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Dynamics of food demand during political instability: Evidence from Kyrgyzstan

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Abstract

This study assesses the impact of two revolutions—the Tulip Revolution in 2005 and the Melon Revolution in 2010—on household food demand in Kyrgyzstan. Different categories within food products witnessed distinct adjustments in consumer demand. Employing a complete demand system and seemingly unrelated regressions with nationally representative panel data, we find that household food demand fluctuates based on pre-conflict expectations. Despite declining total food expenditure during the first revolution and increasing in the second, the expenditure shares for staples and luxuries display heterogeneous trajectories. Food preferences shifted toward luxuries during the first revolution and staples during the second. Our findings underscore the necessity of a disaggregated perspective in understanding conflict-induced shocks on food demand.

KEYWORDS
food demand, Kyrgyzstan, QUAIDS, revolution

JEL CLASSIFICATION
D12, I12, O12

1 | INTRODUCTION

Conflicts, encompassing wars and revolutions, lead to unpredictable situations, inflicting grave and enduring repercussions on human populations. A notable consequence is the exacerbation of food insecurity (Delgado et al., 2021; UN FSS, 2021). Food insecurity is progressively concentrated in conflict-affected areas of developing nations, leading to a harmful cycle of violence and hunger (Brück et al., 2018; Martin-Shields & Stojetz, 2019). In 2020, an estimated 720–811 million people faced hunger, with over 99.1 million in 23 countries affected by conflict-driven food crises (Brück et al., 2018; Delgado et al., 2021; FAO et al., 2021; FSIN & GNAFC, 2021; Martin-Shields & Stojetz, 2019; UN FSS, 2021). Empirical studies on the impact of conflict on food security often adopt a reduced-form single equation model to measure total food expenses and aggregated consumption (Adong et al., 2021; Akresh et al., 2011; Dabalen & Paul, 2014; D'Souza & Jolliffe, 2013; Ihle & Rubin, 2013; Koren, 2018; George et al., 2019; Serneels & Verpoorten, 2015; Verwimp & Munoz-Mora, 2017). However, this approach tends to overlook the possible substitution between different types of food. While some studies delve into the nutritional dimensions of food insecurity (Akbulut-Yuksel, 2014; Akresh et al., 2012; Bundervoet et al., 2009; Gordon & Halileh, 2012;

Kumar & Quisumbing, 2013; Minoiu & Shemyakina, 2014), a comprehensive theoretical framework for effectively assessing trade-offs among various food groups at the time of conflicts warrants further exploration. Conflict-induced uncertainty alters household expenditures and preferences toward staple food consumption (Rockmore, 2020). Categorizing food as a staple or luxury necessitates analyzing subcategories (Hussein et al., 2021; Roosen et al., 2022). A complete demand system analysis is the sole approach to examining food demand coherently across different groups (Hoang, 2018; Korir et al., 2020; Law et al., 2019). This method effectively segregates total demand changes into income-induced shifts and preference-related changes (Hoang, 2018; Korir et al., 2020; Law et al., 2019). This study presents a unique contribution to the literature by employing a comprehensive demand system analysis to assess the impact of conflict on food demand. More specifically, the effect of two short violent conflicts in the Kyrgyz Republic on the expenditures and demand functions' slope of different food groups will be quantified in a systematically sound manner. The analysis uses quarterly household data from the Kyrgyz Integrated Household Survey (KIHS) spanning 2005 to 2019, covering around 5000 households per wave and 337 food items. The case of Kyrgyzstan is particularly compelling, given two revolutions that led to 300 deaths and the displacement of 400,000 individuals (Solvang & Neistat, 2010).

2 | CONTEXT, DATA, FOOD CONSUMPTION, AND THEORY

2.1 | Context

Kyrgyzstan is one of the few transition economies rebounding from the dual political revolutions in 2005 and 2010. These events led to leadership changes and subsequent inter-ethnic clashes between Uzbeks and Kyrgyz in the South. In June 2010, these clashes caused 300 deaths and displaced 400,000 people from their homes (Kubicek, 2011; Solvang & Neistat, 2010). The impact of these revolutions on national food demand remains uncertain, as the upheavals primarily affected the two largest cities, Bishkek and Osh (Figure 1).

Following its independence in 1991, Kyrgyzstan initially embarked on political and economic reforms during President Akayev's initial term (Anderson, 1999). However, Akayev consolidated power within his family during his second term, establishing a patronage system that marginalized Southern politicians. Subsequently, politicians from Southern voting districts obtained only 6 out of 75 parliamentary seats, while the population share accounts for 52% (Radnitz, 2010). This led to large-scale protests organized by the United Opposition in the South, which spread to the capital and culminated in the storming of the White House, prompting the president's departure from the country on March 24, 2005 (Kroeger & Anderson, 2014).

Under the leadership of Kurmanbek Bakiyev, the opposition assumed power, dubbing the movement that ousted Akayev the "tulip revolution." For many residents of Bishkek and Osh, however, those days are remembered for mass pogroms and looting, which targeted major shops and retail outlets.[1] These disturbances resulted in food scarcity and essential shortages for approximately two weeks until the restoration of shops and supplies. While citizens sought governmental change to enhance living conditions, they confronted short-term food deficits in Bishkek and Osh. Furthermore, the newly appointed president, Bakiyev, continued to uphold the core tenets of "patronal presidentialism," akin to Akayev's approach (Hale, 2006).

Amid accusations of corruption and overseeing economic stagnation, the Bakiyev regime faced widespread citizen protests. In the spring of 2010, demonstrators occupied government buildings nationwide, culminating in the overthrow of the Bakiyev government on April 7, 2010, despite violent resistance by government security forces (Alff & Eschment, 2010). The subsequent phase of conflict commenced when pro-Bakiyev forces seized control of public buildings in Jalal-Abad province. However, armed Uzbek-Kyrgyzstanis, aligned with the Interim Government, reclaimed these structures. This political struggle transformed into a deadly inter-ethnic conflict between Uzbeks and Kyrgyz in the southwest from June 7th to 25th, 2010 (Akiner, 2016; Steiner & Esenaliev, 2011).

Following the initial phase of the second conflict in Bishkek, citizens avoided deprivation by pre-stocking essential items and food due to the vivid memory of the "tulip revolution" events in 2005.[2] In June 2010, Osh experienced looting and deadly violence, causing people to stay home out of fear. In retrospect, the anticipated nature of the June 2010 conflict prompted proactive measures, contrasting the situation in 2005. Notably, the second conflict disproportionately affected Osh over Bishkek, a shift from the more balanced regional impact of the initial conflict. The timeline of conflicts and related events is summarized in Table 1. [3]

[1] https://www.dw.com/ru/a-4121676
[2] Source: https://www.rbc.ru/society/08/04/2010/5703d9339a79470ab501f5894
[3] Events assembled from local news https://kg.akipress.org/news:632188

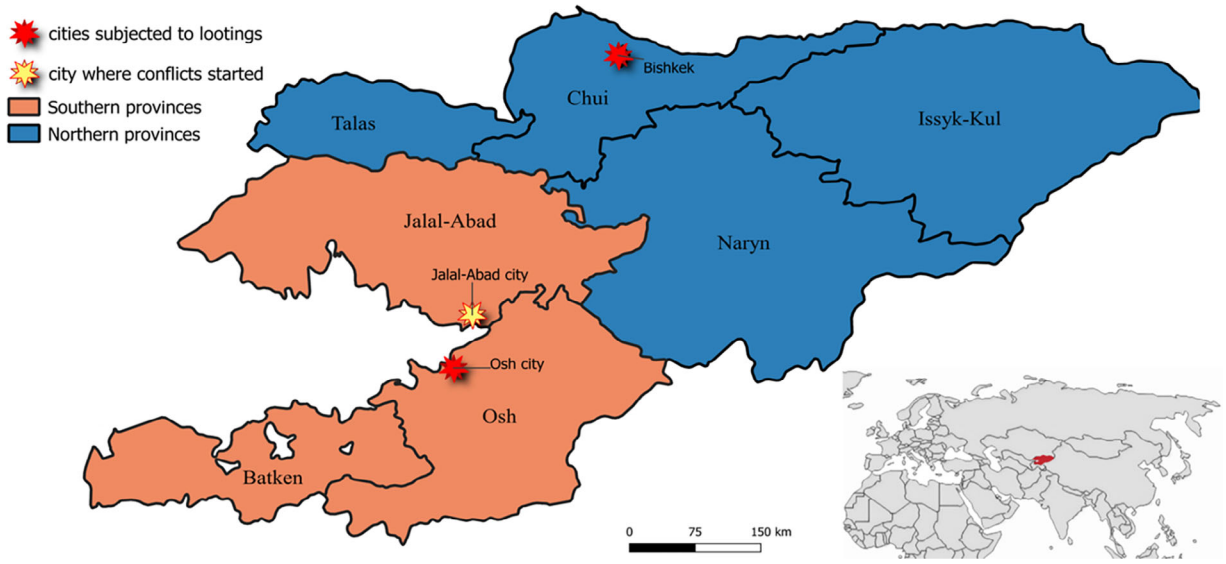

FIGURE 1 Conflicts and looting in Kyrgyzstan.

Source: Author's figure.

TABLE 1 Timeline of events.

Date	Events
27.02.2005	Widespread violations of electoral legislation in the parliamentary elections
04.03.2005	A crowd gathered in Jalal-Abad's central square, with protesters criticizing authorities
21.03.2005	Osh oblast residents seized regional administration, declaring "people's" power
24.03.2005	Protesters stormed the capital's White House, overthrowing President Akayev
24.03.2005	In Bishkek and Osh, looting erupted as unidentified individuals set fire to and ransacked stores
06.04.2010	Security forces apprehended the majority of opposition leaders in Bishkek
07.04.2010	Protesters stormed the White House despite sniper fire; Bakiyev was overthrown
07.04.2010	Extensive looting swept through Bishkek city
13.05.2010	Bakiyev supporters seized South's regional buildings, aiming to topple the provisional government
14.05.2010	Provisional Government backers regained Jalalabad's administrative building
10.06.2010	A clash occurred between Kyrgyz and ethnic Uzbeks
12.06.2010	Arson and looting began in Osh city
4.06.2010	Osh stabilized, but sporadic violence, including looting, persisted in the days that followed

2.2 | Data and sample descriptives

We use data from the KIHS, conducted quarterly by the National Statistical Committee (NSC) of the Kyrgyz Republic from 2005 to 2019. This rotating panel offers a nationally representative sample, encompassing around 5000 households per wave since 2003. Notably, the exclusion of 2003 and 2004 is motivated by dissimilar questionnaire structures and the absence of suitably matched questions with other waves. Additionally, the KIHS sample underwent complete renewal in 2013, with only one-third of households replaced between 2013 and 2019 (see A1).

The KIHS sample is selected using two-stage stratified random sampling based on the 1999 population census. The country's 15 strata encompass urban and rural areas across seven provinces and the capital. Each cross-section maintains national, urban/rural, and provincial representation. The survey comprehensively examines consumption and expenditure, analyzing poverty and living standards. The utilized data encompass household expenditure, income, employment, and demographics, averaging 163.4 quarters per household. Summary statistics for the full sample, categorized by household type, are displayed in Table 2.

2.3 | Food consumption in Kyrgyzstan

Food consumption and expenditure data encompass purchased, home-produced, gifted, and in-kind contributed food items, along with items obtained from hunting,

TABLE 2 Summary statistics for household demographics.

	All	Urban	Rural
Total biweekly expenditure on food† (1000 KGS)	2.64	2.83	2.36
Monthly total household income (1000 KGS)	13.35	14.19	12.12
Household size (count)	4.06	3.63	4.70
Gender of household head (1 = male)	.64	.58	.71
Age of household head (years)	52.71	52.40	53.17
Household heads with only basic education (= 1 if yes)	.12	.10	.15
Household heads with secondary education (= 1 if yes)	.42	.36	.51
Household heads with higher education (= 1 if yes)	.38	.46	.26
Dependency ratio (from 0 to 1)	.35	.34	.36
Share of agricultural income	.02	.00	.05
Share of weekly worked hours in public sector	.33	.38	.25
Number of surveyed households	16,486	10,399	6087
Number of observations	2,694,367	1,759,155	1,205,212

Note: The national currency devalued from 41.01 KGS/USD in 2005Q1 to 69.82 KGS/USD in 2019Q4 (IFS, 2023). Monthly income rose from 151 USD in 2005Q1 to 340 USD in 2019Q4.

†Total food expenditure spent at home and outside the home.

covering 337 items.[4] The purchased and consumed amount of food is recorded separately based on recall over the last 14 days. For purchased goods, we use reported expenditures. Only quantities are recorded for home-produced consumption, necessitating the use of the appropriate median unit value in the respective locality for valuation (Attanasio et al., 2013).

For demand elasticity estimation, we conducted several data transformations. Initially, we converted food item quantities into kilogram equivalents using conversion factors. Next, we derived unit prices by dividing reported expenditures by corresponding quantities of food items. To address missing unit prices due to zero purchases or omissions, we imputed them using median market prices by district, accounting for quality effects and measurement errors as addressed by Deaton (1988) and Crawford et al. (2003). To mitigate these issues, we employed the communal mean price method introduced by Cox and Wohlgenant (1986).[5] This method regresses mean-deviated unit values on household characteristics, removing quality effects to obtain adjusted prices. Additionally, we tackled price changes due to inflation using the FAO Monthly Consumer Price Index for food, converting monetary variables to real values.

Lastly, we aggregate all food items into eight groups: meat & fish, cereals & flour products, fruits & vegetables, dairy products, edible oils, sugar & sweets, mixed products, and junk (processed) products. This grouping aligns with the state classifier of the Kyrgyz Republic. Subsequently, we calculate both quantities consumed and expenditures for each group. The distribution of expenditure shares by food group for every quarter is depicted in Figure 2.

2.4 | Theory

Changes in demand are driven by an item's prices, complementary goods' prices, buyer's income, consumer preferences, and expectations, while the interplay of supply and demand determines market prices (Mas-Collell et al., 1995). Political crises as external shocks lead to shifts in food demand (Holland, 2012). Disruptions in supply chains and income shocks primarily trigger these shifts (Mas-Collell et al., 1995). However, if a crisis is anticipated, households might smooth their consumption strategically to alleviate its repercussions (Dutt & Padmanabhan, 2011).

Thus, it is likely that food demand will be differently affected by a short-term market disruption conditional upon the good's characteristics. A crisis diminishes demand for luxury items during and after the crisis while strengthening demand for staple goods (Pangarkar & Shukla, 2023). If consumers anticipate a crisis, the demand for staples might rise (Henchion et al., 2017). We can rely on the expenditure elasticity derived from the data to distinguish both broad categories. Staples exhibit an expenditure elasticity between zero and one, while luxury items show an expenditure elasticity exceeding one (Brauw & Herskowitz, 2020). This transition in a consumer's

[4] Hunting products constitute 0.01% of total food consumption. Tobacco expenditures are excluded from the food basket. Aggregated food groups are classified by similarity.

[5] For detailed quality-adjusted price procedures, refer to appendix A of Hoang (2018). Quality-adjusted prices are presented in figure 7 in the Appendix.

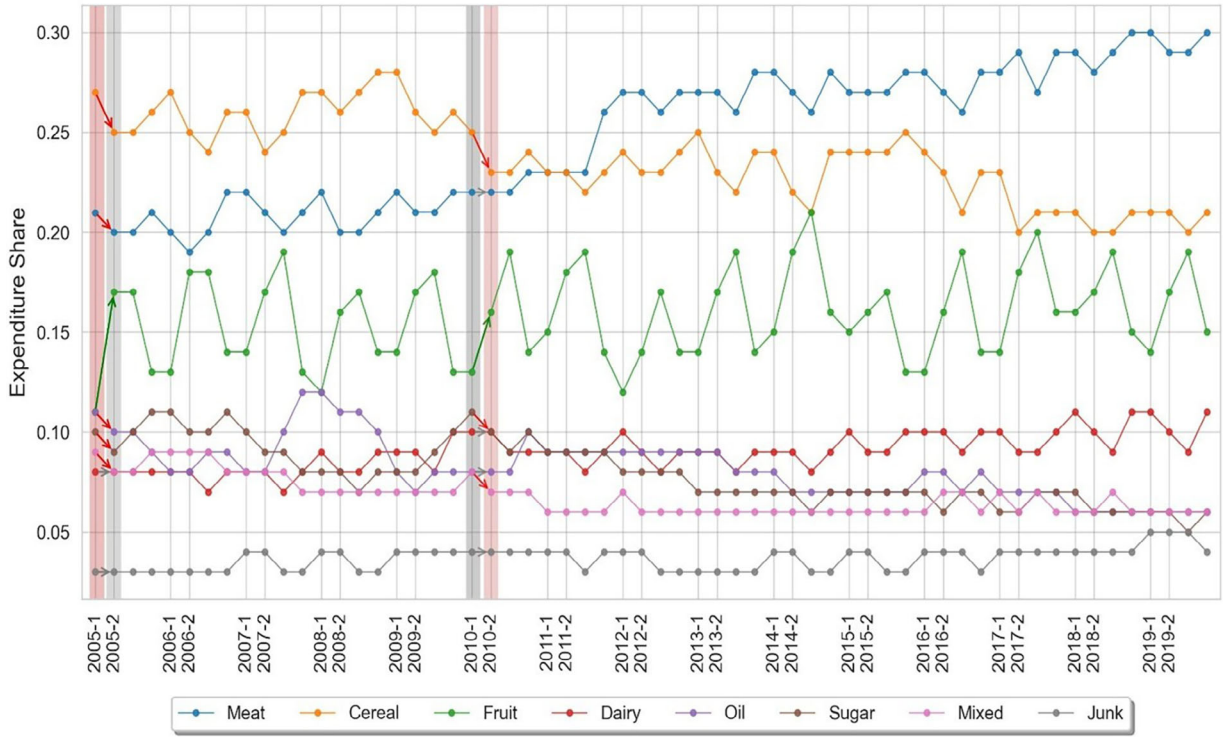

FIGURE 2 Expenditure shares by food groups.

Source: Author's figure.

preference from luxury to staples is expected to result in a shift in own-price elasticities. Subsequently, the own-price elasticity of a staple good should increase, that is, the demand function becomes less elastic.

The unexpected upheaval of 2005 within Bishkek and Osh resulted in unrest and widespread looting that destroyed all shops, causing a temporary closure. During this period, the supply chain halted, eliminating the market dynamics, supply-demand interactions, and prices. Upon store restoration, supply disruptions ceased, but demand overshot. As explained above, the 2010 upheaval followed a comparable scenario, but it was anticipated to enable households to plan their food consumption strategically. Unfortunately, we lack data on income changes and supply chains during the short conflict period, and the survey does not provide exact interview dates within each quarter).[6] In light of this, we suggest the following hypotheses:

1. aggregate food demand decreases during the initial revolution (2005Q1) due to an income shock;
2. aggregate food demand rises before the second revolution (2010Q1) due to the anticipated revolution;
3. demand for staples rises and demand for luxuries reduces during the revolutions due to constrained budgets.

3 | METHODS

Demand analysis examines how consumers react to changes in price, willingness to pay, and income. Two primary approaches, rooted in neoclassical consumer theory, are employed. In the initial standard method, income elasticity is deduced by studying the link between consumption and income for a specific good or bundle of goods (Ogundari & Abdulai, 2013). However, this approach lacks adequate consideration of interdependencies among commodities due to budget constraints and relative prices (Sadoulet & de Janvry, 1995).

The second approach involves a two-stage process. In the first stage, households decide how to distribute total expenditures between food and non-food items. In the second stage, the allocation of total food expenditure among different commodity groups occurs. This method efficiently addresses interdependencies and substitution effects among food items and price changes. It achieves this by estimating fully defined demand systems, such as the linear expenditure system (LES) (Stone, 1954[60]), the Rotterdam model (Barten, 1969), the indirect translog system (ITS) (Christensen et al., 1975), the almost ideal

[6] As pointed out by one reviewer, the shift in elasticities could also be caused by a supply shift. However, there is no evidence that the revolutions affected agricultural production. Thus, we assume supply shocks remain limited to the short-term closure of shops.

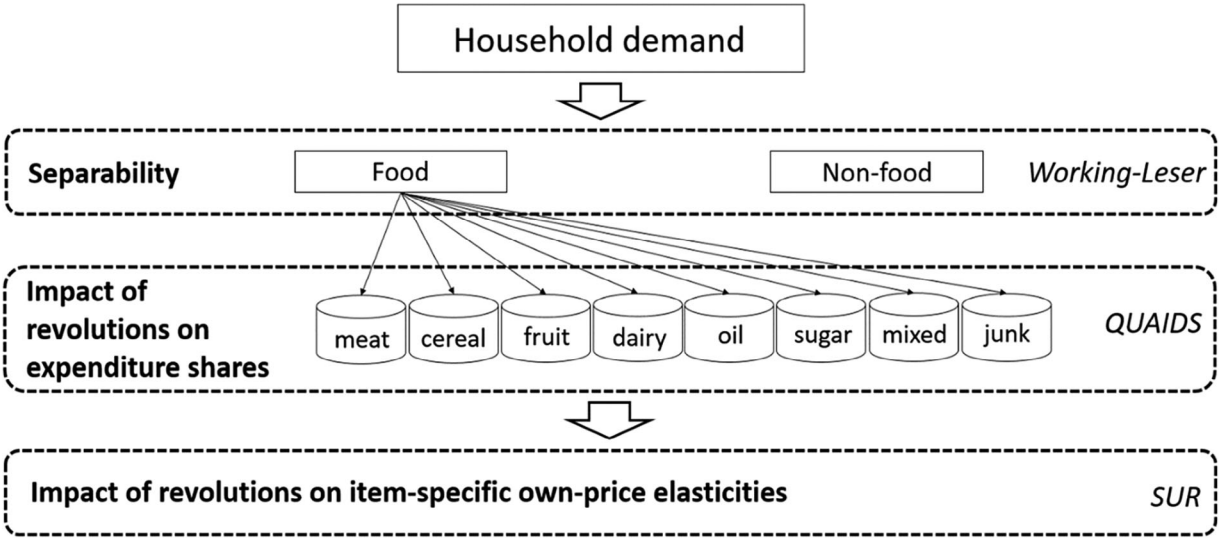

FIGURE 3 Conceptual framework.

Source: Author's figure.

demand system (AIDS) (Deaton & Muellbauer, 1980), and the quadratic almost ideal demand system (QUAIDS) (Banks et al., 1997).

We investigate the impact of revolutions on food demand using a series of multi-stage estimations, as illustrated in Figure 3.

3.1 | Estimating the demand system

Estimating a complete demand system requires weak separability between food and non-food expenditures (Deaton & Muellbauer, 1980). This leads to a two-stage budgeting approach where households allocate income between food and non-food items using the Working-Leser model in the first stage. To handle non- linear Engel curves often seen in separable food demand systems, the QUAIDS model's flexibility is ideal. Thus, in the second stage, we use QUAIDS to assess household expenditure distribution across eight food groups.

3.1.1 | Working-Leser model

Following Chern et al. (2002) and, more recently, Hoang (2018), we employ the standard budget share model borrowed from Working (1943) and Leser (1963) as follows[7]

$$\ln \omega_t = \alpha_0 + \alpha_1 \ln \mathrm{M_t} + \alpha_2 \ln \mathbf{P_t} + \sum_{\mathrm{n}} \beta_n z_{nt} + \epsilon_t \quad (1)$$

[7] Regression results are reported in Table A4.

where ω_t is the share of food in total expenditure in period t and $\mathrm{M_t}$ is the total income per capita, which is the income a household receives from all sources such as self-employed business, remittances, salary, public transfers, and agriculture. $\mathbf{P_t}$ is a Laspeyres price index, defined as:

$$\ln \mathbf{P_t} = \sum_i \overline{w_i} \ln \mathbf{p_{it}} \quad (2)$$

where $\overline{w_i}$ is the mean budget share, and $\mathbf{p_i}$ is the price of the good i. Household characteristics z_{nt} include household size, province of residence, a dummy variable for urban residence, age, gender, and education of the household head ϵ_t is an error term.

3.1.2 | QUAIDS

We use Poi's (2012) *quaids* command implemented in Stata to model food demand with household demographics. This command incorporates demographics using the scaling technique introduced by Ray (1983) and computes the uncompensated price elasticities for individual observations in the data. Assuming a utility-maximizing household with s demographic characteristics represented by vector $\mathbf{z}$ is scaled by the following function:

$$m_0(\mathbf{p}, \mathbf{z}, \mathrm{u}) = \overline{m_0}(\mathbf{z})\, \phi(\mathbf{p}, \mathbf{z}, \mathrm{u}) \quad (3)$$

where $\overline{m_0}(\mathbf{z})$ measures the increase in a household's expenditures in terms of demographic characteristics holding consumption patterns constant. The second term, $\phi(\mathbf{p}, \mathbf{z}, u)$, controls for differences in relative prices and

actual goods consumed. The budget share equation of Banks et al. (1997) derived from maximizing the indirect utility function and augmented with a vector of demographic variables **z** becomes:

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \ln p_{jt} + (\beta_i + \eta_i' \mathbf{z}) \ln \left[\frac{m_t}{\overline{m_0}(\mathbf{z_t}) a(\mathbf{p_t})} \right] + \frac{\lambda_i}{b(\mathbf{p_t}) c(\mathbf{p_t}, \mathbf{z_t})} \left\{ \ln \left[\frac{m_t}{\overline{m_0}(\mathbf{z_t}) a(\mathbf{p_t})} \right] \right\}^2 + \epsilon_{it} \quad (4)$$

where w_{it} is the expenditure share of food group i in period t, p_{jt} is the price of good j, m_t is a household's total food expenditure, $a(\mathbf{p_t})$, $b(\mathbf{p_t})$, $c(\mathbf{p_t}, \mathbf{z_t})$ are the price indices, $\mathbf{p_t}$ is the vector of prices, $\alpha_i, \beta_i, \gamma_{ij}, \lambda_i, \eta_i$ are parameters to be estimated, and ϵ_{it} denotes the error term.

Price indices are defined as:

$$\ln a\ (\mathbf{p_t}) = \alpha_0\ + \sum_i \alpha_i \ln p_{it} + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln p_{it} \ln p_{jt}. \quad (5)$$

$$b\,(\mathbf{p_t}) = \prod_i p_{it}^{\beta_i} \quad (6)$$

$$c\,(\mathbf{p_t}, \mathbf{z_t}) = \prod_j p_{jt}^{\eta_i' z} \quad (7)$$

where $\sum_j \eta_{sj} = 0\ \forall s$ and η_i' represent jth column of parameter matrix η.

3.1.3 | Deriving demand elasticities

Using the procedure given by Banks et al. (1997), we derive demand elasticities for aggregated food groups by partially differentiating Equation (4) with respect to $\ln m_t$ and $\ln p_{jt}$ such that

$$\mu_{it} \equiv \frac{\partial w_{it}}{\partial \ln m_t} = \beta_i + \eta_i' \mathbf{z} + \frac{2\lambda_i}{b\,(\mathbf{p_t}),\ c\,(\mathbf{p_t}, \mathbf{z})} \ln \left[\frac{m_t}{\overline{m_0}\,(\mathbf{z})\, a\,(\mathbf{p_t})} \right] \quad (8)$$

and

$$\mu_{ijt} \equiv \frac{\partial w_{it}}{\partial \ln p_{jt}} = \gamma_{ij} - \mu_{it} \left(\alpha_j + \sum_k \gamma_{jk} \ln P_{kt} \right) - \frac{\lambda_i \left(\beta_i + \eta_i' \mathbf{z} \right)}{b\,(\mathbf{p_t}),\ c\,(\mathbf{p_t}, \mathbf{z})} \left\{ \ln \left[\frac{m_t}{\overline{m_0}\,(\mathbf{z})\, a\,(\mathbf{p_t})} \right] \right\}^2 \quad (9)$$

where P_{kt} is a price index calculated as the arithmetic mean of prices for all k food groups.

Then the expenditure and the uncompensated price elasticities are respectively computed as

$$\varepsilon_{it} = \mu_{it} / w_{it} + 1 \quad (10)$$

and

$$\varepsilon_{ijt}^u = \mu_{ijt} / w_{it} - \delta_{ijt} \quad (11)$$

where δ_{ijt} represents Kronecker delta taking value 1 if $i = j$ and 0 otherwise. Using the Slutsky equation, we can finally compute the compensated price elasticities as

$$\varepsilon_{ijt}^c = \varepsilon_{ijt}^u\ + \varepsilon_{it} w_{jt}.$$

3.2 | Seemingly unrelated regressions

We analyze the impact of revolutions on item-specific uncompensated price elasticities using seemingly unrelated regressions (SUR) initially developed by Zellner (1962). SUR enables more efficient estimation by consolidating data from different food groups and imposing parameter constraints across various equations. The SUR model for uncompensated price elasticities of eight food groups is outlined as follows:

$$\hat{\varepsilon}_{it} = \beta_i + \beta_{i1} R_{1t} + \beta_{i2} R_{1t+1} + \beta_{i3} R_{2t} + \beta_{i4} R_{2t-1} + \beta_{i5} R_{1t} \times B + \beta_{i6} R_{1t} \times O + \beta_{i7} R_{2t} \times B + \beta_{i8} R_{2t} \times O + \epsilon_{it} \quad (13)$$

where $\hat{\varepsilon}_{it}$ represents the uncompensated price elasticity for the food group i in period t, obtained from the QUAIDS model. R_{1t} and R_{2t} are dummy variables signifying revolutions in 2005 and 2010. Meanwhile, R_{1t+1} and R_{2t-1} denote post-revolution I and pre-revolution II quarters, respectively. B and O serve as dummy variables indicating cities (Bishkek and Osh) subjected to looting. ϵ_{it} represents the error term.

4 | RESULTS

4.1 | Demand elasticities

Figure 4 reports expenditure and uncompensated own-price elasticities.[8] These elasticities are evaluated at the sample mean for the entire sample and across regions. The expenditure elasticities range from .39 to 1.22, all displaying positive values, indicating that all goods are normal. Based on the estimated expenditure elasticities, meat & fish (1.17),

[8] Values of expenditure, own- and cross-price elasticities are available in Table A5.

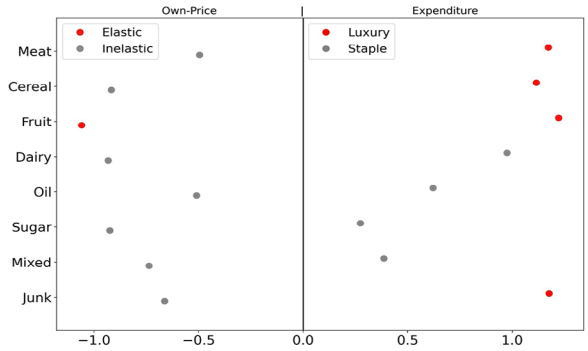

FIGURE 4 Demand elasticities.

Note: The graph shows the average elasticities for the full sample and the corresponding standard deviation.

cereals & flour (1.12), fruits & vegetables (1.22), and junk products (1.18) fall into the luxury category. The majority of these categories also account for the highest expenditure shares. Medium- and low-consumption goods such as dairy, edible oils, sugar, and mixed products are relatively income-inelastic and considered staples.

The uncompensated own-price elasticities, as expected, exhibit negative values, ranging from (−1.06) to (−.5). With the exception of fruits & vegetables (−1.06), demand for all food groups is classifies as own-price inelastic, signifying quantities that respond to price changes by less than one. Sugar and flour products, being imported with volatile prices, heighten households' price sensitivity. The relatively lower own-price elasticity for more expensive? Items like meat & fish (−.5) can be attributed to meat's significant role in the Kyrgyz diet, where its expenditure share exceeds .25 in most quarters.

4.2 | Food consumption and revolutions

Table 3 presents the outcomes derived from fixed-effects and QUAIDS estimations. These analyses aim to explore the relationship between households' overall food expenditure (depicted in column 1), the allocation of expenditures across eight specific commodity categories (columns 2–9), and explanatory variables encompassing binary indicators signifying revolutions and supplementary sociodemographic factors.

In the first quarter of the initial revolution, average food spending dropped by 542 KGS, followed by a decline of 541 KGS in the subsequent quarter. Unlike the previous trend, households increased food spending before and during the second revolution, with rises of 85 KGS and 49 KGS, respectively. During the first revolution, cities affected by looting (Bishkek and Osh) experienced more significant food expenditure reductions: 610 KGS and 595 KGS, respectively. In the second revolution, households in these cities increased their food expenditure by 134 KGS and 86 KGS. The percentage of mean expenditure before the second revolution increased by 12% in Bishkek and 7% in Osh.

QUAIDS estimates reveal that the initial revolution is associated with reduced expenditures on fruits & vegetables (4%), dairy products (3%), and junk items (2%), where fruits & vegetables and junk food are luxuries. In the subsequent quarter, there was a decrease in expenditure on meat (2%), which is also a luxury along with other products. Bishkek residents reduced their consumption of meat (2%), fruits & vegetables (4%), oil (1%), and sugar (1%). On the other hand, Osh citizens decreased spending on fruits & vegetables (6%), mixed products (1%), and junk items (2%).

During the second revolution, food consumption patterns diverged from the initial revolution nationwide, while both cities faced looting incidents. Across the country, there was a decline in expenditure shares for all luxury categories, including meat & fish, cereals, fruits & vegetables, and junk items, while spending on all staple items increased. In Bishkek, expenditure shares for luxury items like meat & fish, fruits & vegetables, and staples such as edible oils and sugar decreased. Similarly, residents of Osh exhibited heterogeneous consumption patterns for various food items.

Considering the effect of sociodemographic variables on food expenditure shares, the age of the household head has no economically relevant impact on any food category. Different levels of education of household heads are associated with heterogeneous food consumption. Surprisingly, farmers spent less on the most often consumed items such as meat & fish, cereals, and fruits & vegetables than non-farmers. Households with more children and elderly members spent more on the relatively cheap categories such as cereals, sugar, edible oils, dairy, and mixed products.

In Figure 5, we normalize the predicted expenditure shares by the expenditure elasticities to accentuate the relative shifts in expenditure shares compared to their elasticities, both by product and between the two revolutions. Figure 5 reveals significant increases in expenditure shares for cereals, edible oils, sugar, and meat & fish, accompanied by declines in dairy, fruits & vegetables, junk, and mixed products during the first revolution. In the second revolution, expenditure shares for luxury foods decreased while those for staples increased.

4.3 | Food preferences and revolutions

Table 4 displays the outcomes of the SUR estimates. These estimates were conducted to investigate the connection between households' uncompensated own-price

TABLE 3 Effect of revolutions on food expenditure shares.

	FE	QUAIDS							
Variables	**Food**	**Meat**	**Cereal**	**Fruit**	**Dairy**	**Oil**	**Sugar**	**Mixed**	**Junk**
Revolution I	−542 (5.648)	.007 (.003)	.044 (.002)	−.037 (.001)	−.032 (.001)	.027 (.001)	.007 (.001)	−4e-4 (.001)	−.015 (.001)
Post Revolution I	−541 (5.162)	−.021 (.002)	.003 (.002)	.015 (.001)	−.017 (.001)	.014 (.001)	.006 (.001)	.009 (.001)	−.009 (.001)
Revolution II	84 (5.461)	−.004 (.003)	−.021 (.002)	−.003 (.001)	.001 (.001)	.005 (.001)	.019 (.001)	.009 (.001)	−.006 (.001)
Pre Revolution II	49 (4.973)	.008 (.002)	−2e-4 (.002)	−.026 (.001)	.010 (.001)	−.003 (.001)	.016 (.001)	.001 (.001)	−.006 (.001)
Revolution I× Bishkek	−68 (10.043)	−.026 (.006)	−.030 (.004)	−4e-4 (.003)	.071 (.003)	−.040 (.002)	−.021 (.002)	−.007 (.002)	.053 (.002)
Revolution I× Osh	−53 (10.722)	.030 (.007)	.005 (.005)	−.020 (.004)	.012 (.003)	−.016 (.002)	−.003 (.003)	−.006 (.002)	−.003 (.002)
Revolution II× Bishkek	49 (10.142)	−.049 (.006)	−.003 (.004)	.011 (.004)	.056 (.003)	−.015 (.002)	−.011 (.002)	.002 (.002)	.010 (.002)
Revolution II× Osh	37 (10.592)	−.002 (.007)	−.001 (.005)	.028 (.004)	−.001 (.003)	.015 (.002)	−.015 (.003)	−.009 (.003)	−.015 (.002)
Rural		4e-5 (.001)	.023 (4e-4)	−.024 (3e-4)	−.041 (3e-4)	.024 (2e-4)	.018 (2e-4)	.010 (2e-4)	−.10 (2e-4)
Age	3.419 (.128)	.001 (2e-5)	−3e-4 (1e-5)	−9e-5 (1e-4)	3e-4 (1e-5)	−2e-4 (7e-6)	−3e-4 (8e-6)	−2e-4 (8e-6)	−7e-5 (8e-6)
Gender	351 (2.826)	.009 (.001)	−.013 (4e-4)	−.009 (3e-4)	−.012 (3e-4)	.008 (2e-4)	.012 (3e-4)	.011 (2e-4)	−.006 (2e-4)
Basic education	−231 (5.502)	−.012 (.001)	.018 (.001)	.008 (.001)	−.018 (.001)	.010 (4e-4)	.002 (.001)	−1e-4 (.001)	−.008 (.001)
Secondary education	−142 (4.382)	−4e-4 (.001)	.001 (.001)	.008 (.001)	−.009 (.001)	.006 (4e-4)	.001 (4e-4)	−.002 (4e-4)	−.005 (4e-4)
High education	137 (3.581)	−.005 (.001)	−.004 (.001)	.002 (.001)	.002 (.001)	2e-4 (4e-4)	.005 (4e-4)	.002 (4e-4)	−.002 (4e-4)
Dependency ratio	218 (3.890)	−.029 (.001)	.003 (.001)	−.012 (.001)	.022 (4e-4)	.006 (4e-4)	.012 (4e-4)	.001 (4e-4)	−.004 (4e-4)
Share of farm income	79 (4.207)	−.024 (.002)	−.005 (.002)	−.002 (.001)	−.006 (.001)	.005 (.001)	.019 (.001)	.014 (.001)	−.002 (.001)
Share of public employment	52 (2.023)	.006 (.001)	−.008 (4e-4)	−1e-4 (3e-4)	−.002 (3e-4)	−.005 (2e-4)	.002 (2e-4)	.001 (2e-4)	.004 (2e-4)
Constant	2415 (8.443)	.395 (.008)	.617 (.006)	.411 (.005)	−.002 (.004)	−.114 (.003)	−.229 (.003)	−.231 (.003)	.154 (.003)
R^2	.479	.079	.075	.184	.147	.212	.153	.092	.070

Note: Robust standard errors are indicated in parentheses. Fixed-effects analysis involves 295,539 observations, and QUAIDS analysis uses 300,000 observations.

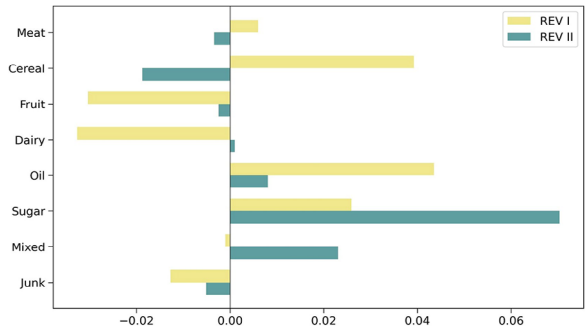

FIGURE 5 Effect of revolutions on food expenditure shares.

elasticities and binary variables representing revolutions, along with their interaction with cities subjected to looting. In Equation (11), the presence of w_{it} in the denominator can lead to missing observations when a household does not consume a specific item ($w_{it} = 0$). Additionally, when w_{it} is close to 0, the estimated uncompensated price elasticity can be high in absolute terms. Consequently, we limited the sample to household-level elasticities ranging from (−2) to (+2) to mitigate extreme values. This adjustment explains the lower number of observations in the SUR estimation due to missing and extreme values.

Across the country, there was a significant rise in preferences for key staples such as dairy, sugar, mixed products, and frequently consumed luxury items like meat & fish, and cereals during the initial revolution. With elasticities for dairy (−.93) and sugar (−.92) over the sample average (see A5), consumer demand in Bishkek is predicted to be less elastic by .25 and .24 percentage points, respectively. In Osh, preferences decreased for almost all products but remained inelastic, except for fruits & vegetables.

During the second revolution and pre-revolution quarters, the absolute impact of the second revolution on food preferences decreased for all commodities. We observe the most significant reduction in sugar and meat nationwide. Food choices varied between the two cities, reflecting distinct household responses. In Osh, preferences predominantly rose for luxury items like meat & fish, fruits & vegetables, and junk food. Conversely, in Bishkek, preferences increased for almost all items except cereals, dairy, and junk food.

Figure 6 illustrates the impact of revolutions on food choices relative to their actual own-price elasticities. We divide the nationwide own-price elasticities acquired during the periods of conflict by the actual price elasticities calculated over 15 years. The figure reveals that in the first revolution, a price escalation would result in a more pronounced decline in demand for commodities such as meat & fish, dairy, sugar, and mixed food products, similar to patterns seen in non-conflict periods. Conversely, all products displayed heightened elasticity during the second revolution, indicating increased sensitivity to price changes.

Comparing Figures 5 and 6, it is evident that the changes in price elasticities show a significantly larger scale than alterations in expenditure shares. The impact of conflicts on food demand is more pronounced through price shifts than income changes. Additionally, the effect of revolutions on food expenditure shares is heterogeneous. During the first revolution, food preferences shifted towards luxury items like fruits & vegetables and junk food. In contrast, the shift was more pronounced during the second revolution toward staples such as edible oils, sugar, and mixed food.

5 | DISCUSSION

Our analysis offers a comprehensive understanding of the impact of political conflicts on different food groups' demands in Kyrgyzstan. Our study uncovered diverse household behavior in food demand during conflicts and examined the effects of anticipated and unanticipated conflicts on food demand.

TABLE 4 Food preferences and revolutions.

Variables	Meat	Cereal	Fruit	Dairy	Oil	Sugar	Mixed	Junk
Revolution I	.164 (.017)	.006 (.004)	−.125 (.003)	.147 (.006)	−.134 (.018)	.140 (.018)	.041 (.011)	−.074 (.023)
Post Revolution I	.187 (.011)	−.019 (.003)	.027 (.002)	.010 (.004)	−.083 (.013)	−.107 (.013)	.005 (.008)	−.168 (.016)
Revolution II	−.161 (.011)	−.009 (.003)	−.024 (.002)	−.096 (.004)	−.178 (.012)	−.346 (.012)	−.130 (.007)	−.104 (.015)
Pre Revolution II	−.270 (.009)	−.014 (.002)	−.069 (.002)	−.152 (.003)	−.139 (.010)	−.483 (.010)	−.189 (.006)	−.162 (.012)
Revolution I× Bishkek	.129 (.024)	−.034 (.006)	.037 (.004)	−.245 (.008)	.036 (.026)	−.239 (.026)	−.063 (.016)	−.279 (.034)
Revolution I× Osh	−.037 (.036)	−.030 (.009)	−.020 (.007)	−.132 (.013)	−.161 (.039)	−.171 (.039)	−.025 (.024)	.179 (.051)
Revolution II× Bishkek	.467 (.021)	−.040 (.005)	.032 (.004)	−.045 (.007)	.451 (.022)	.203 (.022)	.146 (.014)	−.039 (.029)
Revolution II× Osh	.091 (.031)	−.029 (.008)	.033 (.006)	−.004 (.011)	−.124 (.033)	−.085 (.034)	.097 (.020)	.262 (.043)
R2	.017	.002	.037	.035	.007	.029	.011	.004

Note: Robust standard errors are given in parentheses. The number of observations is 128,492.

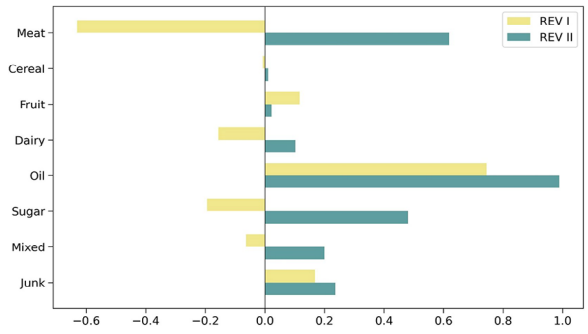

FIGURE 6 Effect of revolutions on price elasticities.

Our study reveals that when conflicts arise unexpectedly, total food demand decreases. This discovery aligns with empirical evidence indicating that violent conflicts directly impair food systems, negatively impacting food security (Delgado et al., 2021). The deliberate use of food as a weapon of war and the intentional destruction of food systems by conflict actors contribute to a lasting legacy of food insecurity resulting from the war (Keen & Lee, 2007). Our findings indicate that government adoption of radical laws can swiftly escalate public dissatisfaction, potentially triggering a coup that initiates a chain of adverse consequences, beginning with compromised food security.

Our findings also reveal that households strategically plan their food consumption when conflicts are anticipated, increasing total food expenditure before the conflict's commencement. This observation adds to the literature on household coping strategies adopted before and during crises (Barrett et al., 2001). However, the mechanisms and processes underlying these strategies still need to be more adequately understood in the development literature, where limited attention has been given to analyzing the variations in coping strategies employed by households in peaceful versus conflict-affected settings.

Our hypothesis of heightened demand for staples was partly affirmed in the initial revolution and fully validated in the second, while preferences for luxury items decreased in the second revolution and increased in the first. This finding underscores the crucial role of event predictability in shaping rational human behavior (Zhang et al., 2021). Furthermore, our findings emphasize that preferences more prominently drive the effects of conflicts on food demand than changes in income, underscoring the significance of market conditions in shaping food choices over budget constraints (Heffetz & Shayo, 2009).

Finally, it is crucial to acknowledge the potential limitations of this study. One significant factor is the possibility of underestimating demand due to potential disruptions in the supply chain for stores that continued operating during conflicts. Furthermore, accurately capturing the timing of conflicts could be challenging due to the difficulty distinguishing between households directly impacted by conflicts and those unaffected due to data limitations. Lastly, the study emphasizes the dominance of long-term conflict impacts on food demand over short-term effects, where short-term impacts may not be readily apparent (refer to Figure 2).

6 | CONCLUSION AND POLICY IMPLICATIONS

Amidst escalating armed conflicts and widespread unrest, this article delves into the impact of political conflicts on food demand through complete demand system analyses. To comprehend the ramifications of conflicts, we formulate three hypotheses elucidating consumer behavior before, during, and after conflicts, along with their preferences across various food group categories. Drawing from our findings, we propose that governments, mass media, and other institutions responsible for disseminating information should promptly convey signals of anticipated conflicts if they become unavoidable.

Our findings emphasize that solely analyzing the impact of conflict on total food expenditure overlooks potential shifts within food categories. Adopting a disaggregated perspective becomes imperative for researchers focusing on the interplay of conflicts with food and nutrition security. Likewise, the results reveal a regional disparity, with households in the most affected regions—Bishkek and Osh—experiencing more substantial impacts on food expenditure than other areas. Furthermore, predicting conflicts' effects on individual food categories is challenging. Additional analyses are essential to determine suitable strategies for averting shortages of specific foods, which is especially crucial for ensuring healthy nutrition during tumultuous periods.

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REFERENCES

Adong, A., Kornher, L., Kiptoo Kirui, O., & von Braun, J. (2021). Conflict exposure and food consumption pathways during and after conflict: Evidence from Northern Uganda. *World Development*, *147*, 105636. https://doi.org/10.1016/j.worlddev.2021.10563

Akbulut-Yuksel, M. (2014). Children of war. *Journal of Human Resources*, *49*(3), 634–662. https://doi.org/10.3368/jhr.49.3.634

Akiner, S. (2016). Kyrgyzstan 2010: Conflict and Context. Central Asia-Caucasus Institute & Silk Road Studies Program, ISBN: 978-91-86635-94-7.

Akresh, R., Verwimp, P., & Bundervoet, T. (2011). Civil war, crop failure, and child stunting in Rwanda. *Economic Development and Cultural Change*, *59*(4), 777–810. https://doi.org/10.1086/660003

Akresh, R., Bhalotra, S., Leone, M., & Osili, U. O. (2012). War and Stature: Growing Up during the Nigerian Civil War. *American Economic Review*, *102*(3), 273–277. https://doi.org/10.1257/aer.102.3.273

Alff, H., & Eschment, B. (2010). Revolution, Umsturz, Volksaufstand… Materialien zur aktuellen Lage in Kirgistan. https://laender-analysen.de/zentralasien-analysen/28/revolution-umsturz-volksaufstand-materialien-zur-aktuellen-lage-in-kirgistan/

Anderson, J. (1999). *Kyrgyzstan: Central Asia's island of democracy?* Harwood Academic.

Attanasio, O., Di Maro, V., Lechene, V., & Phillips, D. (2013). Welfare consequences of food prices increases: Evidence from rural Mexico. *Journal of Development Economics*, *104*, 136–151. https://doi.org/10.1016/j.jdeveco.2013.03.009

Banks, J., Blundell, R., & Lewbel, A. (1997). Quadratic Engel curves and consumer demand. *Review of Economics and Statistics*, *79*(4), 527–539. https://doi.org/10.1162/003465397557015

Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural africa: concepts, dynamics, and policy implications. *Food Policy*, *26*, 315–331.

Barten, A. P. (1969). Maximum likelihood estimation of a complete system of demand equations. *European Economic Review*, *1*(1), 7–73. https://doi.org/10.1016/0014-2921(69)90017-8

Brauw, A., & Herskowitz, S. (2020). Income variability, evolving diets, and elasticity estimation of demand for processed foods in Nigeria. *American Journal of Agricultural Economics*, *103*(4), 1294–1313. https://doi.org/10.1111/ajae.12139

Brück, T., d' Errico, M., & Pietrelli, R. (2018). The effects of violent conflict on house- hold resilience and food security: Evidence from the 2014 Gaza conflict. *World Development*, *119*, 203–223. https://doi.org/10.1016/j.worlddev.2018.05.00

Bundervoet, T., Verwimp, P., & Akresh, R. (2009). Health and civil war in rural Burundi. *Journal of Human Resources*, *44*(2), 536–563. https://doi.org/10.3368/jhr.44.2.536

Chern, W. S., Ishibashi, K., Taniguchi, K., & Tokoyama, Y. (2002). Analysis of food consumption behavior by Japanese households (No. ESA Working Paper No. 02-06). Rome, Italy: Food and Agriculture Organization. http://www.fao.org/docrep/007/ae025e/ae025e00.htm

Cox, T. L., & Wohlgenant, M. K. (1986). Prices and quality effects in cross-sectional demand analysis. *American Journal of Agricultural Economics*, *68*(4), 908. https://doi.org/10.2307/1242137

Crawford, I., Laisney, F., & Preston, I. (2003). Estimation of household demand systems with theoretically consistent Engel curves and unit value specifications. *Journal of Econometrics*, *114*, 221–241.

Christensen, L. R., Jorgenson, D. W., & Lau, L. J. (1975). Transcendental logarithmic utility functions. *The American Economic Review*, *65*(3), 367–383.

Dabalen, A. L., & Paul, S. (2014). Effect of conflict on dietary diversity: Evidence from C^ote d'Ivoire. *World Development*, *58*, 143–158. https://doi.org/10.1016/j.worlddev.2014.01.010

Deaton, A., & Muellbauer, J. (1980). An almost ideal demand system. *The American Economic Review*, *70*(3), 312–326.

Deaton, A. (1988). Quality, quantity, and spatial variation of price. *The American Economic Review*, *78*(3), 418–430.

Delgado, C., Murugani, V., & Tschunkert, K. (2021). Food systems in conflict and peacebuilding settings SIPRI, Stockholm.

D'Souza, A., & Jolliffe, D. (2013). Conflict, food price shocks, and food insecurity: The experience of Afghan households. *Food Policy*, *42*, 32–47. https://doi.org/10.1016/j.foodpol.2013.06.007

Dutt, P., & Padmanabhan, V. (2011). Crisis and consumption smoothing. *Marketing Science*, *30*(3), 491–512. https://www.jstor.org/stable/23012483

FAO, IFAD, UNICEF, WFP, WHO. (2021). The State of Food Security and Nutrition in the World (2021). Transforming food systems for food security, improved nutrition and affordable healthy diets for all. FAO, Rome. https://www.fao.org/publications/sofi/2021/en/

FSIN, GNAFC. (2021). Global Report on Food Crises. Joint analysis for better decisions. https://www.wfp.org/publications/global-report-food-crises-2021

George, J., Adelaja, A., & Weatherspoon, D. (2019). Armed conflicts and food insecurity: Evidence from Boko Haram's Attacks. *American Journal of Agricultural Economics*, *102*(1), 114–131. https://doi.org/10.1093/ajae/aaz039

Gordon, N. H., & Halileh, S. (2012). An analysis of cross sectional survey data of stunting among palestinian children less than five years of age. *Maternal and Child Health Journal*, *17*(7), 1288–1296. https://doi.org/10.1007/s10995-012-1126-4

Hale, H. (2006). Democracy or autocracy on the march? The colored revolutions as normal dynamics of patronal presidentialism. *Communist and Post-Communist Studies*, *39*(3), 305–329.

Heffetz, O., & Shayo, M. (2009). How large are non-budget-constraint effects of prices on demand? *American Economic Journal: Applied Economics*, *1*(4), 170–199. https://doi.org/10.1257/app.1.4.170

Henchion, M., Hayes, M., Mullen, A. M., Fenelon, M., & Tiwari, B. (2017). Future protein supply and demand: Strategies and factors influencing a sustainable equilibrium. *Foods*, *6*(7), 53. https://doi.org/10.3390/foods6070053

Hoang, H. K. (2018). Analysis of food demand in Vietnam and short-term impacts of market shocks on quantity and calorie consumption. *Agricultural Economics*, *49*(1), 83–95. https://doi.org/10.1111/agec.12397

Holland, A. (2012). The Arab Spring and World Food Prices. *American Security Project*, https://www.jstor.org/stable/resrep05961

Hussein, M., Law, C., & Fraser, I. (2021). An analysis of food demand in a fragile and insecure country: Somalia as a case study. *Food Policy*, *101*, 102092. https://doi.org/10.1016/j.foodpol.2021.102092

Ihle, R., & Rubin, O. D. (2013). Consequences of unintended food policies: Food price dynamics subject to the Israeli–Palestinian conflict. *Food Policy*, *42*, 96–105. https://doi.org/10.1016/j.foodpol.2013.07.007

International Financial Statistics. (2023). Exchange rates selected indicators, Kyrgyz Republic. https://data.imf.org/regular.aspx?key=61545850

Keen, D., & Lee, V. (2007). Conflict, trade and the medium-term future of food security in Sudan. *Disasters*, *31*(s1), S9–S24. https://doi.org/10.1111/j.1467-7717.2007.00346.x

Koren, O. (2018). Food abundance and violent conflict in Africa. *American Journal of Agricultural Economics*, *100*(4), 981–1006. https://doi.org/10.1093/ajae/aax106

Korir, L., Rizov, M., & Ruto, E. (2020). Food security in Kenya: Insights from a household food demand model. *Economic Modelling*, *92*, 99–108. https://doi.org/10.1016/j.econmod.2020.07.015

Kroeger, A., & Anderson, K. H. (2014). Remittances and the human capital of children: New evidence from Kyrgyzstan during revolution and financial crisis, 2005–2009. *Journal of Comparative Economics*, *42*(3), 770–785. https://doi.org/10.1016/j.jce.2013.06.001

Kubicek, P. (2011). Are Central Asian leaders learning from upheavals in Kyrgyzstan? *Journal of Eurasian Studies*, *2*(2), 115–124. https://doi.org/10.1016/j.euras.2011.03.002

Kumar, N., & Quisumbing, A. R. (2013). Gendered impacts of the 2007–2008 food price crisis: Evidence using panel data from rural Ethiopia. *Food Policy*, *38*, 11–22. https://doi.org/10.1016/j.foodpol.2012.10.002

Law, C., Fraser, I., & Piracha, M. (2019). Nutrition Transition and Changing Food Preferences in India. *Journal of Agricultural Economics*, *71*(1), 118–143. https://doi.org/10.1111/1477-9552.12322

Leser, C. E. V. (1963). Forms of Engel functions. *Econometrica*, *31*(4), 694–703.

Martin-Shields, C. P., & Stojetz, W. (2019). Food security and conflict: Empirical challenges and future opportunities for research and policy making on food security and conflict. *World Development*, *119*(C), 150–164. https://doi.org/10.1016/j.worlddev.2018.07.011

Mas-Collell, A., Whinston, M. D., & Green, J. (1995). *Microeconomic theory*. Oxford University Press.

Minoiu, C., & Shemyakina, O. N. (2014). Armed conflict, household victimization, and child health in Coˆte d'Ivoire. *Journal of Development Economics*, *108*, 237–255. https://doi.org/10.1016/j.jdeveco.2014.03.003

Ogundari, K., & Abdulai, A. (2013). Examining the heterogeneity in calorie–income elasticities: A meta-analysis. *Food Policy*, *40*, 119–128. https://doi.org/10.1016/j.foodpol.2013.03.001

Pangarkar, A., & Shukla, P. (2023). Conspicuous and inconspicuous consumption of luxury goods in a digital world: insights, implications, and future research directions. *International Journal of Advertising*, *42*(7), 1226–1238. https://doi.org/10.1080/02650487.2023.2246260

Poi, B. P. (2012). Easy demand-system estimation with quaids. *Stata Journal*, *12*(3), 433–446.

Steiner, S., & Esenaliev, D. (2011). Are Uzbeks better off? Economic welfare and ethnicity in Kyrgyzstan. *Sustainability*, *13*, 8371. https://doi.org/10.3390/su13158371

Radnitz, S., (2010). *Weapons of the wealthy. predatory regimes and elite-led protests in Central Asia*. Cornell University Press.

Ray, R. (1983). Measuring the costs of children. *Journal of Public Economics*, *22*(1), 89–102. https://doi.org/10.1016/0047-2727(83)90058-0

Rockmore, M. (2020). Conflict-risk and agricultural portfolios: Evidence from Northern Uganda. *The Journal of Development Studies*, *56*(10), 1856–1876. https://doi.org/10.1080/00220388.2019.1703953

Roosen, J., Staudigel, M., & Rahbauer, S. (2022). Demand elasticities for fresh meat and welfare effects of meat taxes in Germany. *Food Policy*, *106*, 102194. https://doi.org/10.1016/j.foodpol.2021.102194

Sadoulet, E., & de Janvry, A. (1995). *Quantitative development policy analysis*. John Hopkins University Press.

Serneels, P., & Verpoorten, M. (2015). The impact of armed conflict on economic performance: Evidence from Rwanda. *Journal of Conflict Resolution*, *59*(4). https://doi.org/10.1177/0022002713515409

Solvang, O., & Neistat, A. (2010). Kyrgyzstan: Where is the justice? Interethnic violence in Southern Kyrgyzstan and its aftermath. Human Rights Watch Report.

Stone, R. (1954). Linear expenditure systems and demand analysis: An application to the pattern of British demand. *The Economic Journal*, *64*(255), 511. https://doi.org/10.2307/2227743

United Nations. (2021). Food systems summit, New York.

Verwimp, P., & Munoz-Mora, J. C. (2017). Returning Home after Civil War: Food Security and Nutrition among Burundian Households. *The Journal of Development Studies*, *54*(6), 1019–1040. https://doi.org/10.1080/00220388.2017.1311407

Working, H. (1943). Statistical laws of family expenditure. *Journal of the American Statistical Association*, *38*(221), 43–56.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, *57*(298), 348–368.

Zhang, W., Shen, Q., Teso, S., Lepri, B., Passerini, A., Bison, I., & Giunchiglia, F. (2021). Putting human behavior predictability in context. *EPJ Data Science*, *10*, 42. https://doi.org/10.1140/epjds/s13688-021-00299-2

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