

Global food prices, regime type, and urban unrest in the developing world

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Abstract

The 2014 IPCC report concludes that changes in precipitation and temperature could cause global food prices to nearly double by 2050. Anecdotal evidence of riots during the global food price spikes of 2007–08 and 2010–11 raises the more general question of whether global food prices affect patterns of contentious politics in developing countries. Drawing on a dataset of urban unrest in 55 major cities in 49 Asian and African countries for the period 1961–2010, we find the effect of global food prices on protests and rioting is contingent on regime type: democracies are more prone to urban unrest during periods of high food prices than autocracies. We show that this is due both to the more permissive political opportunity structure in democratic systems and to systematic differences in food policy across regimes of different types. Relative to autocracies, democracies pursue policies that are more favorable to the rural sector and less favorable to the cities. The findings have longer-run implications. To the extent that climate change will make many developing countries more dependent on food imports, and that prices could rise and be more volatile, we suggest another vector by which climate change may affect political unrest. Our findings highlight the importance of both political institutions and policy choices in mediating global shocks.

Keywords

contentious politics, food prices, political economy

The rapid inflation in global food prices since 2000, and the acceleration of that increase in 2007–08 and 2010–11, has again raised the question of whether price shocks pose threats to political stability in the developing world. Protests and riots related to food prices took place in over 30 countries in 2007–08 (Brinkman & Hendrix, 2011). The import-dependent Middle East witnessed food riots in Egypt, Jordan, Yemen, and Morocco. Demonstrations took place in Ethiopia, Burkina Faso, Senegal, Mozambique, Mauritania, Cameroon, Côte d'Ivoire, and Guinea. In Asia, people took to the streets in Bangladesh, India, the Philippines, Cambodia, and Thailand. In 2010–11, food price-related protests recurred in several African countries including Algeria, Guinea-Bissau, Kenya, Libya, Mauritania, Mozambique, Senegal, Somalia, Sudan, Togo, and Uganda (Salehyan et al., 2012), as well as Bangladesh, China, and India. Across North Africa and the

Middle East, spiraling food prices were among the stated grievances of Arab Spring protesters in 2011.

High prices are not only a function of short-run market dynamics. Structural changes in world agricultural production, trade, and climate are also at work. In the 1960s, Africa and Asia exported roughly as much food as they imported. By 2011, these two regions had become much more dependent on imports. African nations ran food trade deficits of \$30.1 billion USD; Asia's food trade deficit had ballooned to \$96.6 billion USD, doubling since 2006 (FAOSTAT, 2014). Over the longer run, global warming could fundamentally alter the distribution of world agricultural output and

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exacerbate volatility in prices. The 2014 Intergovernmental Panel on Climate Change Assessment Report identifies warming, increasing aridity, and increasing climatic variability as some of the main consequences of global climate change. The Intergovernmental Panel on Climate Change (IPCC) predicts with medium confidence that food prices may rise as much as 84% by 2050 as a result of climate change, with increasing volatility and some risk of precipitous increases (IPCC, 2014). These pressures are likely to be greatest in poor countries, where substantial shares of the population already face food insecurity.

The development policy community is amply aware of the political challenges associated with rising and volatile global prices (for example, Asian Development Bank, 2008). There is also a long tradition of academic work on the issue, including important historical debates about the causes of food riots in early modern Britain and France (Tilly, 1971; Snyder & Tilly, 1972). A generation of work on so-called 'IMF riots' underscored the political effects of structural adjustment measures, including devaluations and the reduction of subsidies that affected food prices (Bienen & Gersovitz, 1986; Walton & Seddon, 1994; Abouharb & Cingranelli, 2007). This literature has similarities with a longstanding tradition of considering the relationship between global macroeconomic shocks and domestic politics and policy (Gourevitch; 1986; Bates, 1998).

More recently, however, attention has focused on the political effects of price shocks, especially those emanating from global markets. Bellemare (forthcoming) finds that food prices are a significant determinant of protests and riots¹ in which food prices were among the stated motivations of demonstrators. However, he does not address the possibility that food prices might be related not only to food riots but to other forms of social unrest as well. Arezki & Brückner (2011), for example, find that higher global food prices are associated with an increase in antigovernment demonstrations and riots in low-income countries.

While we address the potential mediating effect of income, we move beyond their analysis to look at the mediating effects of political institutions. In modeling the political response to global price shocks, it is important to be attentive to the effects of domestic politics and policy as well. In contrast to the historical debates referenced above (Tilly, 1971; Snyder & Tilly, 1972) most

studies of the effects of price increases have not taken this analytic step. There are a number of causal routes through which domestic political factors might mediate between global price shocks and protest; we focus on two. The first is the opportunity structure. The capacity of groups to mobilize is a function of political institutions that facilitate – or impede – collective action. In the face of any given grievance, adversely affected groups face more or less permissive political conditions for protest. A second route is through policy. In developing countries, policy interventions historically favored urban consumers at the expense of the rural sector. If consumers are sheltered from global price shocks by state intervention, they should be less likely to respond through contentious politics.

In this article, we explore the relationship between global food prices and urban unrest, taking into account the role of these mediating domestic political and policy factors. We draw on data on urban unrest in 55 major cities in 49 mostly developing Asian and African countries for the period 1961–2010. The effects of rising food prices are complex and cross-cutting, bringing benefits to some producers and traders while imposing costs on net consumers of food, whether urban or rural. Poor rural consumers may be more vulnerable than urban-dwellers, who typically have higher incomes and greater access to markets. Yet there are good theoretical reasons to focus on urban consumers, as they are more concentrated, more likely to engage in collective action, and more likely to garner the attention of political elites.

We first consider the effects of regime type, which could influence urban unrest through both the opportunity structure and policy channels. We consider not only the differences between democracies and authoritarian regimes but also the behavior of publics in anocracies, or semi-competitive authoritarian regimes that permit some contestation and opportunity for independent collective action. We would expect that more democratic regimes would provide greater opportunity for protest than less democratic ones.

Regime type might also operate on protest via a policy channel. Using a dataset on revealed bias in farm-gate pricing of agricultural products, we are able to test whether democratic governments are more responsive to rural constituencies than more autocratic governments, *ceteris paribus*, and thus less likely to intervene in favor of urban consumers by suppressing prices. To address this issue, we model agricultural distortions as a function of regime type.

We find that the effects of global food prices on protest are mediated by regime type. Global food prices are

¹ We use the terms 'protest and rioting' and 'urban unrest' interchangeably.

correlated with urban unrest in democracies, but not in autocracies. We find that food policy in democracies is less biased in favor of urban constituencies. As a result, part of the effect of democracy on urban unrest flows through its effect on food policy. Moreover, because of the long temporal extent of the data, we demonstrate that food prices affected urban unrest long before the most recent price spikes.

International shocks and domestic response: Food prices, regime type, and urban unrest

Our dependent variable encompasses protests, demonstrations, and riots. These forms of contentious politics should be distinguished from armed rebellion aimed at the overthrow of the government, and from revolutions, which overthrow the political regime and even the class structure. Although we explore some important differences across these various forms of collective action, there is a growing recognition of some similarities in the underlying causal mechanisms that might generate contentious politics (McAdam, Tarrow & Tilly, 2001).

The theoretical links between price movements and protest can be grounded in traditions of research on protest going back to the relative deprivation hypothesis. Initially formulated in psychological terms and defined in terms of a perceived entitlement or expectation (Gurr, 1968, 1970), these approaches are consonant with prospect theory and contemporary psychological models that have informed behavioral economics (Tversky & Kahneman, 1991). Feelings of deprivation can also arise not only from interpersonal or intergroup comparisons, but from intertemporal comparisons as well: how an individual's assessment of current welfare compares to their assessment of past welfare (Sayles, 1984).

The argument would seem particularly plausible for food, which is the most basic of all necessities and the one most likely to embody explicit or implicit political entitlements (Dreze & Sen, 1989). Food prices have particular influence on the welfare of poor households that are net purchasers of food. The share of food in total household expenditure in developing countries averages 49.4% and can exceed 70% in poor households (for example, in Ghana, but also in Pakistan and Tajikistan) (Brinkman & Hendrix, 2011; FAO, WFP & IFAD, 2011). Initial estimates suggested that the increases in food prices from 2000 through 2008 contributed to expanding the share of hungry people in the world from around 800 million to 900 million, with particular increases in Asia and Africa (FAO, 2008). Subsequent estimates reached more modest conclusions, and

emphasized the heterogeneous effects of food price increases (FAO, WFP & IFAD, 2012; Verpoorten et al., 2013).

Nonetheless, it is plausible that the grievances associated with higher food prices will be more substantial when aggregate incomes are lower and a larger share of households are thus at risk. For this reason, we restrict our analysis to looking at urban centers in Africa and Asia. These world regions are home to over 90% of the world's undernourished (FAO, 2013). Moreover, of the 20 most populous countries in Africa, all are net cereal importers (FAO, 2013). Some of the 20 most populous Asian countries run large trade surpluses in food; Thailand and Vietnam are major rice exporters. As a whole, however, the region is also a net importer of food.

High prices are not necessarily an unalloyed blessing for the rural sector. While they help rural producers, they may have particularly devastating effects on poor rural households that are net consumers of food. Nonetheless, while urban dwellers typically have higher incomes, the effects of rising prices are likely to be more uniformly adverse (Verpoorten et al., 2013). More importantly for our purposes, the capacity of urban residents to engage in collective action is clearly much more substantial than rural dwellers.

The causal chain running from global food markets to urban unrest can pass along a number of different routes. First, the political opportunity structure is a key determinant of whether grievances result in popular mobilization. Famine in North Korea claimed between 600,000 and one million lives during the mid-1990s, but no rioting or demonstrations occurred in Pyongyang. By contrast, comparatively small price movements – and in the presence of ample food stocks – brought trade unions into the streets of Delhi in 2011.

Given the heterogeneity of the countries in the sample, regime type provides an extremely important first cut at the political opportunity structure and the relative costs to expressing grievances publicly (Tilly, 1978; McAdam, Tarrow & Tilly, 2001). For any given level of grievance emanating from global price shocks, highly repressive autocratic regimes should be better positioned to deter public displays of discontent and to repress them if they transpire (Goodwin, 2001). These particular forms of collective action should be more common where aggrieved citizens are either legally allowed to engage in protest and public manifestations are considered legitimate mechanisms for expressing grievances, as in democracies, or where semi-authoritarian governments choose to tolerate such acts of dissent, as in intermediate or anocratic regimes. In these relatively more open regimes, political entrepreneurs have incentives to

mobilize their partisans and civil society forces around popular grievances, and generally do not face high costs – in the form of state repression – for doing so.

The second intervening variable of interest is the extent to which government interventions of various sorts either dampen or exacerbate the effects of international shocks on urban consumers. Urban bias – the tendency for governments in developing countries to be more responsive to the concerns and preferences of urban residents at the expense of rural dwellers – is well documented (Lipton, 1977; Bates, 1981; Bezemer & Headey, 2008; Wodon & Zaman, 2009). One of the clearest manifestations of urban bias has been in food policy. Governments in the developing world have frequently sought to dampen food prices paid by urban consumers. Although introducing economic distortions, such interventions have an equally obvious political rationale: the greater the extent of government intervention in favor of urban consumers, the less likely grievances associated with high prices will translate into urban unrest.

Marketing boards, consumer subsidies or price controls, and export taxes or even bans are three particularly well-known mechanisms by which governments have intervened in food markets to the benefit of urban consumers and the detriment of rural producers. While marketing boards were ostensibly designed to stabilize farm incomes and provide agricultural extension services, their operations tended to tax rather than support farmers, particularly in Africa (Bezemer & Heady, 2008). Marketing boards exploited monopsony power to set prices below what they would have been in more competitive markets, effectively subsidizing urban food consumption and industrial uses of agricultural commodities.

General consumer subsidies and price controls also tilt the distribution of benefits toward comparatively affluent, urban households. General subsidies lower prices for all consumers regardless of need. The welfare benefits of lower prices are, in theory, proportionally larger for poor households, which spend larger shares of their income on food. But more well-off households and those living in more urban areas are frequently better positioned to exploit these opportunities (Dreze & Sen, 1989; Wodon & Zaman, 2009).

Finally, export restrictions increase domestic food supplies, but impose opportunity costs on both domestic farmers and foreign consumers. In the domestic arena, producers forego the benefit of higher prices and the incentives to increase supply. Internationally, export restrictions are classic beggar-thy-neighbor policies, which throw costs of adjustment onto international markets, leading to higher prices and volatility. Export

restrictions may have increased world rice and wheat prices by 35% and 25%, respectively, during the 2007–08 crisis (Martin & Anderson, 2012).

In all political systems, rulers risk removal from office, whether from internal coups, popular upheaval or the ballot box. Rulers thus invest in policies that favor those segments of society that pose the most credible political threats. For autocrats that do not face electoral constraints, these political threats are most likely to arise from mobilized urban dwellers, and even from the middle and upper classes. Autocrats thus face relatively stronger incentives to intervene in markets to protect urban consumers, thus dampening protest through concessions as well as repression and control (Wallace, 2013). These protections, whether taking the form of direct consumer subsidies, price controls or export bans amount to transfers from the rural sector to urban consumers.

In democracies, by contrast, leaders risk removal from office by losing elections as well as from contentious politics. Democratic institutions thus generate more complex political incentives. While leaders in developing democracies must pay attention to the risks arising from contentious politics in urban areas, the median voter in a developing country is typically poor and lives in a rural area. In 2010, rural dwellers made up 72.4%, 61.7%, and 51% of the total population in low, lower-middle, and middle-income countries respectively (World Bank, 2013). A number of studies have shown how electoral incentives affect the stance of government toward the rural sector in developing democracies (Stasavage, 2005; Blaydes & Kayser, 2011). *Ceteris paribus*, developing democracies should be less likely to intervene in ways that transfer welfare from rural producers to consumers. This may be good policy given the concentration of poverty in rural areas, but it suggests that a global price increase is more likely to translate into higher consumer prices in democracies than in autocracies. Thus, democracies may witness more protest not only as a result of the political opportunity structure, but because of policies they pursue with respect to the rural sector.

The preceding discussion informs the main conditional hypothesis we test in the remainder of the article:

Hypothesis 1: Global food prices will be positively associated with protest and rioting in democratic regimes, but not in autocratic regimes.

The previous discussion also yields two additional hypotheses regarding the causal mechanisms mediating the effects of food policy interventions.

Hypothesis 2: Democracy will be associated with less urban bias in food policy.

Hypothesis 3: Greater urban bias in food policy will be associated with reduced incidence of protest and rioting.

Data, estimation, and results

Our theory relates global food prices to the level of urban protest and rioting in developing countries, conditional on income and regime type. An important feature of our analysis is that the data are not limited to food riots per se, as in Bellemare (forthcoming).² Rather, we seek to link food prices to contentious politics more generally, whether protest centers specifically on food prices or not.

Variables

The dependent variable, protests and riots, is derived from the PRIO Urban Social Disturbance in Africa and Asia (henceforth USDAA) database (Urdal & Hoelscher, 2012).³ The USDAA data were coded from Keesing's *Record of World Events* and include a range of contentious political action, from nonviolent demonstrations to acts of terrorism, riots, armed attacks by militant groups, and repressive responses by governments. The data cover 55 major cities in 49 countries across Africa and Asia over the period 1960–2010.⁴ Africa and Asia are home to 92% of the world's food-insecure population (FAO, 2013) and 28 of the 29 'food riots' identified by Lagi, Bertrand & Bar-Yam (2012) that occurred during the 2007–08 and 2010–11 global food price spikes.

Our coding, *protests and riots*, uses the event narratives to limit our dependent variable to nonviolent demonstrations and riots.⁵ Protests refer to distinct, continuous, and largely peaceful action staged by members of a political or identity group against the government or another group; riots refer to the same phenomenon, but with the presence of violence (Urdal, 2008). The cities display significant heterogeneity with respect to the prevalence of

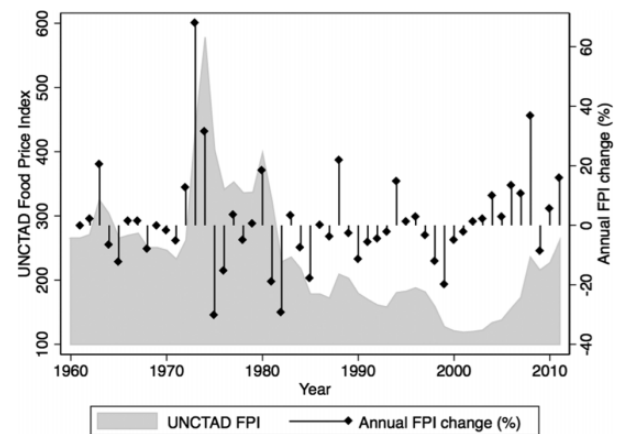


Figure 1. Global food prices and changes, 1960–2011

protests and riots: an average of 2.4 protests per year occurred in New Delhi, while Ashgabat, the capital of Turkmenistan, experienced only one over the 50-year period. The mean value is 0.7, while the modal value is zero (67.8% of city-year observations). More than one event occurs in 15.8% of city-year observations, while more than eight events occur in roughly 1%. The online appendix presents a list of cities included in the analysis.

To model global food prices, we use the United Nations Conference on Trade and Development (UNCTAD) Food Price Index (FPI) (UNCTAD, 2013).⁶ The index includes staple grains, sugars, meat, and vegetable oilseeds and is taken from the trading desks at the relevant exchanges, such as Chicago and Bangkok.⁷ Figure 1 displays the UNCTAD Food Price Index for 1960–2011, as well as annual percentage changes (in constant 2005 US dollars). Although there have been media reports to the contrary, the recent spikes in global food prices are not unprecedented: several shocks occurred during the period under study, both positive and negative. While food prices were declining through the 1960s, the early 1970s witnessed the highest food prices on record, peaking in 1974. This spike was due to significant increases in oil prices, which affected

² Bellemare's analysis is conducted using monthly data at the global level. It cannot be used as an alternate specification of our dependent variable, which necessarily locates protests in particular countries and urban centers.

³ The USDAA can be accessed at <http://www.prio.no/CSCW/Datasets/Economic-and-Socio-Demographic/Urban-Social-Disturbance-in-Africa-and-Asia/>.

⁴ Data were not collected for Latin America.

⁵ The city-year counts are compiled by summing the total of 'ptypes' 50 (organized violent riot), 51 (spontaneous violent riot), 60 (organized demonstration), and 62 (spontaneous demonstration).

⁶ Because the index is based on prices in current US dollars, we deflate the index using the US GDP deflator (Heston, Summers & Aten, 2012).

⁷ Recent work on food prices and protest generally uses either the FAO or the IMF food price index (FAO, 2014; IMF, 2014). Because all three indices reflect trade volume-weighted values for very similar baskets of commodities, the three series are highly correlated: UNCTAD and FAO indices ($r = 0.95$), UNCTAD and IMF ($r = 0.97$). The advantage of the UNCTAD series is that it provides much longer temporal coverage: the FAO index is only available starting in 1990; the IMF index starts in 1980.

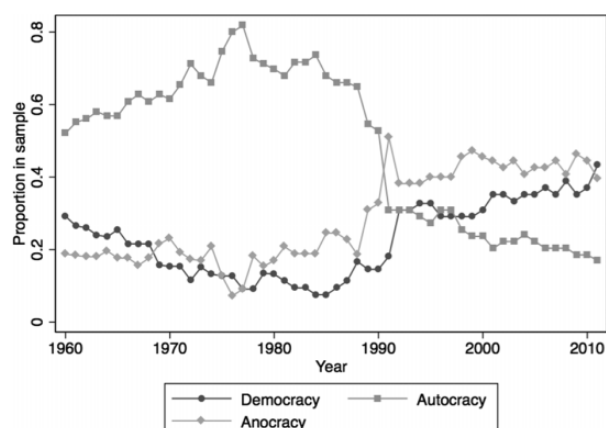


Figure 2. Democracy, anocracy, and autocracy in Africa and Asia, 1960–2011

the costs of inputs and transportation, and a fall in production by major food exporters – the United States, Canada, Australia, and Argentina – just as the Soviet Union entered world markets with massive purchases. Subsequent periods of high prices occurred in 1979–80 (again, partly a result of Soviet buying), in 1988–89 and 1996 (weak US crops), and finally in the gradual increase in prices during the worldwide economic boom of the first half of the 2000s, capped by the spiraling price increases and international food crises of 2007–08 and 2010–11.

We use the Polity IV dataset to model regime type (Marshall & Cole, 2011). Our specifications use a tripartite classification of regimes: democracy, anocracy, and autocracy. This classification is based on the revised combined Polity2 score, which ranges from –10 (‘fully institutionalized autocracy’, characterized by little citizen participation, routine transfer of authority within the political elite, and the absence of effective checks on executive power) to 10 (‘fully institutionalized democracy’, with open political participation and electoral competition and meaningful checks on executive power) (Marshall & Cole, 2011). We follow the Polity Project’s recommendations and emerging norms by coding a country as democratic if $\text{Polity2} \geq 6$, anocratic if $-5 \leq \text{Polity2} \leq 5$, and autocratic if $\text{Polity2} \leq -6$. Anocracies are ‘intermediate’ regimes, and include governments with stable, centralized institutions but uncompetitive elections or other constraints that tilt electoral and political outcomes in favor of incumbents or limit political and civil liberties; Singapore provides an example. However, the category includes also situations where control of the government is fragmented (Democratic Republic of the Congo post-1992) or absent altogether (Somalia post-1988).

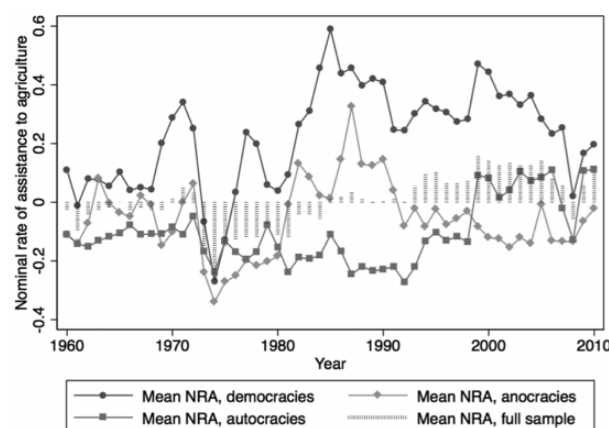


Figure 3. Agricultural assistance by regime type, 1960–2010

As we are interested in the conditional effects of continuous variables as mediated by regime type, this dummy coding renders interpretation of results clearer. Results are robust to the use of an alternative measure of regime type from Cheibub, Gandhi & Vreeland (2010).⁸ As Figure 2 demonstrates, there are general temporal trends in the data, with the proportion of autocratic governments in the sample highest during the 1970s and 1980s and with democracies relatively more prevalent at earlier and later periods.

In order to model the degree of urban/rural bias in food-related policy interventions, we use the Estimates of Distortions to Agricultural Incentives data (Anderson et al., 2008). The data reflect distortions to farm-gate prices arising from a number of policy interventions, including import and export taxes, subsidies, export quotas, domestic taxes or subsidies on farm outputs or inputs, and direct consumer subsidies for food staples. The variable, nominal rate of assistance (NRA), is the proportion by which government policies have raised (if $\text{NRA} > 0$) or lowered (if $\text{NRA} < 0$) returns to farmers above what they would be without the government’s intervention. The data have a mean of 0.01 and range from –0.87 (Mozambique, 1975) to 2.26 (Republic of Korea, 2004), with lower values reflecting a greater degree of urban bias in food policy and higher values reflecting a greater degree of rural bias in food policy. Zero reflects net policy neutrality, although perhaps with offsetting interventions. A value of 1 would correspond to a doubling of farm-gate prices relative to world markets; –0.5 would mean farm-gate prices were suppressed to one-half of those prevailing in world markets. We

⁸ See the online appendix, Table A5.

expect that higher values will be associated with a greater frequency of protest and rioting, as they proxy policy favoring rural interests at the expense of urban interests.

Simple descriptive statistics indicate democracies are more pro-rural in their agricultural policy. Democracies have higher NRA scores than autocracies (mean $NRA_{\text{autocracy}} = -0.14$, mean $NRA_{\text{democracy}} = 0.24$, $p < 0.001$) and anocracies (mean $NRA_{\text{anocracy}} = -0.05$, mean $NRA_{\text{democracy}} = 0.24$, $p < 0.001$). However, this difference could be due to omitted variable bias – both more pro-producer agricultural policy and democracy may be associated with higher incomes – so more rigorous testing is required. Figure 3 plots the yearly mean NRA by regime type for the period under study. Until the early 1970s, NRA was relatively similar across regime types, with the divergence between regime types emerging in the aftermath of the 1974 food price spike. All regime types responded to the 1974 spike in prices with shifts to pro-consumer policies. As the crisis subsided, however, democratic (and, to a lesser extent, anocratic) regimes began instituting pro-producer policies. By the mid-1980s, democracies had increased prices paid to producers by roughly 40% relative to world prices. In the 2000s, agricultural policy has become progressively more pro-producer across regime types, save for 2008, when governments intervened in markets to protect consumers.

To model level of development or mean income, we use log-transformed real GDP per capita (Heston, Summers & Aten, 2012). The sample includes high-income Asian countries (Japan, South Korea, Singapore), post-Soviet Central Asian republics, and low-income African and Asian countries (Nepal, Tanzania, Zimbabwe).

In addition to our theoretical variables of interest, we include several controls at both the country and city levels. We control for global oil prices by including real oil price per barrel in constant 2012 dollars and interaction terms with the regime type variables; data are from British Petroleum (2013). To the extent that global oil prices track food prices, the FPI measures might be capturing the effect of other global price shocks.⁹ We control for GDP growth in order to isolate the effects of global prices from more general economic conditions. Prior research indicates that political unrest is less prevalent in times of economic prosperity, and that high food prices are more destabilizing in low-income countries

(Blattman & Miguel, 2010; Arezki & Brückner, 2011). To test this last conjecture, we include an interaction between log GDP per capita and FPI in some specifications.

We control for trade openness ((exports + imports)/GDP) in order to isolate the effect of global prices from any more general effects of economic openness that may operate (Bussmann & Schneider, 2007). We also control for exchange rate levels by including the logged exchange rate vis-à-vis the US dollar. Higher exchange rates (i.e. more units of local currency to purchase a dollar) erode purchasing power, although it bears note that the widespread currency devaluations of the 1980s and 1990s – part of broader programs of structural adjustment – coincided with a period of comparatively low world prices. Both trade openness and exchange rates are from Heston, Summers & Aten (2012). Finally, in some models, we control for both population and population growth at the city level; more populous cities and cities experiencing rapid population growth may experience more unrest, though previous research challenges this simple assertion (Buhaug & Urdal, 2013).¹⁰ We use the population estimates from the UN Demographic Yearbook with linear interpolation and extrapolation (Buhaug & Urdal, 2013).

We include a time trend in order to mitigate the risk that we are capturing general linear trends in the protest and riot data, perhaps due to changes in reporting on protest and rioting in the developing world.¹¹ Finally, we include a dummy indicator for the end of the Cold War and dissolution of the Soviet Union (years 1990–92); this period was exceptionally tumultuous, as both the United States and the Soviet Union rapidly withdrew development and military assistance from developing countries. We lag all independent and control variables in order to mitigate concerns about endogeneity. Descriptive statistics for all variables can be found in Appendix 1.¹²

As discussed earlier, there is significant unit heterogeneity with respect to average levels of protests and riots.

⁹ While food and oil prices have been highly correlated since 2000 ($r = 0.9$), over the entire period the correlation is relatively weak ($r = 0.13$).

¹⁰ These variables are only available for a restricted temporal domain (1960–2006), so they are not included in the core specifications.

¹¹ The zero-inflated negative binomial models, included in the online appendix, address the potential for systematic underreporting of protests and rioting in more autocratic regimes.

¹² Results are robust if contemporaneous measures are used as well, though the coefficient on economic growth is much larger, negative, and statistically significant. This is likely due to the endogenous nature of economic growth to political unrest (Blattman & Miguel, 2010).

Because the dependent variable is collected at the city-year level while control variables are mostly available at the country-year level, the inclusion of controls only partially mitigates this issue. In order to address unmodeled unit heterogeneity, we estimate all models with city fixed effects. These estimators eliminate the cross-sectional elements from the data, and reported coefficients thus reflect longitudinal changes within units. This specification is ideal given our theoretical focus on how grievances are associated with intertemporal changes in food prices that are associated with declining welfare, and increased perceptions of loss and grievance.

Results: Price shocks, regime type, and urban unrest

Table I presents the main results of our panel analysis of 55 urban centers in Africa and Asia, 1961–2010. We present the results of fixed-effects negative binomial regression models with errors clustered on years, since one of our main independent variables of interest (FPI) is constant by year; clustering on years partially accounts for otherwise unmodeled common shocks that might affect all cities similarly in a given year.¹³ Results for fixed effects OLS regression, conditional fixed-effects negative binomial regression, and zero-inflated negative binomial regression are consistent with those reported here and presented in the online appendix.¹⁴

Model 1 tests the basic, unconditional effects of the main variables of interest, excluding controls. With all other values held constant at their means, a one standard deviation increase in the FPI from its mean value (231.7 to 325.9) is associated with a 13.0% increase in the frequency of protests and rioting. Model 1 provides some evidence for the effects of the political opportunity structure as well, with both semi-competitive anocratic regimes experiencing more protests and riots than autocratic regimes ($p < 0.01$). The coefficient on democracy is positive, as expected, but not statistically significant.

In order to test the conditional argument about the mediating effects of domestic politics, Model 2 introduces interaction terms for regime type and global food prices (FPI*Democracy and FPI*Anocracy). Interaction

terms complicate interpretation of coefficients, as levels of statistical significance are conditional on the mediating variable taking on a value of zero (Braumoeller, 2004). The dummy specification of regime type simplifies interpretation somewhat. The coefficient on FPI represents the effect of global food prices in an autocracy, while the coefficients on the democracy and anocracy variables represent the effect of regime type on protest and rioting when the FPI equals zero – the effect necessarily varies across observed values of the interacted variable. In order to assess the impact of global food prices in democracies and anocracies, one must calculate the conditional slope as an additive function of the coefficients on FPI and the interaction terms.

In Model 2, the coefficients on both FPI*Democracy and FPI*Anocracy are positive and significant ($p < 0.01$), indicating that the frequency of protest and rioting increases as global food prices rise in both democracies and anocracies. A one standard deviation increase in the FPI from its mean value is associated with a 35.0% increase in the frequency of protest and rioting in democracies and a 28.9% increase in the frequency of protest and rioting in anocracies. However, the uninteracted term (FPI) is negative and insignificant: global food prices are not correlated with protest and rioting in autocracies, and the coefficient estimate is very close to zero.

Model 3 includes several additional controls for oil prices, level of development and rates of economic growth, an interaction between level of development and FPI, and controls for exchange rate levels and trade openness. The inclusion of these controls has virtually no impact on either the statistical significance or the estimated coefficients for FPI*Democracy ($p < 0.01$) and FPI*Anocracy ($p < 0.05$). We find no evidence that global oil prices are a significant determinant of protests and rioting, nor for the interaction between GDP per capita and FPI. Our findings likely diverge from Arezki & Brückner (2011) due to our use of fixed effects and our sample, which includes few high-income countries. Model 4 includes city-level controls for population and population growth. Once again, their inclusion does not alter the main findings.

Figure 4 plots the coefficient estimates and 95% confidence intervals for FPI, FPI*Democracy, and FPI*Anocracy from the various specifications of Model 2: negative binomial with errors clustered on years, negative binomial with errors clustered on cities, OLS with errors clustered on years, zero-inflated negative binomial with errors clustered on years, and finally conditional fixed effects negative binomial regression. The coefficient on the uninteracted FPI switches signs and is always close

¹³ Alternate specifications, with errors clustered on cities, are reported in the online appendix. Results are similar.

¹⁴ There is considerable diversity of opinion about the merits of these various estimators: see, for example, Allison & Waterman (2002) and Hilbe (2011). As the results of standard diagnostics for choosing negative binomial versus the zero-inflated estimator were inconclusive, we report results for the most commonly used estimator in the body of the text. There is no evidence of an incidental parameters bias in coefficient estimates (Allison & Waterman, 2002).

Table I. Global food prices and urban unrest in Africa and Asia, 1961–2010

<i>Variables</i>	(1) <i>Negative binomial w/FE</i>	(2) <i>Negative binomial w/FE</i>	(3) <i>Negative binomial w/FE</i>	(4) <i>Negative binomial w/FE</i>	(5) <i>Negative binomial w/FE</i>	(6) <i>Negative binomial w/FE</i>	(7) <i>Negative binomial w/FE</i>
FPI _{<i>t</i>-1}	0.001* (0.001)	-0.000 (0.001)	0.002 (0.004)	0.004 (0.004)	0.001 (0.005)	-0.000 (0.005)	-0.002 (0.005)
FPI*Democracy _{<i>t</i>-1}		0.004** (0.001)	0.004** (0.001)	0.004** (0.001)	0.006** (0.002)	0.006** (0.002)	0.006** (0.002)
FPI*Anocracy _{<i>t</i>-1}		0.003** (0.001)	0.003* (0.001)	0.003** (0.001)	0.003* (0.001)	0.003* (0.001)	0.003* (0.001)
FPI*GDP pc _{<i>t</i>-1}			-0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
Oil price _{<i>t</i>-1}			-0.001 (0.003)	-0.001 (0.003)	0.004 (0.003)	0.004 (0.003)	0.005 (0.003)
Oil*Democracy _{<i>t</i>-1}			-0.004 (0.004)	-0.008 (0.006)	-0.012** (0.004)	-0.011* (0.004)	-0.011* (0.005)
Oil*Anocracy _{<i>t</i>-1}			0.001 (0.004)	0.002 (0.004)	-0.003 (0.004)	-0.003 (0.004)	-0.004 (0.003)
NRA _{<i>t</i>-1}						0.251 (0.180)	-0.315 (0.335)
NRA*Democracy _{<i>t</i>-1}							0.662* (0.326)
NRA*Anocracy _{<i>t</i>-1}							0.652* (0.291)
Democracy _{<i>t</i>-1}	0.148 (0.150)	-0.673* (0.307)	-0.815* (0.389)	-0.617 (0.403)	-1.165** (0.452)	-1.214** (0.453)	-1.243** (0.443)
Anocracy _{<i>t</i>-1}	0.480** (0.122)	-0.253 (0.315)	-0.437 (0.359)	-0.461 (0.335)	-0.410 (0.401)	-0.414 (0.401)	-0.403 (0.390)
log GDP pc _{<i>t</i>-1}			0.168 (0.150)	0.389* (0.154)	0.131 (0.211)	0.004 (0.234)	-0.082 (0.248)
GDP growth _{<i>t</i>-1}			-0.028** (0.006)	-0.030** (0.006)	-0.017* (0.009)	-0.018* (0.009)	-0.018* (0.009)
Trade openness _{<i>t</i>-1}			0.006** (0.002)	0.004* (0.002)	0.006* (0.002)	0.006** (0.002)	0.007** (0.002)
log Exch. rate _{<i>t</i>-1}			0.023 (0.041)	0.039 (0.044)	0.048 (0.066)	0.048 (0.067)	0.067 (0.067)
City growth _{<i>t</i>-1}				0.010 (0.006)			
log City pop. _{<i>t</i>-1}				0.571** (0.185)			
End Cold War	0.556** (0.194)	0.531** (0.167)	0.594** (0.172)	0.554** (0.197)	0.440** (0.139)	0.446** (0.133)	0.427** (0.129)
Time trend	0.015** (0.004)	0.017** (0.004)	0.014† (0.007)	-0.011 (0.013)	0.014 (0.009)	0.015† (0.009)	0.015† (0.009)
Constant	-29.521** (7.481)	-32.604** (7.791)	-27.949* (13.890)	13.372 (23.233)	-27.583† (16.495)	-29.861† (16.604)	-29.574† (16.622)
N	2,661	2,661	2,293	2,098	1,504	1,504	1,504
Clusters	50	50	50	47	50	50	50
Period	1961–2010	1961–2010	1961–2010	1961–2006	1961–2010	1961–2010	1961–2010

†*p* < 0.1, **p* < 0.05, ***p* < 0.01. Standard errors, clustered on years, in parentheses.

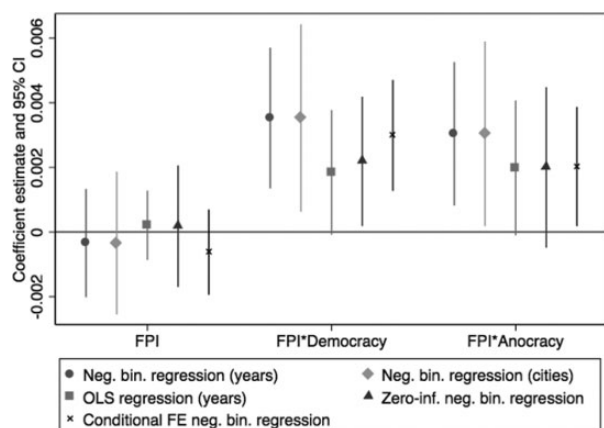


Figure 4. Comparing coefficient estimates across estimators and error structures

Clustering units are in parentheses.

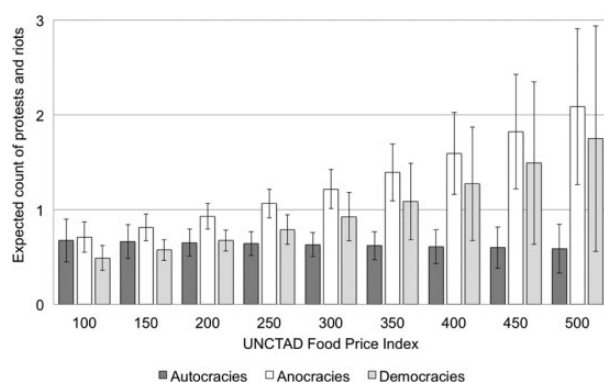


Figure 5. Global food prices and urban unrest in Africa and Asia, by regime type

to zero. FPI*Democracy is significant in all five specifications, while the coefficient estimates on FPI*Anocracy are significant in four of five specifications. The result seems robust across estimators and assumptions about the error structure.

Figure 5 plots quantities of interest (expected number of protests and riots) against FPI, using coefficient estimates from Model 2. For both anocracies and democracies, higher food prices are associated with an increased frequency of protests and riots. However, the proportional effect of food price levels in democracies is larger than in anocracies; for autocracies, it is never statistically significant.

Further investigation indicates the findings regarding the conditional effect of food prices in anocracies are less robust than those for democracy, however: the interaction term is only statistically significant in one of three specifications estimated with conditional fixed effects, and only in two of three specifications using the zero-inflated

negative binomial estimator (online appendix). The coefficients on the FPI*Democracy interaction term are highly significant, both statistically and substantively, and of consistent magnitude across estimators. This exercise demonstrates that the relationship is positive for democratic regimes – as food prices increase, so do protest and rioting – mixed for anocracies, but essentially flat for autocratic regimes.

Results: Effects of opportunity structure and policy

Thus far, our findings simply identify a conditional correlation between food prices and urban unrest, with democratic regimes experiencing more protest and rioting in times of high prices. This provides support for Hypothesis 1, but does not provide any leverage on the question of mechanisms: whether the finding is due to a more permissive opportunity structure and/or less pro-consumer policies in democracies. To get at this question we estimate the additional models including NRA, the measure of urban/rural bias in agricultural policy. Recall that higher values indicate higher rates of assistance to producers and lessened urban bias (i.e. production or input subsidies, price controls above market rates, etc.).

Availability of the NRA data restricts the size of these samples significantly, though Model 5, run on the same sample and excluding the NRA variable, demonstrates that coefficient estimates for variables of interest are of similar magnitude and significance across the sample sizes. Model 6 introduces this mediating policy variable. The coefficient estimate is positive, but not statistically significant.¹⁵ Once interacted with the regime variables, however, a pattern emerges. Higher rates of support to the agricultural sector are associated with a significant increase in protests and rioting in democracies and anocracies when compared with autocracies.¹⁶ A one standard deviation increase from the mean value for NRA (0.05 to 0.5) is associated with a 17% increase in the frequency of protests and rioting in democracies and a 16.4% increase in anocracies. This finding supports the conjecture that urban bias in agricultural policy lessens urban unrest (Hypothesis 3), though the effect is conditional on regime type.

Note, however, that the inclusion of NRA does not affect the coefficient estimate or statistical significance

¹⁵ The uninteracted coefficient on NRA is positive and significant under the conditional fixed-effects specification and in the estimations using the alternate democracy measure (Tables A2 and A5, Model 6, in the online appendix).

¹⁶ This finding is robust under the OLS with fixed effects, zero-inflated negative binomial, and negative binomial with errors clustered on cities specifications.

of the FPI*Democracy or FPI*Anocracy parameters. Rather, it results in a slight increase in the magnitude of the effect of the democracy term ($\beta_{\text{Democracyw/outNRA}} = 1.165^{**}$, $\beta_{\text{Democracyw/NRA}} = -1.243^{**}$): the baseline number of protests and riots is lower in democracies when NRA is not modeled. This supports the conjecture that some of the effect of democracy operates through NRA; we take up the issue of the magnitude of the effects operating through these two channels below.

The control variables produced several findings that were interesting in their own right. Confirming a vast prior literature on economic shocks, we find that economic growth has a dampening effect on urban unrest. We find no evidence that oil prices are associated with an increase in unrest; if anything, higher oil prices appear to have a counterintuitive dampening effect on urban unrest in democracies ($p < 0.05$, Models 5–7). This finding is at odds with the conventional wisdom that high fuel prices lead to urban unrest. However, most governments intervene in fuel markets as much (or more) than in markets for food, so these findings should not be considered dispositive; much more work would be required to explore the links between fuel price increases, government subsidies and supports, and protest. More open economies experience more urban unrest, though exchange rate fluctuations were not significant. We found no evidence that rates of population growth in a particular city were associated with an increase in unrest, but strong evidence that more populous urban areas experience more unrest ($p < 0.01$). Consistent with our expectations, the period coinciding with the collapse of the Soviet Union (1990–92) was particularly tumultuous ($p < 0.01$ across specifications).

While we have demonstrated conditional effects of both food prices and rural bias in food policy on urban unrest, we have yet to demonstrate whether democracies are systematically more pro-rural in their food policy interventions (Hypothesis 2). The t-tests presented earlier provide some evidence for this assertion, but the relationship could be spurious: for instance, democracy is correlated with economic development, which is also associated with more pro-producer agricultural policies. In order to investigate this conjecture further, we estimate the effect of regime type on NRA using OLS regression with various methods for addressing unit effects: panel random- and fixed-effects and panel-corrected standard errors (Beck & Katz, 1995). Here, we model NRA as a function of regime type (with auto-cracy the excluded category), economic development and the economic growth rate, prevailing global food prices and recent price changes, and the (logged) exchange rate

and trade openness. All models include year fixed effects in order to control for common contemporaneous shocks like the 1974 and 2007–08 food price spikes.

The results presented in Table II provide evidence in support of Hypothesis 2: democracies, *ceteris paribus*, are more pro-rural in their agricultural policies. The coefficient estimates on democracy are positive and highly statistically significant ($p < 0.01$), with the magnitude of the effect ranging from 0.13 to 0.25 depending on the estimator used; the mean effect (0.19) is roughly one-half of the standard deviation of NRA in the sample (0.43). The finding is robust to modeling strategies that specifically account for the serial correlation in NRA as well.¹⁷ We find similar results for anocracy, though the magnitude of the effect is halved. Oddly, neither global food prices nor recent price changes emerge as significant covariates of NRA, as one might expect, although the effects of global prices and price changes are biased toward zero by the inclusion of the year fixed effects. Figure 3 suggests that across regime types, governments are willing to intervene in pro-consumer, anti-producer ways during acute price spikes (1974, 2008). As we have argued, agricultural policy outcomes are the result of complex political dynamics, driven as much by domestic institutions and interests as by global markets and prices (Anderson, Rausser & Swinnen, 2013).

Conclusion

Despite considerable interest in the politically destabilizing effects of higher global food prices, systematic research on the issue is still relatively scant. To date, researchers have focused on income as the central factor determining whether higher global food prices catalyze political unrest. Lower average incomes imply greater average household risk and thus greater vulnerability in the face of shocks. In the broadest cross-section, this finding is intuitive: almost all the food riots that occurred during the 2007–08 price spike were in developing Africa and Asia. We reframe the discussion around the political-institutional factors conditioning the onset of urban unrest. The effects of higher global prices on urban unrest are not uniform across countries, even those at similar levels of per capita income.

Across a sample of major cities in Africa and Asia for the period 1960–2010, and using a variety of different modeling techniques, we find that:

¹⁷ Results are robust to the inclusion of a lagged dependent variable as well (see online appendix, Table A6). The non-lagged dependent variable specification is theoretically justifiable because our theory is about levels of NRA, rather than changes in NRA.

Table II. Regime type and nominal rates of assistance to agriculture, 1962–2010

	(8) <i>Random Effects OLS</i>	(9) <i>Fixed Effects OLS</i>	(10) <i>Prais-Winsten OLS</i>	(11) <i>Prais-Winsten OLS</i>
Democracy _{<i>t</i>-1}	0.188** (0.054)	0.181** (0.056)	0.254** (0.018)	0.133** (0.025)
Anocracy _{<i>t</i>-1}	0.100** (0.027)	0.106** (0.030)	0.081** (0.016)	0.061** (0.020)
log GDP pc _{<i>t</i>-1}	0.333** (0.070)	0.355** (0.085)	0.306** (0.011)	0.284** (0.026)
GDP growth _{<i>t</i>-1}	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.002)	-0.003** (0.001)
FPI _{<i>t</i>-1}	0.009* (0.004)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)
ΔFPI _{<i>t</i>-1}	0.010** (0.004)	0.000 (0.001)	0.001 (0.001)	0.001* (0.000)
log Exch. rate _{<i>t</i>-1}	0.017 (0.011)	0.014 (0.013)	0.036** (0.003)	0.033** (0.006)
Trade openness _{<i>t</i>-1}	-0.001 (0.001)	-0.001 (0.001)	-0.003** (0.000)	-0.002** (0.000)
Time trend	#	-0.006* (0.003)	-0.005** (0.002)	-0.001** (0.000)
Constant	-4.881** (1.314)	8.888† (4.721)	7.825* (3.904)	
R ²	0.590	0.577	0.622	0.293
N	1,367	1,367	1,367	1,367
Countries	34	34	34	34
Period	1962–2010	1962–2010	1962–2010	1962–2010
Panel-specific AR1 disturbance?	No	No	No	Yes
Time fixed effects?	Yes	Yes	Yes	Yes
Panel fixed effects?	No	Yes	No	No

† $p < 0.1$, * $p < 0.05$, ** $p < 0.01$. Clustered/corrected standard errors in parentheses.

#Year not estimated because of collinearity with year fixed effects.

- Global food prices are robustly and positively associated with an increase in protest and rioting, but this relationship is conditional on regime type. Democracies and, to a lesser extent, anocracies experience more unrest in times of high prices; there is no effect of global prices in autocracies.
- The degree of urban/rural bias in agricultural policy is a robust covariate of unrest as well, with more pro-rural (and thus anti-urban) policy associated with more protests and rioting.
- Finally, democracies and anocracies are significantly more pro-rural in their agricultural policies than autocracies, providing support for the influence of the policy channel on the incidence of urban protest.

By way of conclusion, we point forward to some lines for future research in this area that are currently beyond the reach of existing cross-national data or that would profit from more micro-level treatment. First, our findings with respect to regime type invite closer scrutiny.

We took regime type as a proxy for the political opportunity structure. But the regime coefficients may also be capturing something more akin to partisanship and the *responsiveness* of governments to distress. Under this interpretation, authoritarian and semi-authoritarian regimes may not simply be more repressive; rather, they may be more responsive to the concerns of urban consumers. Closer scrutiny of the political economy of food and protest would have to examine the types of social contracts that exist across regime types and how these contracts affect contentious politics (Haggard & Kaufmann, 2008; Wallace, 2013).

Reflecting on the Arab Spring can reveal some of these complexities. We expected food-related protests to be more common in democracies. However, food prices were among the grievances that motivated mass demonstrations against autocratic regimes in Tunisia, Egypt, Libya, and Syria. The dynamics of the Arab Spring may also reflect some of the risks authoritarian regimes face when attempting to inoculate themselves against protest by

shielding urban consumers from world market prices. Commitments to consumer subsidies created entitlements that were expensive to maintain but difficult to withdraw, even as fiscal pressures mounted. In 2002, Egyptian government food and fuel subsidies equaled 1.4% of GDP; by 2011, they accounted for more than 8% (Hendrix & Brinkman, 2013; IMF Survey, 2012). Commitments to market interventions encouraged evaluation of government effectiveness in terms of consumer prices that governments could not, in the end, control. When protest broke out, the well-known dynamic of repression fueling rather than dampening protest kicked in, and several leaders were deposed. While these cases are out of sample – the USDAA does not include codings for North Africa – they are indicative of the complex political economies surrounding food policy in authoritarian systems.

Further exploration of the political economy of food and agricultural policy is also warranted. Our findings identify the degree of urban/rural bias in food policy, as proxied by NRA, to be significant for urban unrest. Yet the political and economic determinants of agricultural production, a key subject in the field of development economics, have received less attention from political scientists. As Figure 3 demonstrates, agricultural policy in the countries in our sample has become significantly more pro-producer since the 1970s as countries pursued economic reforms, induced in part by debt crises and subsequent structural adjustment programs. Our findings suggest that these changes may also be due in part to democratization. In 1975, only seven of the cities in our sample were in democratic countries. By 2010, that number had increased to 21. Indeed, one of the reasons that the most recent food price spikes were so destabilizing may have been due to the diminished role of governments in securing lower prices for urban consumers. A more complete understanding of how political institutions and global markets structure incentives for intervention in agricultural and food markets is needed.

Finally, there is more to be done to fully model the economic conditions that are likely to give rise to protest. We have focused on global food prices, but we need better information on country-specific characteristics that might influence the food price–protest nexus. Developing countries vary in their dependence on external sources of supply, and global prices may be transmitted differentially across countries depending on a variety of unmodeled economic, institutional, and political parameters. Countries also differ in their vulnerability to a variety of unmodeled domestic shocks, including ecological and climatic shocks. Modeling the causal connections between climatic conditions and their proximate manifestations (temperature,

precipitation, and humidity), food prices, and protest could be the next step in fully specifying a model of vulnerability to food price-related urban unrest. While there is now a large but contested literature linking climatic conditions directly to conflict (Hsiang, Burke & Miguel, 2013; Theisen, Gleditsch & Buhaug, 2013), comparatively little research has made direct links between climatic conditions and conflict that might operate through food prices. Smith (2014), for example, uses local climatic conditions as an instrument for local food prices in assessing their impact on urban unrest in Africa.

Due to population growth and rising incomes in the developing world, increased presence of institutional investors in commodity markets, climate change, and demand for biofuels, food prices are likely to remain comparatively high for the foreseeable future. The price shocks of the 2000s, and the political instability to which they contributed, have put food back on the development agenda in a major way. The events of 2008 catalyzed USAID's \$3.5 billion Feed the Future program and the EU's €1 billion Food Facility and reinvigorated debate over integrating food trade more fully into the WTO's dispute settlement mechanisms. Extant research on the political effects of higher food prices has emphasized domestic economic conditions as the most important factor in whether or not higher global prices lead to domestic unrest. Our findings indicate political and policy factors, including institutions, mediate these effects as well.

Replication data

The online appendix, data, and annotated code for replicating the presented results, written in Stata, will be uploaded to the journal's web site, www.prio.no/jpr/datasets.

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Appendix 1. Descriptive statistics

Variable	Obs.	Mean	Std dev.	Min	Max
Protests and riots	2,661	0.72	1.65	0	32
FPI	2,661	235.78	93.25	118.28	578.55
Democracy	2,661	0.22	0.41	0	1
Anocracy	2,661	0.28	0.45	0	1
Oil price	2,661	40.08	26.06	10.64	103.71
NRA	1,530	0.01	0.43	−0.87	2.26
log GDP pc	2,348	7.33	1.02	5.19	10.82
GDP growth	2,319	2.19	6.19	−33.40	43.32
Trade openness	2,348	56.65	46.39	1.16	433.05
log Exch. rate	2,403	3.52	2.50	1.67e-13	9.90
City growth	2,422	4.15	5.14	−23.40	82.31
log City pop.	2,456	7.08	1.25	3.51	9.81
End Cold War	2,661	0.06	0.24	0	1
Time trend	2,661	1,984.87	14.33	1,961	2,010

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