Public Policy, Price Shocks, and Civil War in Developing Countries

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Abstract

Those who study the role of agriculture in the political economy of development focus on government policy choices on the one hand and the impact of price shocks on the other. We argue that the two should be studied together. We find that civil unrest (Granger) causes government policies, pushing governments in poor and medium income countries to shift relative prices in favor of urban consumers. We also find that while civil wars are related to food price shocks, when government policy choices are taken into account, the relationship disappears. We thus learn two things: Policies that placate urban consumers may inflict economic costs on governments, but they confer political benefits. And when estimating the relationship between price shocks and political stability, equations that omit the policy response of governments are misspecified.

1 Introduction

Particularly in the developing areas, governments treat food supplies as a security matter. This was certainly the case in the West, when countries that are now developed were themselves developing.[1] It remains true today. Thus Table 1, which lists countries that experienced food riots during the price rise of 2007-2008. Recent events in North Africa and the Middle East provide additional evidence of the political importance of food prices.

In this paper, we go beyond qualitative accounts to examine the magnitude and significance of food price shocks on political stability. The reasoning remains informal. The evidence, however, is derived statistically, the specification of the models being informed by the literature on agriculture and development (Johnson 1973; Timmer and Falcon 1983).

As have others (Section 2.2., below) we find that food price shocks significantly increase the likelihood of political conflict – i.e. civil wars – in low income countries. As have others, we also find that governments in low income countries react to political unrest – i.e. riots and demonstrations – by intervening in agricultural markets to protect the interests of consumers. What others have not done, but what we do here, is to address the two themes simultaneously. We then find that when the policy response is incorporated into models of civil wars, the relationship between food price shocks and civil war becomes insignificant. This finding can be taken as suggesting that governments use agricultural policy to secure political order. It also reminds us that in low income countries, political order is expensive. Food price subsidies are costly; so too, in the long run, are policies that lower prices paid to farmers and so generate food deficits. And it suggests that by leaving government policy responses out of their models of political instability, many of the previous studies have been misspecified.

In section 2, we briefly review the literature. In section 3, we describe our sample and our measures and in section 4 our methods of estimation. A novel feature of the latter is the incorporation of the expected policy response of governments into equations that capture the political response to food price rises. In section 5 we present our findings.

2 Literature

Two literatures inform this article. The first explores the relationship between food price rises and political stability. The second addresses agricultural policy and explores the manner

[1] See, for example, Tilly (1971), Tilly (1990), and Kaplan (1976).

in which governments intervene in markets so as alter prices. In the sections that follow, we demonstrate that, while commonly pursued separately, for reasons both of substance and methodology, the two themes should be addressed together.

2.1 Agricultural Policy

The portion of the literature on agriculture in developing countries most relevant to this paper (Johnson 1973; Timmer and Falcon 1983) rests on Engel's law, which implies that that should a person's income alter alter, her demand for food would respond less than proportionately. An implication of Engel's law is that poor people spend a larger percentage of their incomes on food than do those with higher incomes. An important corollary is that the structure of the economies of underdeveloped countries countries contain large agricultural and small manufacturing sectors.[2]

Against this background, we can appreciate the manner in which food price shocks are transmitted domestically. Because food is a necessity, if its price rises, the quantity demanded fails proportionately to decline. Instead, consumers reduce the amount they purchase of other commodities. Particularly in poor countries, where disposable incomes are low, the result is that the fortunes of the urban sector are vulnerable to fluctuations in food prices. For as food prices rise, people spend less on other commodities, resulting in decreased purchases of non-essential items, recession in the manufacturing and retail sector, and rising unemployment.[3] Urban dwellers therefore have ample reason to fear food shortages. We can therefore expect urban consumers of food vigilantly to monitor food prices and vigorously to lobby for policies designed to keep them low.

The impact of economic structure on government policy choice is influenced by the nature of the country's political institutions, which can embody two logics two logics. The first is the logic of electoral competition (Varshney 1993; **?**); the second, the logic of interest group lobbying. If institutions are democratic, given that the rural sector comprises an electoral majority, agricultural producers would be so positioned as to decide the political fate of governments. We would therefore expect democratic governments in low income countries to adopt policies that favor the fortunes of farmers. If authoritarian, however, the government would be likely to be subject to the logic of interest group rather than electoral politics. And given the spatial concentration of urban populations (Olson 1985) and the high degree of concentration in the small, underdeveloped manufacturing sector characteristic of small,

[2]Assuming food is not fully traded.

[3]See, for example, Sen (1983).

undeveloped economies (**?**), we would expect the urban sector to hold an advantage when lobbying and government policies to exhibit "urban bias" (Lipton 1977).

The level of income and, closely related, the sectoral composition of the economy, along with institutional features of the polity thus inform our expectations of how governments would respond to food price shocks. As will be seen, they influence as well the specification of our empirical model.

2.2 Commodity Price Shocks

Deaton and Miller (1995) number among the first systematically to explore the political impact of food price shocks. For each country in Africa, they constructed an index in which they weighted each of 21 commodities by its relative importance in the total value of that country's exports. To deal with the possible impact of endogeneity, they made use of instrumental variables. Applying vector auto-regression to data from 32 African countries, 1960-1990, Deaton and Miller (1995) find the impact of commodity price shocks largely favorable to Africa's economies. Total GDP increases. So too do each of its components: consumption, investment, and government expenditure. The researchers then introduce a measure of "irregular exit"[4] as their index of political instability. Commodity price shocks affect this measure, they note, through their impact on national income. When prices turn negative and national incomes decline, they find, that the likelihood of irregular exits rises.

In contrast to Deaton and Miller (1995), Dell et al. (2008) report that food price rises lead to declines in income, reductions in the growth rate of the economy and increases in political instability and that these relationships prevail only among poor countries. The difference between two sets of findings can be attributed to the instrument which Dell et al. (2008) employ – increases in local temperatures – that would correlate with local variation in domestic production rather than with movements in global markets. In Deaton and Miller's world, were a country to produce rice, it would benefit economically from an increase in rice prices; the value of its the crop would rise. In the world of Dell et al. (2008), a weather shock signals the possibility of a crop failure, with losses of output and a rise in food prices, but a fall in the national income.

As did Deaton and Miller (1995), Dell et al. (2008) employ the probability of irregular exit as a measure of political instability. The probability of irregular exit rises with temperatures, they report, and thus with food prices. They also find temperature increases to be associated

[4]Irregular exits include assassinations, coups, and the forced resignation of the head of state. See also Bienen and van de Walle (1991)

with political "interregnums" or periods in which no discernable government holds power. As Dell et al. (2008) remind us, two advantages accrue to the those who employ weather as opposed to price data. The first is a greater ability to separate the impact of changes in food prices from changes in the prices of other commodities. The second is an ability to eliminate the possibility of endogeneity bias, arising from the impact of political instability on food supplies.

Writing in 2008, Besley and Persson (2008) construct country specific Laspeyres indices for a global sample of roughly 125 countries for 45 commodities and for the period 1960 to 2000. They find a positive and significant relationship between their index and the occurrence of civil wars. Decomposing the bundle of commodities into agricultural goods, petroleum products, and minerals, they attribute this result largely to the impact of price rises for farm products. The relationship is stronger, they find, in poor countries and in nondemocracies.

The last contribution is that of Arezki and Bruckner (2011), who study the relationship between a food price index based upon international prices and export shares on the one hand and a series of political variables on the other: Polity's measures of democracy and political restraint, Banks' data on riots and anti-government demonstrations, and PRIO's measure of civil unrest.

As do Dell et al. (2008), Arezki and Bruckner (2011) find that food price shocks impact measurably on poor but not on high income countries. Based on estimates drawn from a panel of data drawn from 61 low income countries, 1970-2007, they find food price shocks systematically related to declines in Polity scores, increases in riots and demonstrations, and increases in the likelihood of civil unrest. Their findings are robust to the exclusion of large food producers, which they list as China, Guatemala, India, Ivory Coast, Pakistan, Thailand, Uganda, Ukraine, and Vietnam. They make no effort, however, to control for movements in the prices of other commodities, such as petroleum products.

Portions of this literature also focus on particular countries, such as Colombia (as by Dube and Vargas (2006) and Angrist and Krueger (2008)), or on the role of climate (as by Miguel et al. (2004) and Hsiang et al. (2011)). Given the focus of this paper, we do not review their contributions here.

2.3 Discussion

As we shalll see, the literature on agricultural policy influences our choice of sample: Differences in the political economy of rich nations and poor, it suggests, mean that food price shocks will more strongly impact the politics of developing countries than the politics of

the developed and we therefore join Dell et al. (2008) and Arezki and Bruckner (2011) in limiting our sample to the former. In addition, the literature affects our choice of variables and of estimators, as we attempt to elude the spurious effect of other variables – such as macro-economic or oil price shocks – and bias arising from reverse causation.

As important as what the literature covers is what it omits: the relationship between government policies and the impact of food price shocks. Hitherto, the two literatures run in parallel. A major purpose of this paper is to bring them together by observing how the manner in which governments intervene in agricultural markets influence the impact of food price increases.

3 Variables and Sample

As our measure of **price shocks**, we created import and export Laspeyres indices, using FAO measures of food consumption and World Bank data on international reference prices[5]. These indices provide measures of food price imports and exports for each country and for each year. For country i and year t, the expression of the Laspeyres index reads

$$\text{Laspeyres}_{it} = \frac{\sum (p_{ct} \times q_{ci1980})}{\sum (p_{c1980} \times q_{ci1980})}$$

where p_{ct} gives the global market price of commodity c in year t and q_{cit} gives the quantity consumed (exported) of commodity c in country-year it's consumption (export) basket.[6]

The data cover crops that account for nearly 70% of the calories consumed globally. We employ 1980 as the base year.[7]

Figure 1 employs data from 12 countries to illustrate variation in the value of our aggregated food price index over time and country. Clearly, the boom of the 1970s accounts for a major portion of the temporal variation. It can also be seen that despite occasional sharp upward movements, food prices steadily declined over the sample period. When estimating the relationship between our price index and measures of political instability, we therefore experimented with a variety of corrections for trend. None improved the fit, however; indeed, they reduced it. While we shall report evidence of a relationship between the price index

[5] Anderson (2009)

[6] For more, see Deaton and Muellbauer (1980).

[7] For each year, we dropped countries whose production accounted for 20% or more of the major food crops. An important exception occurred when we dropped price setters in rice markets, strongly suggesting that domestic insecurity significantly affects food prices in rice markets.

and measures of political instability, these measures failed to correlate with trend-filtered versions of the index.[8]

We employ two measures of **political instability**. The first is the Peace Research Institute's (PRIO) measure of civil war, for which there are three variants: PRIO 25, which assumes a value of 1 if a civil war in a given year results in at least 25 battle deaths; PRIO 100, which assumes a value of 1 if a civil war results in at least 100 battle deaths; and PRIO 500, which assumes a value 1 if a civil war yields at least 500 battle deaths. Use of the three measures enables us to probe the impact of food price shocks not only upon the onset but also upon the intensity of civil wars. Depending on the battle death threshold, between 10% and 14% of country-years experienced civil wars. A second is Arthur Bank's conflict index, which we draw from his Cross-National Time Series Data Base. For each country and each year, Banks records the occurrence of strikes, assassinations, revolutions, riots, and purges, which he then weights according to his assessment of their impact on political stability. We explore the relationship of food price shocks to the natural log of Banks' variable, seeking thereby to reduce the impact of potentially influential outliers.

As a measure of **government policy**, we employ an index of the relative rate of assistance (RRA), as calculated by the World Bank.[9] The index reflects the relative magnitude of the shifts of the nominal rates of assistance (NRA) between agriculture and other sectors of the economy. More formally, for purposes of illustration, if the sole intervention by government is an *ad valorem* tariff, the NRA for a given commodity is then

$$\text{NRA}_{it} = \frac{E_{it} \times P_t \left(1 + \tau_{mit}\right) + E_{it} \times P_t}{E_{it} \times P_t}$$

where τ_{mit} is the tariff rate applied by country i in year t on competing imports m, E_{it} is the country-year specific domestic currency price of US dollars (exchange rate), and P_t is the dollar denominated global price of the commodity in year t. The measure thus captures the difference between global and domestic prices produced by the government's tariff.

The measure provides a means for calculating the relative rate of assistance (RRA), which is the index we employ to characterize government policy.[10] For country i in year t, the RRA

[8] It is as if consumers were responding politically to food price rises, even when these increases represented but a return to a long-term equilibrium level.

[9] Anderson (2009)

[10] The measure can, and has been, adopted to incorporate additional forms of government intervention.

is

$$\text{RRA}_{it} = \frac{1 + \text{NRA/agriculture}_{it}}{1 + \text{NRA/nonagriculture}_{it}} - 1.$$

The RRA is thus a function of the relative extent to which the government separates domestic from international prices for agricultural and non-agricultural commodities. When government policies favor agricultural producers to a greater degree than others, then this measure is positive; when they instead favor consumers, it is negative. Put another way, positive values suggest that the government favors farmers; negative, that it is biased in favor of urban interests.

As our measure of **political institutions**, we employ Political Competition, a variable taken from Polity IV. We do so because the first-best measure of political competition, that of Beck et al. (2002), is not available in sufficient historical depth. Fortunately, Political Competition correlates closely (0.80) with the latter measure, enabling us to employ it instead.[11]

Price shocks in food markets can be the result of monetary forces as well as physical shortages; and when that is the case, food prices move in concert with those of other commodities. Of these commodities, it is perhaps only petroleum that is able to induce political shocks comparable in magnitude to those resulting from food. In our efforts to identify the impact of food prices, we therefore control for **the importance of petroleum** in the national economy and of **monetary instability**.

Our measure of government policies, calculated by Anderson (2009), exists only for a subset of lower income nations. The size and composition of our sample is also influenced by the heterogeneity in the degree of political sensitivity to food price shocks among countries that differ in their levels of average. While missingness in our government policy variable adheres to no discernible pattern, we can not be certain that it is purely at random.

Since we limit our focus to low income countries, the mean per capita GDP in our sample is but $\$1,410$ per year; the poorest country is Chad, with per capita GDP of but \$410 in 1987, while the most affluent country is Thailand, with per capita GDP of $\$6,882$ in 1996. Since poorer countries tend also to be less democratic, our sample consists of more non-democracies than democracies. Indeed, no countries in the sample were rated fully competitive at any point since 1961, while 20 were at some point fully non-competitive.

[11] The measure, collected by Beck et al. (2002), was developed by the Africa Program at Harvard University, who demonstrated that it Guttman scaled. It is also invertible, i.e. given a number on the scale, an observer can know the structure of political competition precisely.

These lower income countries were less likely to be OPEC members than their more affluent counterparts, consume less primary energy, and experienced civil wars in between 15% and 20% of country-years. According to these measures, our sample's representative countries are Indonesia, Ghana, Cote d'Ivoire, and Senegal, all in the 1980s and 1990s.

Table 3 provides a full list of the variables, describes them, and indicates the sources from which they were taken.

4 Empirical Strategy and Specification

This paper illustrates that government policies influence the impact of food price shocks on political instability. To achieve an unbiased estimate of government policies on political outcomes, we seek to eliminate the impact of conflict on policy choice; that is, to rid ourselves of endoegenity bias. To do so, we employ a two-stage least squares model. In the first stage we estimate the determinants of government policy response; we then use the predicted response, derived from the first stage, to estimate the effect of policy on political instability in the second. To eliminate the impact of variables capable of inducing a spurious relationship between "theoretical" and dependent variables, we include an indicator of monetary crises in the first equation and of the importance of petroleum in the national economy in the second.

While we would have preferred to employ standard methods of causal inference, we found it difficult to cleanly separate treatment and controls: not only were food price global, but also our measure of them was continuous. We therefore adopted the identification strategy resembling that of Besley and Persson (2008) and introduce both country and year fixed effects. As highlighted by Figure 1, the major portion of the variation in our food price index is cross-national. Focusing on the within portion of the variance enables us to attribute country level differences in the response to price shocks to country level variation in the theoretical variables and, in particular, to political institutions (in Equation 2) and policy choices by governments (in Equation 2).

4.1 First Stage: The Policy Equation

By imposing tariffs, levying export taxes, and issuing licenses and permits, governments can limit trade and so separate the level of prices in domestic and foreign markets. Using these measures, governments can also alter relative prices for rural producers and urban consumers. The purpose of the first stage equation is to account for the manner in which governments intervene, as captured by the RRA.

Recognizing the importance of income levels – and responding to the previous findings of (Dell et al. 2008; Arezki and Bruckner 2011) – we restrict our sample to low and low, middle income countries. Our sample thus includes countries where people are poor and spend a large percentage of their incomes on food. We have learned from the literature that in such economies rural dwellers are numerous. If the government must compete for votes in order to stay in office, it will therefore have to consider letting domestic food prices rise. On the other hand, urban consumers are spatially concentrated; by comparison with their rural counterparts, they face low costs when organizing. Authoritarian governments in low income countries would therefore be more likely than democratic to respond to agricultural price shocks in ways that favor the interests of consumers.

The core model can therefore be written as:

$$\begin{aligned}\text{Policy}_{it}|\text{Income Level} \;=\; & \alpha_C + \alpha_T + \alpha_1 \text{Export Laspeyres}_{it} + \alpha_2 \text{Import Laspeyres}_{it} \\ & + \alpha_3 \text{Political Competition}_{it} \\ & + \alpha_4 \text{Export Laspeyres}_{it} \times \text{Political Competition}_{it} \\ & + \alpha_5 \text{Import Laspeyres}_{it} \times \text{Political Competition}_{it} \\ & + \alpha_6 \text{Policy}_{it-1} + \alpha X \qquad (1)\end{aligned}$$

We estimate four variants of this equation.

As we shall see, the estimates of policy choice are interesting in themselves. At least as important, they can be entered into the second stage equation, which captures the political impact of food price shocks. Previous estimates have treated the impact of food price increases as direct, i.e. as if consumers and producers dwelled in a world without governments. But surely the manner in which consumers respond to such crises would be shaped by how they expect their government to behave. It is precisely this expected response that equation 1 yields. It tells us how governments can be expected to behave, given the composition of the economy over which they preside, their political institutions, and (in model 4) the policy choices they have made in the past.

The results of our estimates appear in Table 4. Models 1 and 2 are estimated with straightforward OLS, where α_C and α_T are fixed effects for country and year, respectively, and X a set of control variables (as discussed above). Model 2 includes robust and clustered standard errors, which correct for dependence within country observations. Models 3 and 4 add, respectively, country and year fixed effects and the lagged policy value.

4.2 Second Stage Equation: Political Conflict

The estimates of equation (1) yield the expected policy responses of governments to food price shocks, conditional upon the political and economic environment within which they inhere and (in the case of model 4) previous policy commitments. Equation (2) introduces these responses into models that capture the political impact of food price shocks. Introducing predicted policy response from the first stage should purge the coefficient relating government policy and political outcomes in the second of endogeneity bias.

As Wooldridge (2002) demonstrates, 2SLS is equivalent mathematically to regression using instrumental variables. The second stage estimates will be consistent, therefore, if the predictions of government policy from the first stage are highly correlated with observed policy. Because model 4 in Table 4 incorporates a lagged value of the dependent variable, our predictions of government policy will be highly correlated with observed policies, assuring us of consistent estimates in the second stage equation.

The problem of inconsistency arises once again, however, because of the need to cluster standard errors by country; clustering reduces the precision of the first stage estimates. When estimating the second stage, we therefore use the IV-Generalized Method of Moments (GMM) estimator developed by Hansen (1982) and extended in Baum et al. (2003) and Baum et al. (2007). The combination of country level clustering and IV-GMM ensures that our estimates correct for dependence among intra-country observations without sacrificing the precision afforded by a strong instrument.[12]

From equation (1), we can see that our system of equations is overidentified. In overidentified settings, standard IV and 2SLS techniques reduce the ℓ available instruments to the k necessary for exact identification, sacrificing efficiency in the process. An additional advantage of the IV-GMM estimator is that it employs information from all available ℓ instruments – in our case, the first stage covariates that enable us to predict government policy – thereby enhancing the efficiency of the second stage estimates.

The general form of the second stage equation can be written as:

$$\begin{aligned} y_{it}|\text{Income Level}_{it} &= \beta_C + \beta_T + \beta_1\widehat{\text{Policy}}_{it} + \beta_2\text{Export Laspeyres}_{it} + \beta_3\text{Import Laspeyres}_{it} \\ &\quad +\beta_4\text{Political Competition}_{it} + \beta Z \end{aligned} \tag{2}$$

We again include country and year fixed effects to control for any unobserved heterogeneity.

[12] In the process, it also creates a weighting matrix such that covariance between the instrument and the second stage error term approaches 0 by definition, removing the remaining source of inconsistency in standard IV estimates.

5 Results

5.1 First Stage

Turning first to the coefficients on import prices (Table 4): they are positive in all models, thus suggesting that when the costs of imports rise, governments seek to stimulate local production. Initially beneficial to farmers, the intent is of course to restore prices by increasing food supplies. By contrast, the coefficient on the export price index is negative in all models. It suggests that when global prices shift such that local farmers can gain higher prices in foreign markets than they can at home, governments prevent them from doing so. By banning exports or imposing export taxes, they seek to prevent local prices from rising to the level of prices abroad.

Note the coefficient on political competition: it is positive and significant in most models. When the value of the coefficient is low, there is little or no electoral competition; political competition is suppressed or takes the form of rivalries between organized interests. As the value of the index rises, it points to the rising significance of party competition. As the sample is drawn from low and middle income countries, the change in political institutions thus signals an increase in the power of the rural majority and therefore – as the coefficients suggest – a shift toward pro-farmer policies.

Importantly for second stage estimation, model 4 attains an R^2 of 0.76, implying that equation (1) explains nearly 80% of observed variation in government policy response. Employing it in a 2SLS model of political conflict will therefore yield consistent estimates in the second stage.

5.2 Second Stage

Each panel of Table 5 contains two equations. Both yield coefficients measuring the relationship between the right hand side (RHS) variables – discussed above – and measures of political instability. The first equation (OLS) in each panel resembles those reported elsewhere in the literature: it relates price shocks and the properties of institutions to the likelihood of civil wars and political unrest. The second equation (GMM) provides estimates of the second stage equation of the 2SLS model, which contains an additional variable: the expected policy response of the government, given the structural characteristic of the economy, the nature of political institutions, and previous policy commitments.

5.2.1 Civil Wars

Focus first on the OLS estimates, which, as noted above, resemble many of the equations previously reported in the literature. Negative and significant, the coefficients on the export price index suggest that when export prices fall, the likelihood of civil wars increases. A standard deviation reduction in the export Laspeyres index generates a 2% increase in the probability of civil war, or roughly two-thirds of a standard deviation. Moreover, this effect grows slightly larger – and is more precisely estimated – as the PRIO battle death threshold increases. When food prices rise, these results suggest, the civil conflicts that ensue are likely to be particularly violent.

But now turn to the even numbered (GMM) equations. The coefficient on RRA suggests that governments that tend to respond to price shocks with measures that favor urban consumers are significantly less likely to face civil wars. Strikingly, the coefficients on export prices are now insignificant, suggesting that governments that adopt pro-consumer policies neutralize the destabilizing impact of price declines in export markets.

In interpreting these findings, it is useful to turn to the qualitative literature on "provisioning," a term that refers to the feeding of public servants – including the armed forces – and urban centers – especially political capitals. The literature notes that the management of food supplies was critical to the keeping of peace in ancient Rome (Garnsey 1988) and 18th Century Paris (Kaplan 1976) and remains critical to the maintenance of order in contemporary Nairobi (Bates 1989). According to these accounts, the delivery of grain at affordable prices enabled emperors, kings, and presidents to campaign for political support from urban populations. By providing heads of state the opportunity to consolidate their support, provisioning transformed food price shocks into political opportunities. In the hands of wiley politicians, food price shocks can render civil wars less likely. While we find this interpretation appealing, we have yet to explore it systematically.

5.2.2 Political Unrest

Thus far we have focused on the impact of food price rises on civil wars. We now turn to measures of political unrest, as recorded by Banks (see Table 3). In models 1 and 2 of Table 6, as the prices of imports rise, unrest increases.[13] In keeping with Deaton and Miller's (1995) findings, rising prices for agricultural exports associate with lower rates of disorder – something they attribute to increased prosperity. Supportive of this interpretation are the

[13]The decline in the number of observations results from the dropping of those in which the raw scores were negative, rendering the log undefined.

coefficients on energy use and OPEC membership: Closely related to levels of income, they too bear negative signs and are significant in both models.

Note the coefficient on government policy (model 2): it is large, negative, and significant at the 1% level. Policy shifts in favor of the urban sector are associated with increases in urban unrest. At this point, the direction of the causal relationship between the two variables remains unclear, however: Do policy shifts in favor of urban dwellers cause urban unrest, or does urban unrest cause governments to subsidize urban food costs? To address this question, we therefore conduct a Granger test (Table 7), which establishes causality by asking whether one time series successfully forecasts another. As depicted in the right hand column, we find that urban unrest is a strong predictor of government policy.

On the basis of this finding, we respecify our equations to suggest that food price shocks condition urban unrest, which in turn induce governments to lower food prices. The first stage results appear in model 3 of Table 6; the second stage estimates in model 4 of Table 6. The findings confirm that urban unrest exerts a large effect on government policy: A standard deviation increase in ln Banks generates a standard deviation shift in relative prices, rendering them more favorable to urban consumers.

5.3 Robustness Checks

Were political instability to occur in a major producing country, it might affect global prices and introduce endogeneity bias: In response to this possibility, we reestimate equations (1) and (2), omitting countries that produce 20% or more of the world's major staple crops: maize, wheat, and soybeans.[14] The results for our core IV-GMM model appear in Table 8, and closely resemble those in Table 5. They suggest that when governments respond to urban unrest by reducing RRA by a standard deviation, the probability of civil war declines by between 3% and 5%, depending on the number of battle deaths. And when governments pursue policies that favor urban consumers, food prices once again have no meaningful effect.

We next consider whether these relationships have evolved over time. Given the impact of the Cold War on the levels and incidence of civil unrest,[15] we re-estimate the model before and after the end of the Cold War. To conserve degrees of freedom, we do so by interacting our export and import food price indices with a dichotomous variable that assumes value 1

[14] Arezki and Bruckner (2011) represents the only other attempt to remove this form of endogeneity bias. They remove several large producers from their sample: China, Guatemala, India, Indonesia, Pakistan, Thailand, Uganda, Ukraine, and Vietnam. Since food production is relatively variable, however, we prefer our time variant approach.

[15] See, for instance,Goldstone and Gurr (2003).

from 1990 on. The results appear in Table 9, and again closely resemble our baseline results in Table 5. When governments adopt policies that shift RRA in favor of urban consumers by a standard deviation, these results suggest, the probability of civil war once again declines by between 3% and 5%, depending on the number of battle deaths.

Lastly, we test whether the dynamics we find in Table 5 are unique to low income countries. The results in Table 8 suggest that while policy shifts in favor of the urban sector appear to slightly reduce the probability of civil war, the effect is much smaller than in poor countries; it is also imprecisely estimated. Surprisingly, we find some evidence that increases in food export costs increase the probability of civil war, though the magnitude of this effect is quite small.

6 Conclusion

As noted in Table 1, the rapid rise in food prices between 2007 and 2008 triggered widespread political unrest. More recently, discontent over food prices exacerbated urban protests in North Africa and the Middle East and so contributed to the events now known as the "Arab Spring." These events have rekindled interest in the relationship between subsistence crises and political disorder. In this paper, we have sought to contribute to the literature on this subject.

Those who study the politics of agriculture in development focus not only on the determinants of political order; they also study government policy. Most often, they find that governments in the developing world adopt policies that favor the interests of urban consumers and discriminate against those of farmers. In doing so, they emphasize the costs of these policies, both to farmers and to the economy. A major lesson of this paper is that the policy choice and political impact should be studied together. Doing so reveals that the economic costs of government policies must be weighed against their political benefits. It also reveals that by omitting the responses of governments, the specifications employed in previous studies of the impact of food price shocks have been misspecified. When governments mitigate the impact of price rises to urban consumers, contrary to previous findings, there is then *no* relationship between food price shocks and civil war.

Our use of a two stage model suggests a mechanism that might account for this finding: political expectations. In countries where the structure of the economy, political institutions and the past behavior of the government are such that the government can be expected to placate urban consumers in the event of food price rises (thus the result of the first stage),

then price shocks will not result in civil wars (thus those of the second). When the organized, powerful, and vulnerable urban sector can rationally expect a favorable response from its government, their protests do not prepare the ground for civil war.

We realize that we have yet to pin down the precise path running between price shocks and conflict; our analysis is incomplete. What we have established is that urban bias lowers the likelihood that food price shocks will trigger civil war. The policy choices of governments in the developing areas become more intelligible when viewed in the light of this finding.

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7 Tables

Table 1: Food Riots, 2008

Bangladesh	Mozambique
Brazil	Pakistan
Burkina Faso	Myanmar
Cameroon	Panama
Cote d'Ivoire	Philippines
Egypt	Russia
Ethiopia	Senegal
Haiti	Somalia
India	Tajikistan
Indonesia	Yemen
Mexico	

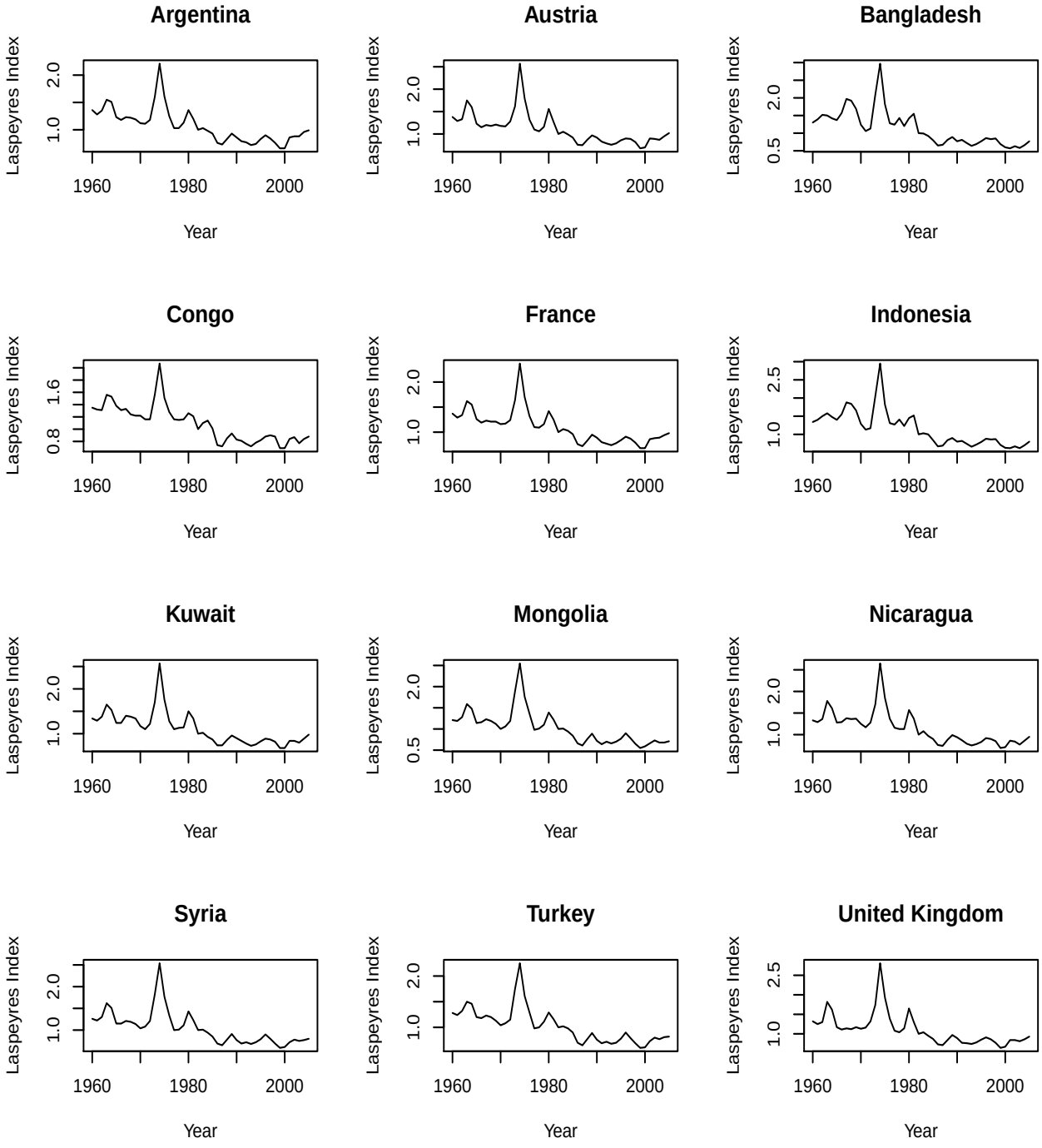

Figure 1: Laspeyres Time Series for a Random Country Sample

Table 2: Outcome Variable Definitions and Descriptive Statistics

Variable	Variable Type (Min/Max)	Mean	Median	Standard Deviation	Description/Source
RRA	$[-0.95, 1.30]$	-0.19	-0.14	0.26	A measure of the extent to which governments manipulate domestic prices in favor of the agricultural sector, developed by Kym Anderson and colleagues for the World Bank; see Anderson (2009).
PRIO 25	Dichotomous	0.21	0.00	0.35	This variable assumes value 1 if a country experienced a civil war with greater than 25 battle deaths in a given year; see `www.prio.no/CSCW`.
PRIO 100	Dichotomous	0.18	0.00	0.34	This variable assumes value 1 if a country experienced a civil war with greater than 100 battle deaths in a given year; see `www.prio.no/CSCW`.
PRIO 500	Dichotomous	0.15	0.00	0.31	This variable assumes value 1 if a country experienced a civil war with greater than 500 battle deaths in a given year; see `www.prio.no/CSCW`.
Banks	$[-0.62, 27.39]$	-0.06	-0.62	1.80	This index aggregates all instances of political violence within a given country-year, with more serious episodes – revolutions, riots, purges – weighted more heavily than strikes and assassinations. It is taken from Arthur Banks' Cross-National Time Series database; see `www.databanksinternational.com`.

Table 3: Explanatory Variable Definitions and Descriptive Statistics

Variable	Variable Type (Min/Max)	Mean	Median	Standard Deviation	Description/Source
Export Laspeyres Index	$[0.00, 18.65]$	1.69	1.57	1.13	A country-year measure of food prices, benchmarked at the representative consumers' 1980 consumption basket. We draw global commodity prices from the World Bank and food consumption data from the FAO.
Import Laspeyres Index	$[0.01, 116.30]$	1.81	1.62	0.79	A country-year measure of food prices, benchmarked at the representative consumers' 1980 consumption basket. We draw global commodity prices from the World Bank and food consumption data from the FAO.
Political Competition	$[1, 10]$	3.56	2.00	2.91	This variable, drawn from the Polity IV dataset, measures "qualities of democratic and autocratic authority in governing institutions," with -10 representing a hereditary monarchy and 10 a consolidated democracy; see Marshall and Jaggers (2005).
Energy Consumption	$[0, 1312845]$	50138	4498	93150	A measure of primary energy consumption, given in thousands of metric coal-ton equivalents. The variable is taken from the Correlates of War 2 Project; see `www.correlatesofwar.org`.
OPEC Membership	Dichotomous	0.08	0.00	0.20	A time variant OPEC membership roster, as commissioned by the CIA's Political Instability Task Force.
Banking Crisis	Dichotomous	0.04	0.00	0.16	Records episodes of banking crises, as presented in Reinhart and Rogoff (2009).
Low Income Status	Dichotomous				Following Arezki and Bruckner (2011), we restrict attention to low and low-middle income countries, as defined by the World Development Indicators.
Post-Cold War	Dichotomous	0.33	0.00	0.47	This variable assumes value 1 from 1990 on.

Table 4: First Stage Results (Standard Errors in Parentheses)

	RRA Model 1	RRA Model 2	RRA Model 3	RRA Model 4
Export Laspeyres	-.050**	-0.050	-0.014	-0.020
	(.016)	(0.037)	(0.027)	(0.014)
Import Laspeyres	.057**	0.057	0.010	0.007
	(.015)	(0.037)	(0.029)	(0.013)
Political Competition	.035**	0.035*	0.035*	0.010
	(.007)	(0.013)	(0.016)	(0.008)
Export Laspeyres × Political Competition	-.008†	-0.008	-0.010	-0.002
	(.005)	(0.009)	(0.006)	(0.004)
Import Laspeyres × Political Competition	-.008	-0.008	-0.005	-0.002
	(.003)	(0.008)	(0.006)	(0.003)
Banking Crisis	-.004	-0.004	-0.016	-0.015
	(.043)	(0.035)	(0.037)	(0.042)
RRA $t-1$				0.657**
				(0.075)
Fixed Effects	No	No	Yes	Yes
Robust Clustered Standard Errors	No	Yes	Yes	Yes
R^2	0.0703	0.0703	0.5703	0.756
N	1182	1182	1182	1182
Significance levels: †† : 15% † : 10%	* : 5%	** : 1%		

Table 5: Second Stage Results (Standard Errors in Parentheses)

	PRIO 25		PRIO 100		PRIO 500	
	OLS (1)	GMM (2)	OLS (3)	GMM (4)	OLS (5)	GMM (6)
$\widehat{\text{RRA}}$		0.261*		0.199††		0.142
		(0.156)		(0.141)		(0.136)
$\ln \widehat{\text{Banks}}$						
		(0.156)		(0.141)		(0.136)
Export Laspeyres	-0.019††	0.011	-0.020††	-0.004	-0.022*	0.009
	(0.013)	(0.027)	(0.012)	(0.024)	(0.009)	(0.020)
Import Laspeyres	-0.005	-0.015	-0.011	-0.037†	-0.018	-0.035†
	(0.015)	(0.016)	(0.017)	(0.144)	(0.017)	(0.021)
Political Competition	-0.012†	-0.026*	-0.008	-0.024*	-0.013	-0.012
	(0.006)	(0.011)	(0.006)	(0.010)	(0.006)	(0.009)
Energy Consumption	-2.41e-07**	-2.59e-07*	-1.69e-07††	-1.72e-07	-1.23e-07	-1.31e-09
	(8.21e-08)	(1.17e-07)	(1.11e-07)	(1.22e-07)	(1.13e-07)	(1.16e-07)
OPEC Membership	-0.303	-0.337	-0.263††	-0.217	-0.271	-0.198††
	(0.211)	(0.191)	(0.174)††	(0.163)	(0.167)	(0.137)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Robust Clustered SEs	Yes	Yes	Yes	Yes	Yes	Yes
N	2427	1061	2427	1061	2427	1061

Significance levels: †† : 15% † : 10% * : 5% ** : 1%

Table 6: Models of Political Unrest (Standard Errors in Parentheses)

	ln Banks OLS (1)	GMM (2)	ln Banks GMM First Stage (3)	RRA GMM (4)
$\widehat{\text{RRA}}$		-1.854**		
		(0.549)		
$\widehat{\ln \text{Banks}}$				-0.134**
		(0.549)		(0.049)
Export Laspeyres	-0.009	-0.344**	-0.225††	-0.047††
	(0.129)	(0.119)	(0.0150)	(0.033)
Import Laspeyres	0.266†	0.210	0.312	-0.018
	(0.134)	(0.160)	(0.263)	(0.035)
Political Competition	-0.021	-0.034	-0.119	0.006
	(0.035)	(0.044)	(0.082)	(0.010)
Export Laspeyres × Political Competition			0.103	
			(0.050)	
Import Laspeyres × Political Competition			-0.008*	
			(0.035)	
Banking Crisis			-0.353	
			(0.329)	
Energy Consumption	-3.80e-06**	-3.73e-06**		-5.43e-07**
	(8.06e-07)	(4.29e-07)		(1.68e-07)
OPEC Membership	-0.304††	-0.395†		-0.088
	(0.197)	(0.235)		(0.093)
Fixed Effects	Yes	Yes	Yes	Yes
Robust Clustered SEs	Yes	Yes	Yes	Yes
N	522	289	508	289

Significance levels: †† : 15% † : 10% $*$: 5% $**$: 1%

Table 7: Direct Granger Causality Test Results (p Values in Parentheses)

	H_0: No Granger causality from RRA to ln (Banks)	H_0: No Granger causality from ln (Banks) to RRA
F Statistic	1.3467	2.2985†
	(0.2526)	(0.0775)

Table 8: Second Stage Results, with Price Setters Dropped (Standard Errors in Parentheses)

	PRIO 25		PRIO 100		PRIO 500		Log Banks	
	OLS (1)	GMM (2)	OLS (3)	GMM (4)	OLS (5)	GMM (6)	OLS (7)	GMM (8)
RRA		0.214*		0.211††		0.157		-1.808**
		(0.108)		(0.145)		(0.140)		(0.558)
Export Laspeyres	-0.022†	-0.004	-0.020††	-0.003	-0.022*	0.011	0.022	-0.364*
	(0.012)	(0.025)	(0.012)	(0.025)	(0.009)	(0.021)	(0.135)	(0.145)
Import Laspeyres	-0.008	-0.021	-0.011	-0.036†	-0.018	-0.034†	0.266*	0.201
	(0.015)	(0.016)	(0.017)	(0.020)	(0.017)	(0.020)	(0.134)	(0.157)
Political Competition	-0.010††	-0.021*	-0.008	-0.024*	-0.013*	-0.013	-0.026	-0.047
	(0.006)	(0.010)	(0.006)	(0.010)	(0.006)	(0.010)	(0.035)	(0.047)
Energy Consumption	-2.42e-07**	-2.55e-07*	-1.70e-07††	-1.78e-07	-1.24e-07	-7.95e-09	-3.79e-06**	-3.77e-06**
	(8.23e-08)	(1.18e-07)	(1.11e-07)	(1.23e-07)	(1.13e-07)	(1.16e-07)	(7.81e-07)	(4.52e-07)
OPEC Membership	-0.299	-0.308††	-0.263††	-0.223	-0.271	-0.202††	-0.300††	-0.358††
	(0.214)	(0.193)	(0.174)††	(0.164)	(0.168)	(0.137)	(0.202)	(0.222)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2403	1037	2427	1037	2403	1037	509	276

Significance levels: †† : 15% † : 10% ∗ : 5% ∗∗ : 1%

Table 9: Second Stage Results, Post-Cold War (Standard Errors in Parentheses)

	PRIO 25		PRIO 100		PRIO 500		Log Banks	
	OLS (1)	GMM (2)	OLS (3)	GMM (4)	OLS (5)	GMM (6)	OLS (7)	GMM (8)
RRA		0.261*		0.193		0.135		-1.930**
		(0.118)		(0.137)		(0.135)		(0.537)
Export Laspeyres	-0.018	0.008	-0.019††	-0.008	-0.021*	0.008	-0.005	-0.398**
	(0.013)	(0.027)	(0.012)	(0.025)	(0.009)	(0.022)	(0.140)	(0.120)
Import Laspeyres	-0.003	-0.016	-0.008	-0.037†	-0.014	-0.039†	0.276*	0.204
	(0.016)	(0.017)	(0.018)	(0.021)	(0.018)	(0.021)	(0.132)	(0.159)
Export Laspeyres	-0.022	-0.043	-0.014	0.053	-0.028	-0.023	-0.014	0.648†
× Post-Cold War	(0.048)	(0.085)	(0.045)	(0.077)	(0.037)	(0.067)	(0.376)	(0.335)
Import Laspeyres	-0.018	0.009	-0.025	-0.001	-0.025	0.059	-0.422	-0.640†
× Post-Cold War	(0.045)	(0.082)	(0.044)	(0.080)	(0.039)	(0.050)	(0.480)	(0.381)
Political Competition	-0.011†	-0.026*	-0.007	-0.023*	-0.012*	-0.012	-0.022	-0.035
	(0.006)	(0.011)	(0.006)	(0.010)	(0.006)	(0.009)	(0.036)	(0.042)
Energy Consumption	-2.36e-07**	-2.58e-07*	-1.63e-07††	-1.67e-07	-1.16e-07	1.41e-09	-3.71e-06**	-3.81e-06**
	(8.11e-08)	(1.18e-07)	(1.12e-07)	(1.23e-07)	(1.13e-07)	(1.13e-07)	(6.83e-07)	(3.66e-07)
OPEC Membership	-0.304	-0.347*	-0.265††	-0.227	-0.273	-0.183	-0.318††	-0.348††
	(0.211)	(0.190)	(0.173)††	(0.164)	(0.167)	(0.139)	(0.200)	(0.241)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2427	1061	2427	1061	2427	1061	522	289

Significance levels: †† : 15% † : 10% ∗ : 5% ∗∗ : 1%

Table 10: Second Stage Results, High Income Countries (Standard Errors in Parentheses)

	PRIO 25		PRIO 100		PRIO 500		Log Banks	
	OLS (1)	GMM (2)	OLS (3)	GMM (4)	OLS (5)	GMM (6)	OLS (7)	GMM (8)
RRA		0.115		0.049		0.014		-0.557
		(0.110)		(0.088)		(0.073)		(0.475)
Export Laspeyres	0.035†	0.092**	0.033††	0.060†	0.022	0.006	0.242†	0.112
	(0.021)	(0.032)	(0.020)	(0.035)	(0.020)	(0.035)	(0.125)	(0.100)
Import Laspeyres	-0.010	0.014	-0.004	-0.005	-0.008	-0.020	0.084	-0.109
	(0.018)	(0.016)	(0.015)	(0.021)	(0.014)	(0.025)	(0.077)	(0.208)
Political Competition	0.003	-0.000	-0.001	-0.002	-0.005	-0.006	-0.024	0.028
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.036)	(0.034)
Energy Consumption	-1.55e-07	-1.17e-07	-1.72e-07	1.05e-09	-4.15e-07	2.68e-07††	-4.21e-06*	-4.36e-06
	(2.12e-08)	(1.98e-07)	(2.17e-07)	(1.81e-07)	(2.57e-07)	(1.82e-07)	(1.81e-06)	(1.48e-06)
OPEC Membership	-0.040		-0.037†		-0.023		-3.737†	
	(0.021)		(0.021)		(0.020)		(0.000)	
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust Clustered Standard Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2222	1205	2222	1061	2222	1061	690	289

Significance levels: $\dagger\dagger$: 15% $\dagger$: 10% $*$: 5% $**$: 1%