Prices and Protests: Evidence from Maize Markets Across Africa

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Abstract

We study the effect of local prices on conflict, using global prices as an instrument. Our analysis focuses on incidents of social unrest—protests and riots—observed at monthly frequency, and is based on a subset of local maize markets across multiple African countries. We find that an increase in the price of maize—a change that presumably benefits net producers but harms consumers—reduces social unrest near markets with substantial crop agriculture. This effect is mitigated—and in some instances reversed—near markets characterised by ethnically diverse groups with varying involvement in crop agriculture. We relate these findings to the existing economics of conflict literature.

Keywords: Agricultural shocks, Cereal markets, Conflict, Economic shocks, Prices.
JEL Codes: D74, O13, Q11.

1 Introduction

Income shocks are an important correlate of conflict (e.g., Miguel et al., 2004; Ray and Esteban, 2017). Conflict, in turn, remains a major barrier to growth and development across low- and middle-income countries (LMICs) (Rodrik, 1999; Collier and Hoeffler, 2002; Gates et al., 2012). In LMICs, food prices are key contributors to household-level income shocks, as households tend to spend a substantial share of their income on food and, in agrarian societies, also earn much of their income by selling the food they produce. So, when food prices rise, consumers are worse off, but net producers are better off. In LMICs with weak rule of law and fragile political systems, such (relative) income shifts can trigger conflict.

Any attempt to empirically investigate the relationship between local food prices and conflict inevitably faces identification challenges, not least that of reverse causality as conflict can influence local supply and, in turn, local prices. For example, conflict may pull agricultural workers away from farms or, worse, lead to the destruction of farmland (Koren, 2019), as well as interfere with the proper functioning of food markets (Hastings et al., 2022).

To circumvent this challenge, studies use global prices on the basis that they drive changes in local prices and are exogenous to local conflicts (Brückner and Ciccone, 2010; Berman and Couttenier, 2015; McGuirk and Burke, 2020). By adopting this approach, they test the reduced-form effect of international prices on local conflict, while assuming, among other potential channels, that global and local markets are integrated and, thus, shocks to global prices are transmitted to local prices—an important middle link in the price–conflict nexus.

We study, specifically, this middle link by leveraging monthly price data from local markets and using international prices as an instrument for local prices to estimate the effect of food prices on social unrest in Sub-Saharan Africa. In so doing, we suggest that local prices are not only an important link but, indeed, the only link through which global prices can propagate local conflict. We argue that the relatively high data frequency used in our analysis allows us to claim that any channel—other than local prices—through which global prices can cause local conflict likely operates at a lower frequency and with a greater delay.

We focus on Sub-Saharan Africa not only because data on conflict and prices are relatively abundant compared to other regions, but also because the region is characterized by widespread poverty and a heavy reliance on agricultural employment. As a result, even relatively small changes in food prices can substantially affect household incomes and well-being, thereby heightening the risk of conflict. We focus on a specific form of conflict—social unrest, comprising protests and riots—not only because this type of conflict tends to be more spontaneous and thus more susceptible to short-term price fluctuations, but also because it allows us to examine specific motives driving this form of conflict in response to absolute and relative income shocks (Panza and Swee, 2023).

Of the existing literature, this study is most closely related (in spirit) to Smith (2014), who applies an instrumental variables approach to isolate the effect of arguably exogenous international food price shocks on conflict in Africa. To address the endogeneity of local food prices, Smith (2014) employs two instruments: global food commodity prices and local rainfall scarcity. Using country-level monthly data, they find that food price spikes significantly increase the likelihood of social unrest in Africa. This study departs from Smith (2014) in two important ways. First, by focusing on market-specific local price changes and their effect on conflict in the immediate vicinity of the affected market, it allows for a more precise identification of the impact driven by local price fluctuations. Second, by examining price–conflict relationship across a spectrum of regions ranging from highly homogenous to substantially heterogenous in terms of ethnic backgrounds and agricultural productivity, this study sheds light on the various mechanisms and channels through which price fluctuations may translate into conflict.

We contribute to several interrelated strands of the literature. First, we contribute to the literature on the economic roots of social unrest, where findings can be mixed due to the presence of multiple, and sometimes competing, mechanisms (Mitra and Ray, 2014; Smith, 2014; Bellemare, 2015; Panza and Swee, 2023). By focusing on food and agricultural markets across both highly and less agriculturally dependent regions, some of which are relatively homogenous while others substantially polarised from the standpoint of agricultural dependence, we investigate distinct channels through which income shocks may trigger conflict.

Second, we engage with research on how agricultural income shocks affect conflict dynamics in different LMICs, and particularly in Africa (Dube and Vargas, 2013; Berman and Couttenier, 2015; Crost and Felter, 2020; McGuirk and Burke, 2020; Berman et al., 2021; Ubilava et al., 2023). Rather than relying solely on plausibly exogenous variation in international commodity prices, we focus on local price shocks across a broad set of markets and use international price fluctuations as an instrument to estimate the impact of harvest-time income shocks on conflict. This approach is granular in both geographic and temporal dimensions, allowing us to uncover dynamics that may be obscured in more aggregated settings.

2 Background and Context

Fleeting price increases not only exacerbate human suffering "but also threaten to destabilize the political and social order" (Barrett, 2022). Recent history provides several examples of rising food prices coinciding with periods of amplified social unrest, illustrating how food price volatility may catalyse significant political transformation. Most recently, 2022 saw significant price increases for many major agricultural commodities resulting from the dual-crises impact of COVID-19 and Russia's invasion of Ukraine (Ferguson and Ubilava, 2022).

Similar co-movement between food prices and social unrest can be observed during each of the other 21st-century agricultural commodity price shocks. The first of these shocks occurred during the mid-2000s when real prices of staple crops, including those of wheat and maize, nearly doubled during the 2004–2008 period (Headey and Fan, 2008). Several studies have linked this spike in food prices to an increase in social unrest, particularly in developing countries (Berazneva and Lee, 2013; Bellemare, 2015). The second of these shocks began in 2010 and saw real food prices rise of comparable magnitudes to the previous episode (Ivanic et al., 2012). In particular, this price shock has been identified as a key contributor to the 'Arab Spring' that resulted in the collapse of several governments in the Middle East and North Africa region during the early 2010s (Sternberg, 2012; Soffiantini, 2020).

These high-price episodes have fuelled academic interest in studying the relationship between food prices and social unrest, which is situated within a broader literature that seeks to examine the impact of income on conflict. The expected effect that changes in household income can have on conflict, however, is ambiguous in terms of both direction and magnitude. Several competing theories have been offered, each with its empirical support.

On one side of this argument, the literature posits that an increase in food prices raises the risk of conflict and social unrest. The relevant theory is linked to the so-called *rapacity effect*, which suggests that rising food prices increase the value of agricultural output or the means of producing it (Dube and Vargas, 2013; Bellemare, 2015; Koren, 2018; McGuirk and Burke, 2020; Abidoye and Calì, 2021; De Winne and Peersman, 2021; Ubilava et al., 2023). The relationship can be nuanced, however. In their study of Colombia, Dube and Vargas (2013) use exogenous shocks to international prices to show that rising prices increase conflict in capital-intensive sectors, where the predation effect is expected to dominate (the opportunity cost effect). Similarly, focusing on the entire continent of Africa, McGuirk and Burke (2020) find that higher prices increase the probability of conflict over the appropriation of agricultural surplus (which they define as 'output conflict').

In addition, and working in the same direction, some studies highlight the importance of the so-called relative deprivation effect (Cederman et al., 2011; Hendrix and Haggard, 2015; De Winne and Peersman, 2021). The logic here is that increasing food prices may reduce real earnings, particularly among the poor, which may leave these individuals feeling relatively more deprived with respect to their past living standards or richer factions within society. These feelings of deprivation may fuel rising anger and thus act as a catalyst for increased public unrest. For example, Hendrix and Haggard (2015) use a sample of 55 major cities across Asia and Africa to show that rising food prices are associated with an increased incidence of food riots and political instability. They conclude that democratic regimes are more susceptible to this outcome, given their relatively more permissive political opportunity structure. Similarly, Siroky et al. (2020) link perceived relative deprivation to the emergence of ethnic conflict, while Guimond and Dambrun (2002) provide psychological evidence that inequality and perceived injustice heighten support for radical and confrontational behaviour.

On the other side of this argument, the literature suggests that an increase in food prices should reduce the risk of conflict and social unrest (Brückner and Ciccone, 2010). There are two relevant theories, the first of which suggests the *opportunity cost* effect. Higher food prices bring the potential for higher wages and profits in the agricultural sector. Therefore, the opportunity cost of rebellion for farmers and agricultural workers would be relatively higher when food prices are rising. Thus, higher food prices may reduce the likelihood of conflict since the wages that would-be rebels must forgo are relatively higher. This point is emphasised in the seminal work of Collier and Hoeffler (2004), where they argue that "if the opportunity for rebellion is illusory [...] unprofitability will cause collapse" (Collier and Hoeffler, 2004, p. 564). Also, as above, Dube and Vargas (2013) show that rising prices reduce the incidence of conflict in labour-intensive sectors, where the opportunity cost effect is expected to dominate, while McGuirk and Burke (2020) suggest the reduction of the probability of conflict over territory (which they define as 'factor conflict').

3 Data and Variable Construction

We source data from several publicly available online platforms. Below, we provide specific details, including any manipulations made in compiling the final dataset.

3.1 Prices

We source price data from the Famine Early Warning Systems Network (FEWS NET) of the U.S. Agency for International Development (USAID),[1] the Global Information and Early Warning System (GIEWS) of the Food and Agriculture Organization (FAO) of the United Nations, and the Commodity Data Portal of the International Monetary Fund (IMF).

The FEWS NET and GIEWS databases store a large number of monthly price series observed at different stages of the supply chain across many African markets. We focus exclusively on maize because: (i) it is one of the most widely produced and consumed staple cereal crops across Africa, and (ii) Africa's share of maize production on the international market is very small, meaning local shocks to maize production or prices cannot influence global maize prices.

While some series start as early as the late 1990s, many are either too short (spanning less than several years) or incomplete (with numerous missing observations). To retain a useful set of price series for the analysis, we applied the following selection procedure.

First, we retained locally procured retail price data for maize, ensuring prices were available per kilogram in U.S. dollars and originated from the same data source.

Second, we excluded price series that were discontinued (or no longer available) prior to January 2024, spanned less than 15 years, and had more than 10 percent missing observations in total, or contained missing observations over four consecutive months. We opted for a relatively short span of the series to ensure large geographic coverage of markets, but the selected series are long enough to allow us to observe substantial within-market variation, including historically relevant global market disruptions of the early 2010s and early 2020s (Ferguson and Ubilava, 2022).

Third, we removed price series from markets with overlapping catchment zones, defined as areas within a 100-km radius of each market centroid, which places markets at least 200 km

[1] We accessed the data on 24 January 2025. Since then, the data portal has become indefinitely unavailable due to the USAID shutdown.

apart—arguably a reasonable distance for identifying separate markets (e.g., Porteous, 2019). Using data on maize land cover from IFPRI (2019), we sequentially eliminated markets with the smallest count of people in their catchment zones until no overlaps remained.

As a result, we retained the price series from 34 markets in 11 countries across Africa. We illustrate the geographic coverage of the price series included in the analysis in Figure 1.

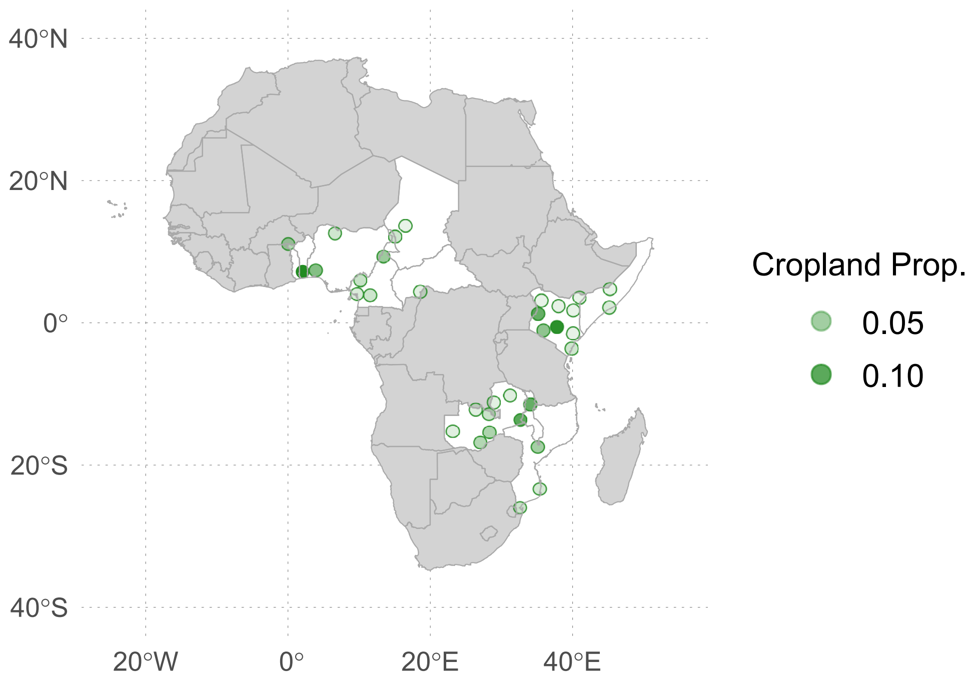

Figure 1: Geographic coverage of the price series

Note: Markets are identified from prices sourced from the Famine Early Warning Systems Network (FEWS NET) of the U.S. Agency for International Development (USAID) and the Global Information and Early Warning System (GIEWS) of the Food and Agriculture Organization (FAO) of the United Nations. Cropland proportions are calculated based on maize harvest area obtained from IFPRI (2019).

For international prices, we use U.S. No. 2 Yellow Maize (FOB Gulf of Mexico), obtained from the IMF. These international prices are plotted alongside the boxplots and averages of local prices in Figure 2.

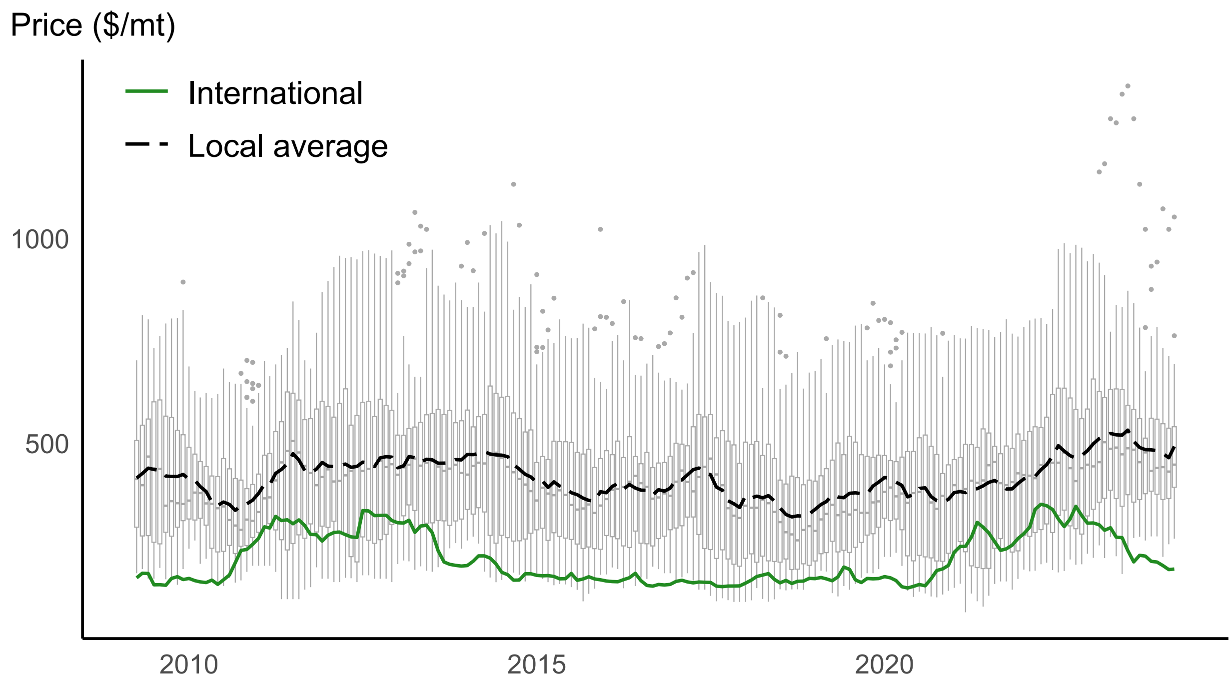

Figure 2: Local and international prices of maize

Note: International prices are for U.S. No.2 Yellow Maize, FOB Gulf of Mexico sourced from the Commodity Data Portal of the International Monetary Fund (IMF). Local prices are (typically) for White Maize sourced from the Famine Early Warning Systems Network (FEWS NET) of the U.S. Agency for International Development (USAID) and the Global Information and Early Warning System (GIEWS) of the Food and Agriculture Organization (FAO) of the United Nations.

3.2 Protests

We obtain conflict data from the Armed Conflict Location & Event Data (ACLED) Project, compiled and maintained by Raleigh et al. (2010, 2023). ACLED provides granular data on conflict incidents categorized into six types: battles (between organized armed groups), explosions/remote violence (often, though not exclusively, carried out by organized armed groups), violence against civilians (perpetrated by organized armed groups), protests and riots (ranging from relatively peaceful demonstrations to more violent forms of public disorder by civilians), and strategic developments (serving, to some extent, as a catch-all for incidents that do not fall under other conflict types). These conflict types are further arranged into three broader disorder categories: political violence with or without civilian targeting (which includes battles, explosions/remote violence, violence against civilians, and some protests and riots), demonstrations (comprising the remaining protests and riots), and strategic developments.

We focus on social unrest captured by demonstrations or protests and riots. While the vast majority of protests and riots fall under the broader disorder category of demonstrations, this category does not fully capture them. Specifically, more violent forms of riots are classified as political violence rather than demonstrations. Conversely, any event classified as a demonstration is, by definition, either a protest or a riot. Thus, the combined number of protests and riots exceeds the number of demonstrations in our sample.

Because we zoom in on specific markets, we only account for five-to-ten percent of reported incidents of social unrest across Africa during the 15-year study period from April 2009 to March 2024. Figures 3 and 4 offer further insights into the spatial and temporal patterns of conflict in Africa, particularly in areas surrounding the markets included in the analysis.

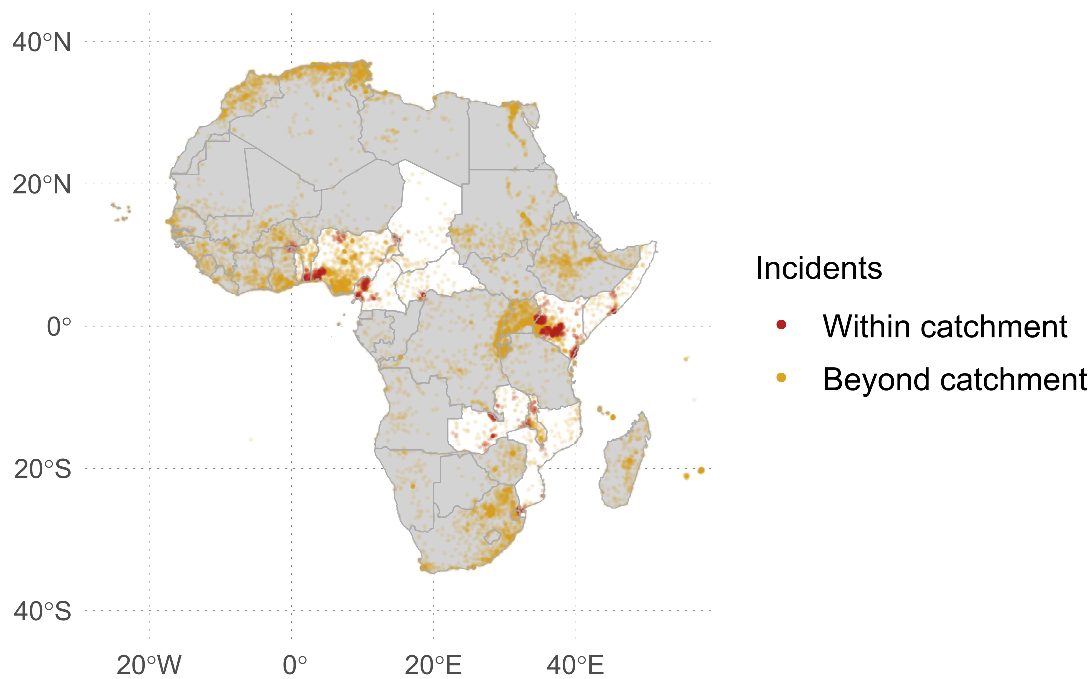

Figure 3: Conflict in market catchment zones

Note: A market catchment zone is defined as the area within a 100-km radius of the market centroid. *Incidents* include battles, explosions/remote violence, violence against civilians, and protests or riots, as recorded in ACLED (Raleigh et al., 2023).

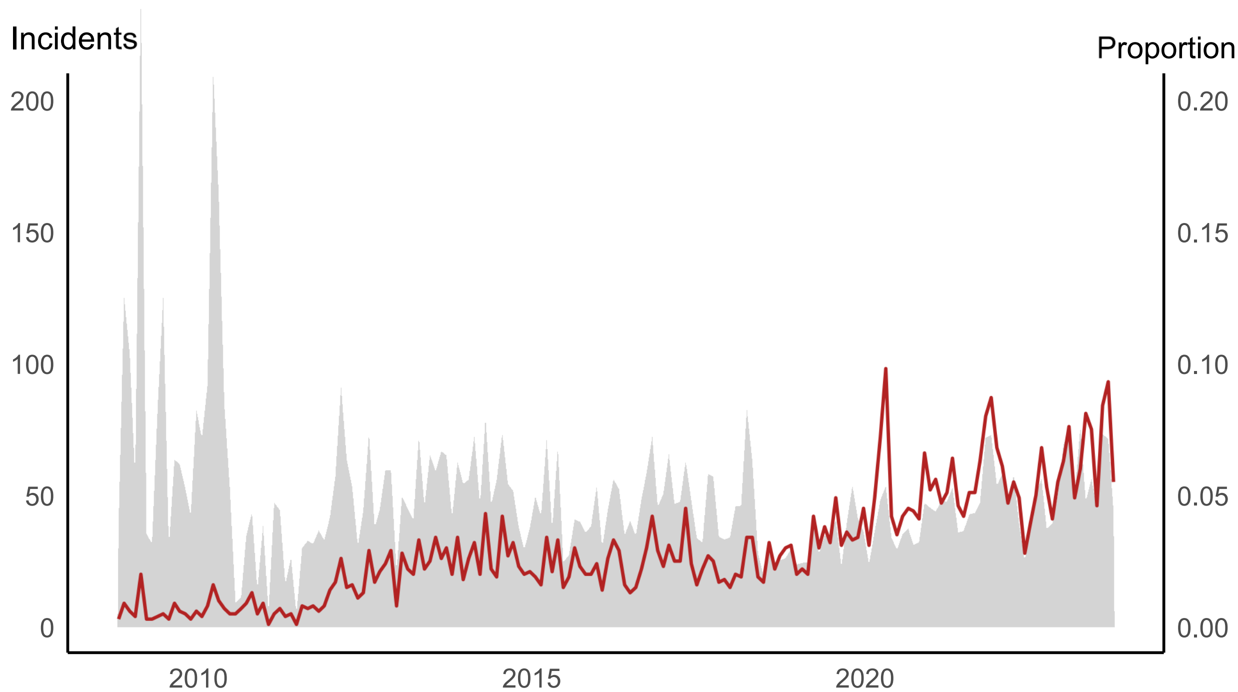

Figure 4: Conflict in market catchment zones

Note: *Incidents* (red line) include protests and riots, as recorded in ACLED (Raleigh et al., 2023). *Proportion* (shaded area) represents the share of incidents observed within market catchment zones in a given month relative to those observed across the entire continent during that same month.

3.3 Other

We obtain data on maize harvest areas from the Spatial Production Allocation Model (IFPRI, 2019). We use these data to create a proxy for agricultural dependence within each market catchment zone as well as a measure of agricultural polarisation, which we define below.

For agricultural dependence, we calculate the average maize harvest area within each market catchment zone and then compute the proportion of land used for maize production. These are illustrated in Figure 1 above.

We use Murdock map (Murdock, 1959, 1967) to identify ethnic boundaries. We then overlay these ethnic boundaries with market catchment zones to obtain the degrees of social heterogeneity in these zones. We use two measures of social heterogeneity: ethic rationalisation (EF) and agricultural polarisation (AP). We define ethnic fractionalisation as:

$$EF_i = \sum_{j=1}^{M_i} \pi_{j,i} \left(1 - \pi_{j,i}\right) \tag{1}$$

where $\pi_{j,i}$ is the proportion of area populated by ethnic group j within the market catchment zone i. This measure, which is bounded by zero and one, gives the probability that two randomly selected individuals from a market catchment zone belong to different ethnic groups (Esteban and Ray, 2008; Ray and Esteban, 2017).

Our measure of agricultural polarisation is an adaptation of the special case of polarisation introduced by Esteban and Ray (1994) given by:

$$AP_i = \sum_{j=1}^{M_i} \sum_{k=1}^{M_i} \pi_{j,i}^2 \pi_{j,i} d_{jk,i} \tag{2}$$

where $d_{jk,i}$ is the distance measure, which in our case is the absolute difference in proportion of maize land cover within the boundaries of ethnic groups j and k.

4 Empirical Strategy

We denote a market with subscript i, and a year-month with subscript t. The unit of analysis is a cell–year–month, covering 34 markets across 11 African countries over the 2009–2024 period. For conflict exposure, we use a catchment zone defined as a 100 km radius circle centered on the market's geolocation.

Our preferred baseline econometric specification is given by the following (second-stage) equation:

$$c_{it} = \beta p_{it} + \mu_i + \lambda_i t + \varepsilon_{it} \tag{3}$$

where c_{it} denotes the number of conflict incidents observed in market i in period t; $p_{it} = \ln P_{it}$ is the local price expressed in natural logarithms. The specification controls for time-invariant (or slowly evolving) differences across markets, μ_i, as well as market-specific linear trends, $\lambda_i t$. Finally, ε_{it} is the error term.

The coefficient of interest is β. A positive value of the coefficient implies that an increase in the crop price relative to expectations is associated with an increase in the probability of conflict in that month.

To identify the coefficient of interest in Equation (3), we instrument endogenous local price shocks with global price shocks. Specifically, we estimate the following (first-stage) equation:

$$p_{it} = \gamma p_t + \alpha_i + \delta_i t + \upsilon_{it} \tag{4}$$

where, similar to the case of the local price, $p_t = \ln Pt$ is the natural logarithm of the global price in period t. As before, the specification controls for time-invariant (or slowly evolving) differences across markets, α_i, and market-specific linear trends, $\gamma_i t$. υ_{it} is the error term.

Identification relies on assumptions of (i) exogeneity: global price shocks are exogenous to local price shocks and conflict; (ii) relevance: global price shocks are transmitted to local prices; and (iii) exclusion: global shocks affect conflict only through their impact on local prices. We discuss and justify each assumption below.

Exogeneity. That global maize prices are exogenous to local conflict and prices in Africa is a plausible and widely accepted assumption (Bazzi and Blattman, 2014; McGuirk and Burke, 2020; Ubilava et al., 2023), given that the continent accounts for only a small fraction of global maize production. Individually, Nigeria—the largest maize producer in our sample and the second largest in th region after South Africa—contributes less than one percent of global maize output (FAO, 2022).

Relevance. Price transmission from global to local markets is notoriously equivocal and varies considerably across countries and markets. For example, Dillon and Barrett (2016) examine markets across East Africa and report an average elasticity of 0.42 for the local maize price with respect to the global maize price, ranging from 0.22 in Kenya to 0.82 in Ethiopia. Similarly, Baquedano and Liefert (2014) analyze price transmission at the country level and find that although local markets tend to be integrated with global markets, the aggregate (cross-country) elasticity of transmission is only 0.30 for maize; country-specific elasticities range from indistinguishable from zero (e.g., Burkina Faso, Niger, and Zambia) to well above 0.5 (e.g., Malawi).

Exclusion. In general, global commodity-price shocks can affect local conflict through multiple channels. While the income–conflict literature generally agrees that the main effect of an international-price change is on local prices and income (Dube and Vargas, 2013; Smith, 2014; Bazzi and Blattman, 2014; McGuirk and Burke, 2020), it is possible, for example, that international flows of food aid respond to price shocks (Nunn and Qian, 2014) and thereby amplify or mitigate conflict; or that international-price shocks lead to greater within- and cross-country migration (Obi et al., 2020), which can result in conflict; or that, in some instances, higher international food prices allow the state to accrue higher tax revenues, which can be spent in ways that reduce the onset of social unrest (Besley and Persson, 2010). Because our study uses monthly data and focuses on narrowly defined geographic regions, we argue that, within a given year–month, international maize prices cannot substantially influence local social-unrest events through any channel other than local maize prices.

Overall, international maize prices satisfy the relevance condition, and it can be plausibly argued that they satisfy both the exogeneity and exclusion conditions. Under these identifying assumptions, β captures an estimate of the local average treatment effect (LATE) of local maize prices on local conflict. That is, β reflects the influence of local maize prices on the incidence of local social unrest events in cases where international maize price shocks lead to a change in local maize prices.

5 Results

We present our headline results in Table 1. The general finding is that there is a negative relationship between local price shocks and conflict, but this relationship weakens as the market catchment zones become more heterogeneous.

Table 1: Main results

	Social Unrest	Protests	Riots
PRICE	0.019	0.032	-0.001
	(0.023)	(0.024)	(0.018)
PRICE × *AREA*	-0.218***	-0.169**	-0.126***
	(0.075)	(0.086)	(0.033)
PRICE × *EF*	0.023	-0.007	0.052
	(0.066)	(0.065)	(0.061)
PRICE × *AREA* × *EF*	0.312**	0.289**	0.175***
	(0.124)	(0.139)	(0.053)
PRICE × *AREA* × *AP*	0.082**	0.050	0.111***
	(0.032)	(0.043)	(0.018)

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