
Liberal Democracy × I_{HIGH}			0.056**	0.056***
(Polity≥9)× $I_{Price\ Spike}$			(0.021)	(0.021)
Log Per Capita GDP	0.308	0.310	0.208*	0.238**
ln(per capita GDP)	(0.247)	(0.257)	(0.107)	(0.109)
Log ExRate Index		−0.042		0.011
ln(Nominal FX rate index)		(0.038)		(0.009)
Year	−0.009	−0.011	−0.013**	−0.011**
Trend	(0.014)	(0.015)	(0.005)	(0.005)
N	109	108	560	549
within-R^2	0.109	0.127	0.140	0.130
#Countries	16	16	76	75
Total Effects:				
MiddleDemocracy			−0.060**	−0.059*
LiberalDemocracy			−0.007	−0.006

Notes:

1. *** denotes statistical significance at 1%, ** at 5% and * at 10%.
   Errors clustered at the country level.
2. See Notes to **Table 2**.