



RESEARCH BRIEF – APRIL 2013

FOOD PRICE SPIKES AND SOCIAL UNREST IN AFRICA

EXECUTIVE SUMMARY

This research seeks to unravel the complex and circular relationship between food prices and social unrest in Africa and to provide insight into potential causal mechanisms. It asks the question of whether rising prices are a contributing cause of not just food riots but also social unrest more broadly defined. By focusing on domestic consumer food price indices, the prices that people actually pay for food, rather than international commodity prices, it provides insight into the much argued but rarely properly tested causal mechanism that hungry people will demand relief in potentially disruptive ways. The main finding is that a sudden increase in consumer food prices in a given month does contribute significantly to an increase in the probability of unrest in that month. Although more research is necessary to determine why people choose particular protest methods and targets, this finding provides evidence that the causal mechanism is a consumer response to economic pressure from rising food prices regardless of the cause of the increase or perceived injustices in the international food system.

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Observed food riots throughout much of Africa and the Middle East in the wake of spikes in international food commodity prices have fueled a renewed academic and popular interest in the connection between food prices and social unrest, including widespread speculation and debate about the role of food prices in the Arab Spring.¹ Dramatic weather events, diversion of crops for fuel production, and continuing volatility in international grain markets have led many to postulate that food riots will become more frequent, pervasive, and disruptive in the future.²

The proposition that rising food prices can and often do lead directly to food riots is central in both academic studies of political stability as well as political and economic policy calculations. It is, nonetheless, rather axiomatic. Prognosticating based on such a simple correlation is, however, dangerous for several reasons. First, it ignores the undoubtedly complex causal mechanisms that might link international food prices to social unrest. Second, it disregards the circular relationship between food prices and unrest. Not only can rising food prices cause unrest but unrest can also drive up food prices. Furthermore, both rising prices and unrest can be the result of a third factor, such as rising fuel prices or political corruption.

This research seeks to unravel the complicated and circular relationship between food prices and social unrest in Africa and provide some insight into potential causal mechanisms. It does so by introducing some theoretical and methodological innovations. From a theoretical perspective, it first asks the previously unanswered question of whether rising food prices are a contributing cause not just of food riots but also of social unrest more broadly defined, including labor strikes, student demonstrations, communal conflict, and other riots regardless of the cited grievance. Secondly, it tests the impact of national consumer food price indices on social unrest because these better represent the prices that people actually pay for food and thereby provide some insight into the economic causal mechanisms.

This research seeks to unravel the complicated and circular relationship between food prices and social unrest in Africa

Methodologically, this research analyzes the relationship between food prices and social unrest at a level and coverage not previously used, incorporating monthly data from 40 countries over a period of 21 years. And finally, it employs an analytical approach that isolates the relationship between food prices and social unrest by using a third variable to predict changes in food prices.

FOOD PRICES AND UNREST

An emerging academic literature has developed in the wake of the international food commodity spikes of 2007-08 and 2010-11, seeking to identify and quantify a statistical relationship between food prices and political and social unrest.

By investigating the connection between national food prices, political institutions, and political stability in 120 countries from 1970 to 2007, Arezki and Brückner find that political institutions in low-income countries deteriorated significantly during times of international food price increases largely because food price increases “significantly increased the likelihood of civil conflict and other forms of civil strife, such as anti-government demonstrations and riots.”³

Lagi et al. identify a correlation between international food prices, as measured by the Food Index of the Food and Agriculture Organization of the United Nations (FAO), and media reports of food riots.⁴ Similarly, Bellemare finds that increases in the FAO Food Index lead to increased media reports of food riots.⁵ Both of these papers present compelling findings of statistical correlations between food prices and riots, but they both use international commodity prices as the measure of food prices.

Local consumer food prices, however, do not necessarily follow the same trends as international commodity prices. Figure 1 illustrates this point using all available national consumer price indices from African countries included in the analysis by Lagi et al. Only in Côte d’Ivoire and Cameroon can any tracking between international and local food prices be identified, and this is delayed. Consumers are not economically impacted by increases observed in international commodity markets unless they are passed through to domestic consumer food prices.

Therefore, the argument that rioters are responding to economic pressure of rising food prices is not supported by the correlations identified in these studies. Additionally, both of these studies are concerned exclusively with food riots. Historically, however, unrest over food prices has been commingled with other issues and grievances. It is not realistic to assume that food riots are solely about food or that other unrest is not also driven by food prices.

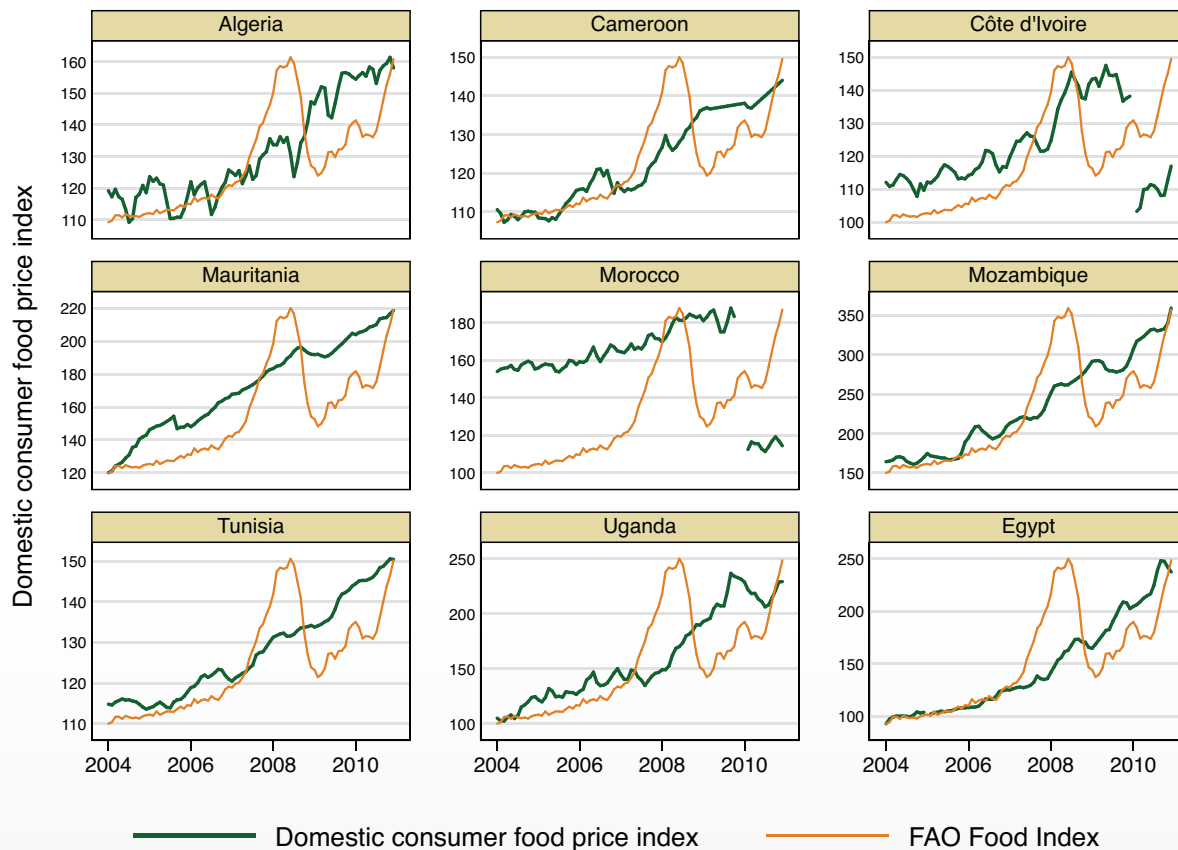
THEORETICAL FRAMEWORK

This brief poses the relatively straightforward question: *Do sudden increases in domestic consumer food prices lead to an increase in the likelihood of social or political unrest of any type, violent or not, in African countries?*

The innovation of this study is two-fold. First, the causal driver under study is increases in the prices that consumers actually pay for food rather than international commodity prices. This is key since consumers do not pay international commodity prices. If people respond to economic pressure with unrest, it should be possible to find a statistical correlation between consumer food prices and the occurrence of unrest.

Second, this study examines the impact of food prices not only on food riots but on a broadly defined range of social unrest, including but not limited to labor strikes, student protests, electoral demonstrations and violence, and communal conflict. Previous research has generally been confined to food riots. It is, however, unrealistic to expect populations to perceive their hardship in the same way, to frame their grievances in the same terms, or to address their petitions to the same audience. Instead, food riots take on many different forms and are often enmeshed with other grievances, notably labor disputes.

In Africa, rising food prices have an undeniably disproportionate impact on poor populations who often devote over half of their income to food purchases.⁶ Economic hardships resulting from rising food prices could, however, manifest in many other forms. Even if people focus their protest on the government, they may demand economic relief in other sectors such as housing, utilities, or fuel if they consider the government powerless to control rising food prices. Or they may seek a wholesale change in political leadership if they consider the current leaders to be incapable of creating favorable economic conditions. Furthermore, people may focus on a different target. As observed by Bush in Egypt, workers may strike with demands of higher wages that would enable them to afford more expensive food.⁷

Figure 1. *International Commodity & Domestic Consumer Prices*

Source: FAO, ILO; Côte d'Ivoire series changed in January 2010; Morocco series changed since January 2010

Although it is difficult to identify particular instances of unrest driven by rising food prices if the protesters do not cite food prices as a grievance, there are numerous examples in which food is just one of many grievances. In Nigeria, the removal of fuel subsidies in December 2011 caused fuel and food prices to rise sharply, which led to widespread political protests that threatened the government of President Goodluck Jonathan.⁸ In Uganda, protests ostensibly over rising food and fuel prices were intimately linked to perceived political oppression of opposition leaders.⁹ A protest in South Africa was organized by a leading labor union and cited rising electricity rates and food prices as grievances.¹⁰

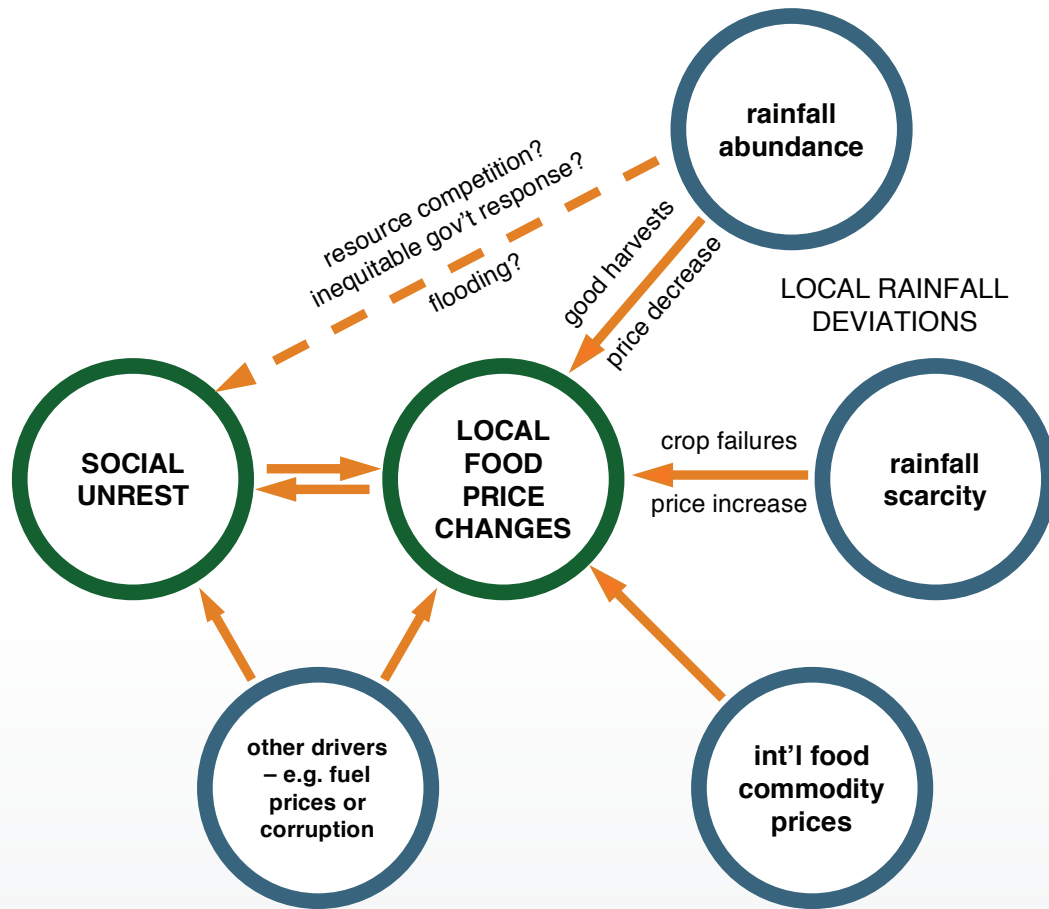
Assuming that there is a correlation between rising food prices and social unrest, determining the causal nature of the relationship is a major challenge since rising food prices and social unrest are often both products of the same circular system. Not only do rising food prices cause social unrest, but social unrest, including food riots, can also drive up domestic food prices because of disruptions in the production or delivery of food supplies. Furthermore, it is possible that

both rising food prices and social unrest are driven by other factors, as was the case in Nigeria in December 2011 and January 2012 when rising fuel prices were likely the driver of both rising food prices and social unrest.

This complicated relationship can undermine efforts to empirically isolate the effect of rising food prices on social unrest, meaning that any statistical analysis that does not recognize and account for these challenges will lead to incorrect conclusions about the relationship between these two phenomena. One method to address this is to use a third factor, known as an instrumental variable, to predict food price spikes. This research considers two such instrumental variables: *international commodity prices* and *rainfall scarcity*. The theoretical framework is diagrammed in Figure 2, which illustrates the reciprocal causal relationship between food prices and social unrest, the potential effect of other factors, and how these instrumental variables may impact unrest either directly or indirectly through food prices.¹¹

Ultimately, the better instrumental variable is *rainfall scarcity*, defined as lower than expected accumulated rainfall at

Figure 2. Theoretical Framework



particular times of the year. Rainfall is unaffected by either food prices or the occurrence of unrest and it has obvious impacts on food prices. Rainfall that does not come at the time or in the amount expected by farmers will lead to lower than expected harvests. Basic economics imparts that lower supply leads to higher prices. Conversely, better than expected rainfall may lead to bumper crops and a drop in prices. This is exactly what the data show in this study's findings.

It is increasingly clear that there is some correlation between rainfall deviations and conflict.¹² The causal mechanisms, however, remain unclear. In the absence of evidence of conflict over water resources, this study argues that any effect of rainfall scarcity must be through agriculture, the most obvious effect of which is rising food prices. Rainfall abundance, however, is a very different phenomenon. While moderately good rains can have positive effects for agriculture, in the extreme, floods can have devastating effects. They can destroy infrastructure and displace populations, which can lead and has led to conflict over scarce resources or unrest over grievances about inequitable

government response. Thus since rainfall scarcity does not impact conflict directly, it is appropriate to use rainfall scarcity, but not rainfall abundance, to predict food prices and, thereby, isolate the effect of rising food prices on social unrest.

RESEARCH DESIGN

This study analyzes the relationship between food prices and social unrest in individual calendar months in individual African countries. The monthly, rather than yearly, increments in this approach helps to better identify more immediate connections between food price changes and the occurrence of unrest events. Poor populations feel the pressure of rising food prices within days or weeks. If food prices are the proximate cause of unrest, then the correlation should be observable within fairly short intervals of time.

This study's focus at the national level is appropriate because it controls for characteristics such as natural endowments of arable land and weather conditions, internal transportation and food storage infrastructures, and access to external

FOOD RIOTS IN HISTORY

Historians, political scientists, and sociologists have all documented and studied the historical role of food and food prices on revolution, rioting, and unrest. Much has been written about the food riots or bread riots in 18th and 19th century England and France. In both countries, failed harvests led to corresponding food price peaks and attendant outbursts of food riots in both the countryside and urban centers.¹³ It would be a mistake, however, to think that these riots, or protests, were all of the same type, carried out by crowds of similar composition, or with common targets. Food riots took on many different forms with many different targets including “simple looting of warehouses, attacking the homes of merchants, or stopping grain vessels bound for other parts.”¹⁴ At the time, the food riot was a more common form of social unrest than the strike amongst many industrial workers. Later, however, “these workers, although more prone in times of hardship to seek redress from grain factors and millers than from their own employers, were also on occasion involved in purely industrial disputes.”¹⁵

Ascertaining the real driver of unrest or predicting the target can be a difficult task. Grievances about the cost of food can often be commingled with other grievances, economic and political, and the occurrence of a particular type of unrest is often determined more by a viable target and perceived culpability than the source of hardship. “Two grievances stand out as the chief cause of revolutionary urban tumults: the cost of food and the availability of employment.”¹⁶ These causes are not mutually exclusive; rather, they are often intertwined with other grievances. How aggrieved groups choose the targets of their ire is a question that is largely outside the scope of this research but is undoubtedly an important theoretical question with obvious practical import.

Although individual outbreaks of unrest coincided with bad harvests and price spikes, the broader trend of food riots in the 18th century was attributable to three trends that accompanied the rise of the nation state and the increasing salience of the market in food systems. First, the proportion of European households that no longer produced a significant portion of their own food, but rather relied on the market for survival, greatly expanded. Second, food production became increasingly commercialized, which included an increasing prioritization of national markets over local needs. Third, “the extensive previously existing controls over the distribution of food, which gave the local population a prior claim over food produced and sold in a locality, and bound the local authorities to provide for the subsistence of the local poor” were dismantled.¹⁷

FOOD RIOTS AND THE MODERN FOOD SYSTEM

Food riots largely disappeared from the world stage from the mid-19th century through the 1970s.¹⁸ Beginning in the late 1970s, however, widespread unrest, including food riots, erupted in countries implementing austerity programs imposed by international financial institutions in the wake of the debt crisis of the early 1970s.¹⁹

In the context of changes to food systems, this period of *structural adjustment* was the historical analogue of the late 18th century. “[M]odern food riots in the developing nations are generated by processes analogous to economic liberalization policies that produced classical food riots, but today’s transformation is taking place at the international level. Neo-liberalism simultaneously affects all Third World countries in much the same fashion as laissez-faire policies within nations once affected particular towns and regions....”²⁰

The more recent rash of food riots in the wake of the 2007–08 spike in international commodity prices has been repeatedly referred to as a new *food crisis*. But, like the 18th century and the 1970s and 80s, it is not a crisis of production. Record grain harvests were reported in 2007. The modern problem is one of access to food.²¹

One author argues that at least as important as the economic pressure of increasing prices was the perception of injustice in the global food system. He writes of the food riots after the 2007-08 spike that “rioters knew why food prices were high and who benefited from food inflation. Rioters knew too why governments had to be forced to mitigate the social costs of food inflation, why and how authoritarian regimes appeased transnational food companies, and how national food strategies impoverished food producers: low farm-gate prices were well-tested mechanisms to extract surplus for largely urban-based development.”²² Additionally, food riots were in some cases commingled with labor strikes. Rising food prices in Egypt led to a strike in April 2008 in which workers demanding higher wages to cover the increasing cost of food.²³

History has demonstrated that food riots are not a singular type of event; rather they can manifest in many different forms with different targets and are often intertwined with other grievances.

markets are all very important determinants of food prices. National trade and agricultural policies, such as tariffs and subsidies, have direct effects on both agricultural production and food prices. While it is undoubtedly true that internal differences between rural and urban markets and political conditions can affect food prices and social unrest, national level analysis is still theoretically justified. While food prices may be driven by changes in growing conditions in rural areas, changes in food prices are more salient to urban populations who purchase a larger portion of their food. Protests are, therefore, more likely in urban centers. Furthermore, even when rural populations are aggrieved, they may be inclined to take these grievances to the capital city where they will be heard.

The Data

The measure of social unrest used in this study is derived from the Social Conflict in Africa Database (SCAD) developed by Hendrix et al.²⁴ SCAD includes data on over 7,300 occurrences of demonstrations, protests, strikes, riots, coups, and communal conflicts in 47 African countries²⁵ between 1990 and 2010. These events are coded for event type—i.e. spontaneous or organized demonstration, riot, strike, pro- or anti-government violence, or extra- or intra-government violence—actors involved and targeted, and the motivating issues. Total events in each country are given in Figure 3 while Figure 4 shows the distribution of these events across time.²⁶ This data has been reformulated and simplified to indicate whether or not unrest occurred in a given country in a given month. Of the 11,804 observations (country months) across the 41 countries and 21 years covered by SCAD, at least one unrest event occurred in 3,677 (30.72 percent) of them. Unfortunately, food index data for some countries is missing for some of the months during this period, which limits the study sample somewhat. At least one unrest event occurred in 29.5 percent of the 9,274 observations included in the final analysis.

Domestic food price indices were obtained from the International Labor Organization (ILO) for 47 countries between 1976 and 2012.²⁷ These data are reported to the ILO by each country and are collected for a basket of foodstuffs deemed to be most relevant in the capital city and other urban centers. In cases where two indices are reported, one was selected as most appropriate. The percentage change from one month to the next is then calculated. This transformation has three distinct advantages. First, it better captures the immediate economic pressure felt by consumers of drastic short-term changes as opposed to more gradual changes to which consumers may be better able to adapt. Second, it enables valid comparison of food

price changes across countries that use indices for prices of different products measured in different currencies. Third, it minimizes any statistical bias resulting from the simple fact that prices in one month are highly dependent upon prices in the previous month. In cases where the series was changed or re-indexed, percentage change for the first month of the new series is omitted in order to avoid any bias from an artificial change in food prices.

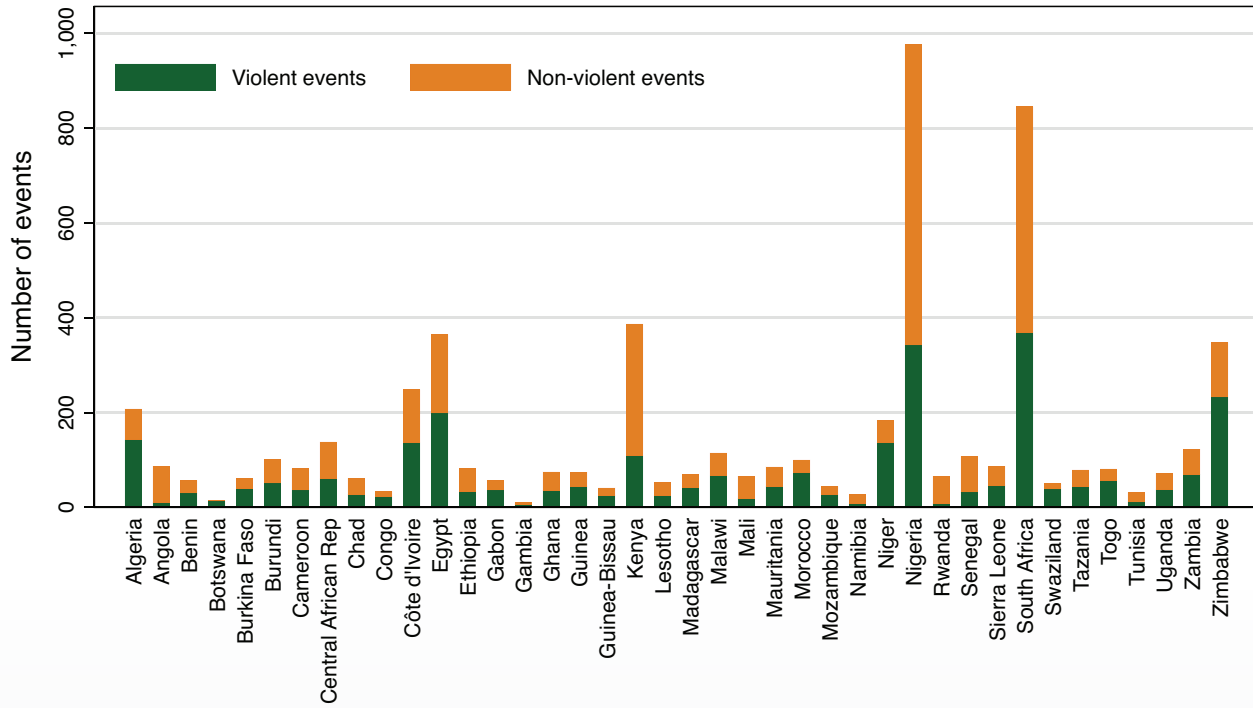
The FAO Food Index is used as the measure of international food commodity prices. This index is “a measure of the monthly change in international prices of a basket of food commodities. It consists of the average of five commodity group price indices (representing 55 quotations), weighted with the average export shares of each of the groups for 2002-2004.”²⁸ It is compiled and reported monthly with comparable data back to January 1990.

The rainfall indicator used here is based on data from the Global Precipitation and Climatology Centre (GPCC).²⁹ This dataset includes monthly rain gauge data for the whole of the African continent since the beginning of 20th century. Similar to the calculation of the Standard Precipitation Index (SPI) developed by Guttman,³⁰ the aggregated data was then transformed in a way meant to capture deviations in accumulated rainfall over a specified number of months from expected rainfall based on observed patterns over the previous generation of 20 years. This transformation is referred to as moving standardized cumulative precipitation (MSCP). Finally this specification of the data was split into two variables to represent (1) rainfall scarcity, or below-normal deviations, referred to as *dry* MSCP; and (2) rainfall abundance, or above-normal deviations, referred to as *wet* MSCP. The period of accumulation used in this study’s final analysis was nine months—the current month plus the preceding eight months—because this had the most substantial and statistically significant effect on food prices.³¹

The study included a range of control variables to capture potential confounding effects of relative levels of democracy and autocracy, demographic characteristics of the populations, and levels of wealth and development. Additionally, a variable indicating the occurrence of elections in each month is included to control for unrest surrounding elections.

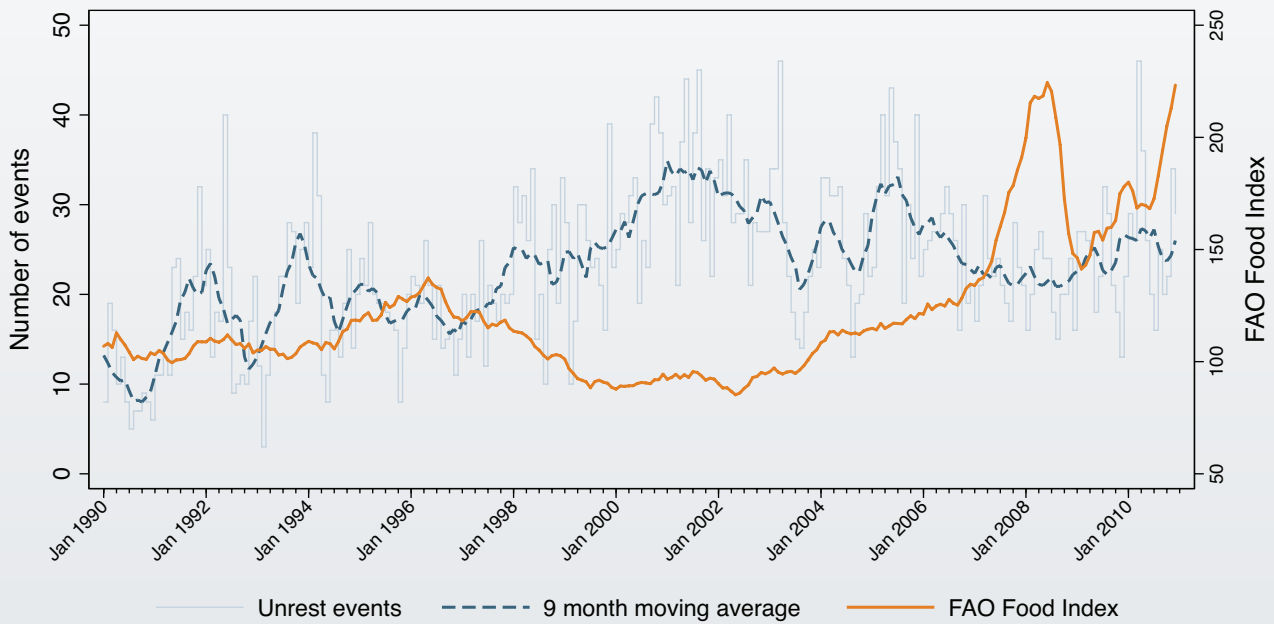
Finally, variables were included for individual calendar months and individual years. The former is intended to control for any seasonality of crop production and rainfall expectations, and the susceptibility of different societies to unrest during different times of the year. For example, Islamic societies may be less inclined to protest during

Figure 3. Unrest Events by Country (1990-2010)



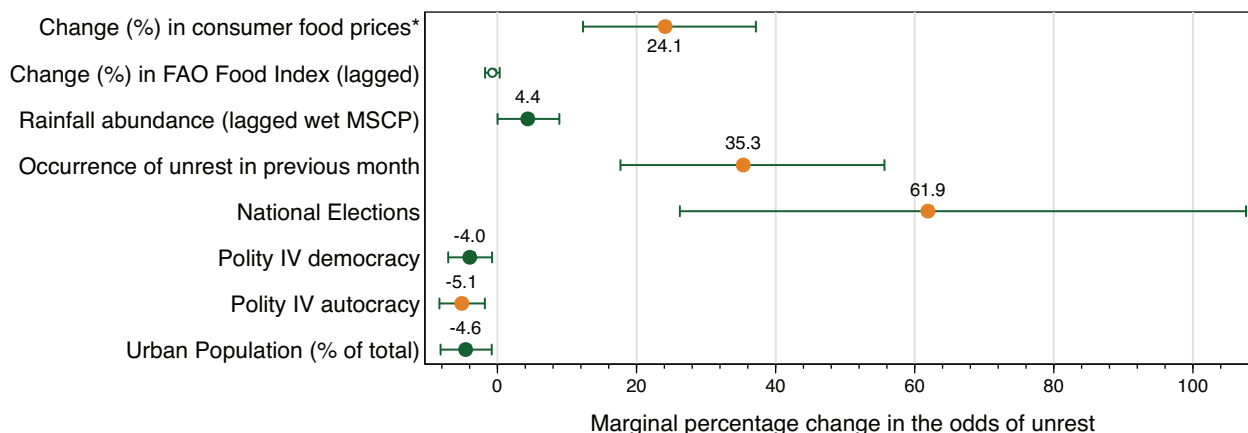
Source: SCAD

Figure 4. Unrest Events & FAO Food Price Changes



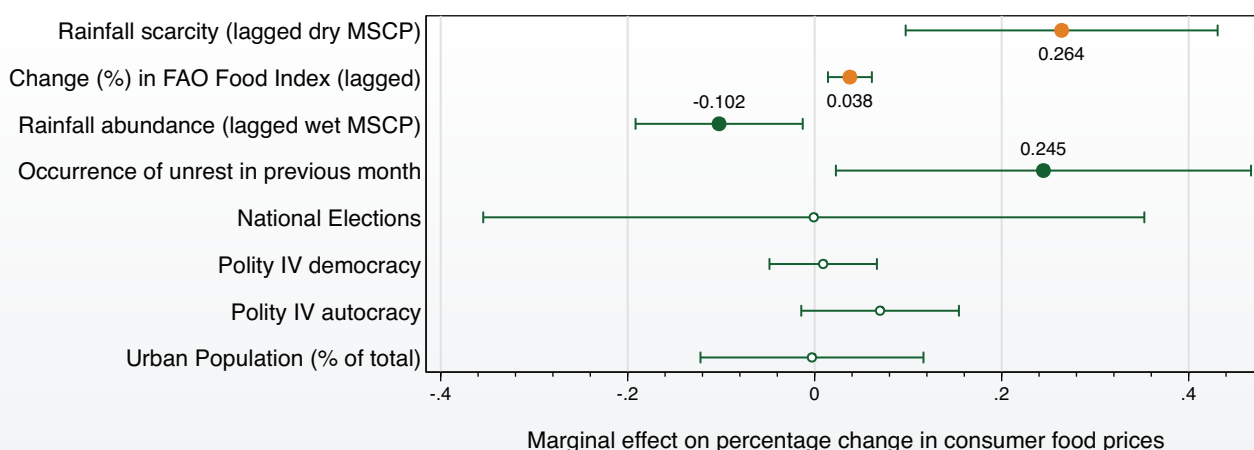
Source: SCAD, FAO

Figure 5a. Second Stage Results: Predicting Probability of the Occurrence of Unrest



* Predicted in the first stage of the model

Figure 5b. First Stage Results: Predicting Change in Domestic Consumer Food Prices



— 95% confidence interval ○ NOT significant at 90% conf level ● significant at 95% conf level ● significant at 99% conf level

Country, calendar month, year fixed effects & non-significant covariates not displayed; 9,274 observations; cluster robust standard errors employed (40 clusters)

Data sources: SCAD, FAO, ILO, Polity IV Project, World Bank World Development Indicators

Ramadan than at other times of the year. The latter, the year variable, should capture changes in global economic conditions and political changes.

The compilation of all these data resulted in a complete dataset of the primary variables of interest for 9,274 country months over 40 African countries between 1990 and 2010. This is an average of 231.85 observations per country.

Estimation strategy

The model estimated is a *two-stage endogenous probit model*. The first stage of the model predicts the percentage change in consumer food prices using rainfall scarcity and all other

variables included the second stage. The second stage of the model estimates the probability of the occurrence of unrest using the predicted food price changes from the first stage, as well as all other variables except rainfall scarcity since its effect is captured in the first stage of the process

RESULTS

Predicting Changes in Domestic Food Prices

Results from the first stage of the model reveal the marginal effects of various factors on the percentage change in domestic consumer food prices (see Figure 5b). The effects of rainfall scarcity, changes in international food commodity

prices, rainfall abundance, and the occurrence of unrest in the previous month are all statistically significant, at the 95 percent confidence level or higher.

All else equal, accumulated rainfall of one standard deviation below the long-term mean is associated with monthly consumer food price increases of 0.264 percent from the previous month. Conversely, accumulated rainfall of one standard deviation above the long-term mean results in a decrease in food prices of 0.102 percent.

Changes in international food commodity prices have a small but statistically significant effect on changes in domestic consumer prices. On average, a one percent increase in the FAO Food Index leads to an increase in domestic consumer food prices of 0.038 percent.

Additionally, the occurrence of unrest in the previous month leads to a statistically significant increase in food prices of 0.245 percent. This is evidence of the circular nature of the relationship between food prices and unrest.

Predicting Unrest

Results from the second stage of the model provide the answer to the central research question. The estimates are presented as marginal percentage changes in the odds of unrest (see Figure 5a).

Each additional percentage point increase in the domestic consumer food price index leads to a 24.1 percent increase in the odds of unrest.

Not surprisingly, the occurrence of unrest in the previous month is also a strong predictor of unrest. The odds of unrest in the current month are 35.3 percent higher if there was unrest in the previous month.

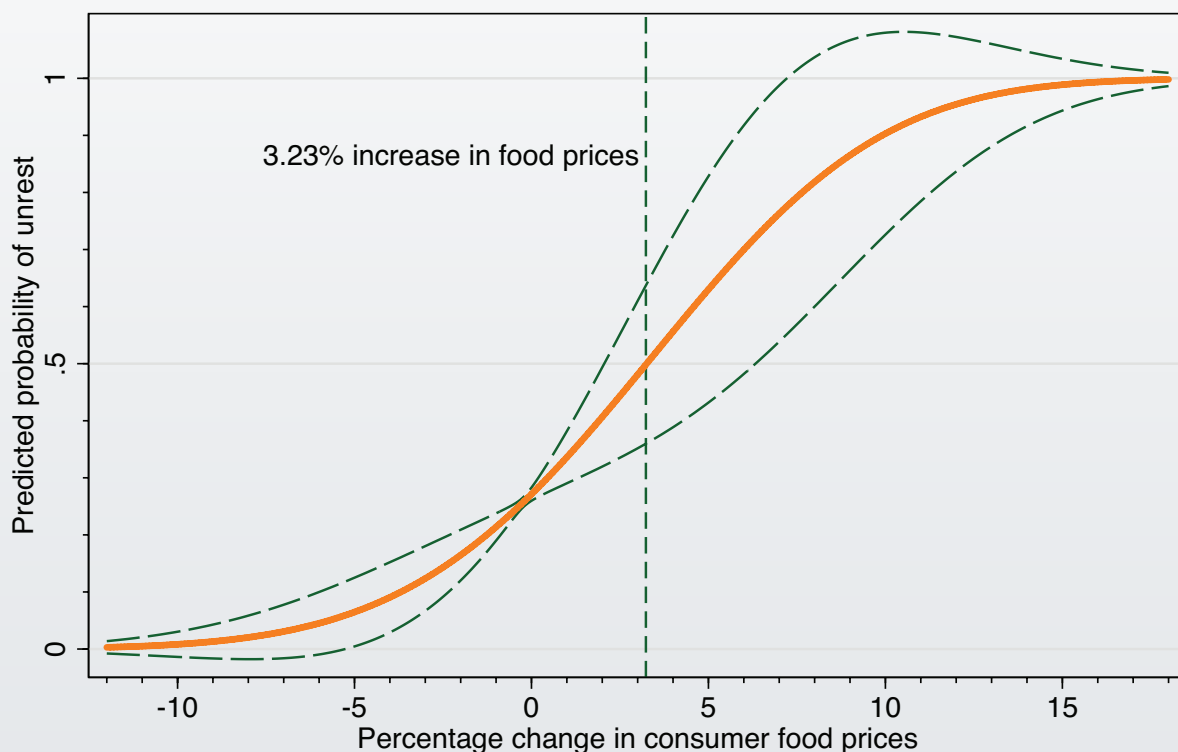
The occurrence of national elections is a strong predictor of unrest as well. The odds of unrest in an election month are 61.9 percent higher than in a month without elections.

Rainfall abundance, although leading to lower consumer food prices, leads to a statistically significant increase in the odds of unrest. This provides some evidence that rainfall abundance affects unrest through some mechanism other than lower food prices.³²

Understanding the magnitude of this effect is difficult because percentage changes in odds are dependent on the baseline odds. That is to say that a 25 percent increase in the odds has a more substantial impact on the probability of unrest if the initial odds are one out of two (50 percent) rather than one out of ten (10 percent).

Figure 6 shows the effect of changes in the predicted probability of unrest. All else equal, if food prices remain

Figure 6. Effect of Food Price Changes on Predicted Probability of Unrest



95% CI displayed; Food Price Index used for international commodity prices; dry MSCP at 9 months used as IV for national food price changes

constant the probability of unrest is 27.1 percent. The probability of unrest increases to fifty percent if food prices increase 3.23 percent over prices from the previous month. Food price increases greater than this mean that unrest is more likely than not. Although a 3.23 percent increase in food prices might seem relatively small, an increase larger than this occurred in 14.8 percent of the country months in the sample set.

Each additional percentage point increase in the national consumer food price index leads to a 24.1 percent increase in the odds of unrest.

CONCLUSION

These results provide strong evidence of a causal relationship between changes in domestic consumer food prices and the probability of unrest. A sharp increase in consumer food prices in a given month does contribute significantly to an increase in the probability of unrest in that month. Furthermore, the results provide evidence that populations respond to the short-term economic pressure of rising food prices regardless of the cause of the increase, and that unrest is more likely at times of larger food price spikes.

These results also demonstrate that changes in international commodity prices can and do lead to increased probability of social unrest. The effect is, however, minimal in Africa because the pass-through of international commodity prices to domestic consumer prices is, on average, limited. Changes in local consumer prices are the real driver of general unrest.

Additionally, the finding that international food commodity prices do not have a more substantial effect on domestic food prices could indicate that there may be another causal mechanism linking international commodity markets to local unrest. This could be perceived injustices in the international food system, or it could be that both are the result of another factor. The price spike of 2007–08 and the contemporaneous food riots could also both be, at least in part, consequences of the global economic crisis.

These findings have important policy implications. Price stability in local markets is important to maintaining political and social stability. Two important points to remember are when considering policy prescriptions are: (1) price spikes have destabilizing effects regardless of the source; and (2) consistently low prices are less important than preventing sudden spikes. Building stable local markets that are resilient to shocks from a variety of sources is key.

Controlling price fluctuations in international markets is important at a macro level but will have little benefit if local markets are still vulnerable to local conditions. Uncertainty around climate change and changing weather patterns must be considered here but from a different perspective than it is usually considered in adaptation circles. Increasing overall long-term production through drought resistant crops or farming techniques is less important to price stability than ensuring availability and access in times of poor conditions. This means improving irrigation infrastructure to buffer against changing rainfall patterns, transportation networks to deliver food regionally, and storage capacity to allow for warehousing of food.

This study has not answered the theoretical question of how and why people choose particular methods, venues, and targets of social unrest. More research is needed in this area, but these questions are likely to be context-specific. Answering these questions will require in-depth case studies of particular episodes of unrest and are likely to have complex answers.

Just like the bread riots of the 18th and 19th century and the austerity protests of the 1970s and 1980s, episodes of unrest and political instability generally involve many issues as contributing factors. The list of possible drivers of unrest is long: perceived lack of justice and equity in global food and economic systems; lack of political freedoms and avenues to voice grievances; poor governance and lack of government accountability; general high levels of poverty and the lack of public service delivery; and poor workplace conditions and labor disputes. All of these issues are intimately connected with access to food. To think that *food riots* are simply about food is a dangerous reduction. Such a view could easily lead interventions to focus on controlling the cost of food while ignoring political or social injustices. But it is equally blind to ignore that the cost of food can be a driver of unrest that manifests in ways other than food riots or is directed at targets seemingly unrelated to the food system. 🇳🇮

ENDNOTES

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- 26 SCAD classifies events into ten different categories: (1) organized demonstrations; (2) spontaneous demonstrations; (3) organized violent riots; (4) spontaneous violent riots; (5) general strikes; (6) limited strikes; (7) pro-government violence (repression); (8) anti-government violence; (9) extra-government violence; (10) intra-government violence. Events in any category are considered to be unrest events. Violent events are limited to events in categories 3, 4, 7, 8, 9 and 10.
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- 31 For a complete description of the transformation of this data, see Smith.
- 32 For a brief discussion of potential mechanisms, see Smith.

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