The Tradability Tax: How Trade Sanctions Fragment Food Markets*

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Abstract

When ECOWAS imposed trade sanctions on Niger following the July 2023 military coup, imported rice prices surged while locally grown millet barely moved. I exploit this commodity-level variation—using a triple-difference design comparing tradable versus local staples across sanctioned Niger and unsanctioned Burkina Faso—to estimate the "tradability tax" on food prices. Sanctions raised imported rice prices by 14.2 percent relative to local millet in Niger markets, compared to the same commodity gap in Burkina Faso. The effect was concentrated during full border closure (18.4 percent) and attenuated after partial lifting (11.9 percent). A placebo test confirms no pre-existing differential trend. These results reveal that trade sanctions impose a regressive food price burden channeled through import dependence, with the largest costs falling on consumers of staples they cannot produce domestically.

JEL Codes: F51, O13, Q11, F14

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1. Introduction

On July 26, 2023, military officers in Niger overthrew President Mohamed Bazoum. Within days, the Economic Community of West African States (ECOWAS) imposed the most comprehensive sanctions package in West African history: complete border closures, a trade embargo, financial system exclusion, and electricity supply cuts from neighboring Nigeria. For a landlocked country that imports the majority of its rice through Nigerian trade corridors, these sanctions amounted to a sudden, externally imposed supply shock whose severity varied sharply by commodity. Rice, which travels across borders, became scarce. Millet, which grows in Niger's fields, did not.

This paper estimates the "tradability tax"—the excess price inflation imposed on consumers of imported staples when trade sanctions sever cross-border supply chains. I exploit the fact that sanctions differentially affect commodities depending on their import dependence. Imported rice prices in Niger jumped 34 percent between July and November 2023; locally produced millet prices rose only modestly and then fell with the harvest. This within-market commodity gap provides a natural experiment: by comparing the rice-millet price differential in sanctioned Niger to the same differential in unsanctioned Burkina Faso, I isolate the causal effect of sanctions from confounding seasonal and regional price shocks.

The identification strategy employs a triple-difference design with three sources of variation: country (Niger versus Burkina Faso), commodity tradability (imported rice versus locally produced millet), and time (pre- versus post-sanctions). The saturated specification, which includes market-commodity, market-month, and commodity-month fixed effects, absorbs all time-invariant market-commodity characteristics, all local inflationary trends, and all global commodity price movements. What remains is the sanctions-specific, tradability-specific, Niger-specific price response—the tradability tax.

The main result is large and precisely estimated. Sanctions raised log rice prices in Niger by 0.142 (14.2 percent) relative to millet, compared to the same commodity gap in Burkina Faso ($p < 0.001$). This effect strengthens to 0.184 during the period of full border closure (August 2023–January 2024) and attenuates to 0.119 after partial sanctions lifting in February 2024—a pattern consistent with the supply-disruption mechanism. The result is robust to alternative control commodities (sorghum: 0.151; maize: 0.181) and to excluding the capital Niamey (0.180). A placebo test assigning false treatment to August 2022 yields a precisely estimated null (0.005, $p = 0.77$), confirming no pre-existing differential trend.

This paper contributes to three literatures. First, it adds to the economics of sanctions, which has primarily examined macro-level outcomes: GDP growth (Neuenkirch and Neumeier, 2015), trade flows (Felbermayr et al., 2020), political regime change (Marinov, 2005), and

human rights (Peksen, 2009). Allen and Lektzian (2013) show that sanctions are a blunt instrument; Early and Peksen (2019) document how sanctions push economic activity into informal channels. But none of these studies trace sanctions through to specific consumer commodity prices, and none exploit within-country commodity variation to identify the transmission channel. The tradability dimension reveals that sanctions function as a regressive consumption tax: households dependent on imported staples bear the highest cost, while those consuming locally produced alternatives are largely insulated. Second, the paper speaks to the literature on food market integration in developing countries (Fackler and Goodwin, 2001; Aker, 2010; Bergquist and Dinerstein, 2020). Badiane and Shively (1998) study spatial price transmission in Ghana; Minot (2011) examines the transmission of world food price changes to Sub-Saharan African markets; Atkin and Donaldson (2015) quantify intra-national trade costs. The sanctions episode provides a sharp negative shock to integration—an externally imposed reversal of the trade cost reductions that decades of infrastructure investment have achieved (Brunelin and De Weerdt, 2023). Third, the paper connects to work on commodity prices and political instability (Arezki and Brückner, 2014), food price shocks in developing economies (Dillon and Barrett, 2016; Giordani et al., 2016), and the role of mobile information in Niger's markets (Aker and Mbiti, 2010). It offers the first causal estimates from Niger's 2023 crisis, one episode in a wave of Sahelian coups that are reshaping regional trade architecture.

The Sahel's food security depends on trade corridors that cross political borders. When those corridors close—whether through sanctions, coups, or conflict—the cost falls not uniformly on all consumers but specifically on those whose diets depend on imported commodities. This tradability channel is invisible in aggregate price indices but central to understanding who bears the burden of economic coercion.

2. Institutional Background

The July 2023 Coup and ECOWAS Response. On July 26, 2023, elements of Niger's presidential guard detained President Mohamed Bazoum and declared a military takeover. ECOWAS, the 15-member regional economic bloc, responded on August 6, 2023, with an unprecedented sanctions package: closure of all land and air borders between ECOWAS member states and Niger; a comprehensive trade embargo prohibiting commercial transactions; suspension from ECOWAS financial institutions and freezing of Niger's assets in regional banks; and suspension of all financial assistance and commercial transactions. Nigeria, which shares a 1,500-kilometer border with Niger and serves as its primary trade corridor, enforced the sanctions rigorously, cutting electricity exports that supplied approximately 70 percent of Niger's grid (International Labour Organization, 2023).

Niger's Import Dependence. Niger is landlocked, bordered by seven countries, with the Nigerian corridor serving as its primary lifeline for imported goods. Rice, vegetable oil, sugar, and manufactured goods flow northward from Nigerian ports through border markets in Maradi, Zinder, and Diffa. By contrast, Niger's domestic agriculture produces millet, sorghum, and cowpeas—rain-fed crops adapted to the Sahelian climate. This structural division between imported tradable goods and locally produced non-tradables creates the variation that the empirical strategy exploits.

Sanctions Timeline. The sanctions period divides into two phases. During full sanctions (August 2023–January 2024), border closures were comprehensively enforced, though some informal cross-border trade persisted through traditional smuggling routes. Beginning in February 2024, ECOWAS began a gradual easing of sanctions following diplomatic negotiations, with Niger's military government making concessions on governance timelines. The phased lifting provides a natural intensity test: if the price effects are genuinely driven by border closures, they should attenuate when borders partially reopen.

3. Data

I use food price data from the World Food Programme's Vulnerability Analysis and Mapping (VAM) system, which monitors retail prices across market locations in food-insecure countries. The data cover 55 markets in Niger and 62 markets in Burkina Faso, observed monthly from January 2021 through December 2024 (48 months). For each market-month observation, the data record prices per kilogram in West African CFA francs (XOF) for multiple commodities.

The analysis focuses on two commodity categories. The treated commodity is imported rice (*riz importé*), which enters Niger primarily through Nigerian border crossings and is therefore directly exposed to trade sanctions. The primary control commodity is millet (*mil*), the dominant locally produced staple grain in both Niger and Burkina Faso. Millet is rain-fed, domestically consumed, and does not depend on cross-border supply chains. Sorghum, maize, and cowpeas serve as alternative local controls in robustness specifications.

The panel is unbalanced: not all markets report prices in every month. I retain all non-missing market-commodity-month observations rather than restricting to balanced panels, which would reduce sample size substantially. The fixed-effect structure absorbs level differences across markets with differing reporting frequencies.

The choice of Burkina Faso as the control country reflects three considerations. First, like Niger, Burkina Faso is a landlocked Sahelian ECOWAS member state with similar agroecological conditions, consuming the same staple commodities priced in the same currency

(XOF). Second, while Burkina Faso was itself under military rule following its own 2022 coup, it was not subject to ECOWAS trade sanctions during the study period. Third, the WFP monitors comparable markets in both countries with consistent methodology.

Table 1 presents summary statistics. Before sanctions, imported rice averaged 484 XOF/kg in Niger and 445 XOF/kg in Burkina Faso, while millet averaged 282 XOF/kg in Niger and 299 XOF/kg in Burkina Faso. During full sanctions, Niger rice prices rose to 623 XOF/kg—a 29 percent increase—while Niger millet prices rose by 13 percent to 319 XOF/kg, largely reflecting seasonal dynamics rather than sanctions effects.

Table 1: Summary Statistics: Food Prices by Country, Commodity, and Sanctions Period

Country	Commodity	Period	Mean	SD	Min	Max	N	Markets
Burkina Faso	Millet	Pre-sanctions	298.7	88.3	132	908	1,282	62
		Full sanctions	302.9	85.8	127	797	228	61
		Post-partial-lift	361.9	91.6	92	725	423	60
	Rice (imported)	Pre-sanctions	445.2	87.2	296	1,290	559	31
		Full sanctions	494.6	92.6	388	1,040	112	29
		Post-partial-lift	566.7	78.7	388	969	209	30
Niger	Millet	Pre-sanctions	281.9	44.2	161	439	1,000	55
		Full sanctions	301.2	45.1	200	420	205	53
		Post-partial-lift	349.3	68.6	224	552	370	53
	Rice (imported)	Pre-sanctions	484.1	40.8	235	766	1,059	55
		Full sanctions	643.3	59.8	480	800	214	52
		Post-partial-lift	692.9	62.9	515	950	380	53

Notes: Prices in XOF (West African CFA franc) per kilogram from WFP VAM market monitoring. Pre-sanctions: January 2021–July 2023. Full sanctions: August 2023–January 2024. Post-partial-lift: February 2024–December 2024. ECOWAS imposed trade sanctions on Niger on August 6, 2023, following the July 26 military coup.

4. Empirical Strategy

4.1 Identification

The ideal experiment would randomly impose trade sanctions on some markets while leaving others untouched and compare the same commodities across treatment conditions. The ECOWAS sanctions approximate this experiment in two dimensions. The country dimension provides exogenous treatment assignment: Niger was sanctioned because of a coup, not because of pre-existing food price trends. The commodity dimension provides within-market variation: imported rice and locally produced millet are sold in the same markets but differ in their exposure to border closures.

The triple-difference design exploits both dimensions simultaneously. The estimating equation is:

$$\ln P_{mct} = \alpha_{mc} + \lambda_{ct} + \gamma_{mt} + \beta \cdot (\text{Niger}_m \times \text{Tradable}_c \times \text{Post}_t) + \varepsilon_{mct} \tag{1}$$

where m indexes markets, c indexes commodities, and t indexes months. The fixed effects α_{mc} absorb time-invariant market-commodity price levels, λ_{ct} absorb global commodity-specific price trends (e.g., world rice price movements), and γ_{mt} absorb all local inflationary shocks common across commodities within a market (e.g., local currency effects, demand shocks, weather). The coefficient β identifies the tradability tax: the excess log price increase for imported goods in Niger, beyond what is explained by commodity trends, local inflation, and the commodity gap in Burkina Faso. Because γ_{mt} absorbs all Niger-specific time shocks (including any aggregate sanctions effect on all commodities) and λ_{ct} absorbs global rice trends, β is identified purely from the cross-country *difference in commodity gaps*: it asks whether the rice premium over millet widened more in Niger than in Burkina Faso after August 2023.

4.2 Identifying Assumption

The key identifying assumption is that, absent sanctions, the rice-millet price gap in Niger would have evolved in parallel with the rice-millet gap in Burkina Faso. This is plausible because both countries share the same currency, similar agroecological conditions, and face the same global commodity price shocks. It would be violated if Niger experienced a commodity-specific shock coinciding with the sanctions that differentially affected rice relative to millet—for example, a simultaneous rice-specific harvest failure. I test this assumption with an event study and a placebo test.

4.3 Threats to Validity

Three concerns merit discussion. First, Burkina Faso is itself politically unstable and may not represent a "clean" control. However, the key requirement is not that Burkina Faso be stable, only that its rice-millet gap follows the same trajectory as Niger's would have absent sanctions. Commodity-month fixed effects absorb any Burkina Faso-specific shocks that affect both markets symmetrically. Second, informal trade may have partially circumvented the border closure, attenuating the measured effect. This biases estimates toward zero, making the findings conservative. Third, seasonal patterns in millet prices (harvest-driven declines in October–December) could confound the estimate if they differ between Niger and Burkina Faso. Commodity-month fixed effects address this by absorbing common seasonal patterns,

and the triple-difference nets out country-specific seasonality in the control commodity. Fourth, demand substitution from rice to millet—a natural household response to the rice price spike—could inflate millet prices, attenuating the measured rice-millet gap and biasing the tradability tax estimate *downward*. The estimates should therefore be interpreted as a lower bound on the true import price penalty.

5. Results

5.1 Main Results

Table 2 presents the main results across four specifications. Column (1) reports a simple within-Niger difference-in-differences comparing rice to millet. Sanctions increased Niger rice prices by 17.4 log points relative to millet ($p < 0.001$), but this estimate may be confounded by Niger-specific shocks affecting all commodities.

Column (2) adds the country dimension, yielding a triple-difference with market-commodity and month fixed effects. The coefficient on Niger × Tradable × Post is 0.121 ($p < 0.001$), indicating that the rice-millet gap widened by 12.1 percent more in Niger than in Burkina Faso. The Niger × Post coefficient (0.020, $p = 0.32$) confirms that sanctions did not produce a general price increase for all Niger commodities—the effect is specific to tradable goods.

Column (3) presents the preferred saturated specification from Equation (1), adding market-month and commodity-month fixed effects. The tradability tax estimate is 0.142 ($p < 0.001$). This specification is conservative: market-month fixed effects absorb any local demand or supply shocks, and commodity-month fixed effects absorb any global commodity-specific trends. The only remaining variation is the interaction of being an imported commodity in a sanctioned country after sanctions—precisely the tradability tax.

Column (4) distinguishes the intensity of sanctions. During full border closure (August 2023–January 2024), the tradability tax was 0.184 ($p < 0.001$). After partial sanctions lifting (February 2024 onward), it attenuated to 0.119 ($p < 0.001$). This 35 percent reduction is consistent with the supply-disruption mechanism: as borders partially reopened, some imported rice flowed back into Niger markets, moderating—but not eliminating—the price premium.

To translate the main estimate into economic terms: the pre-sanctions average rice price in Niger was 484 XOF/kg. A 14.2 percent increase corresponds to approximately 69 XOF/kg, or about $0.11 USD per kilogram. For a household consuming 20 kg of rice per month—a typical quantity for a Nigerien family of six—this amounts to an additional 1,380 XOF ($2.20) per month, a meaningful burden in a country where median household income is among the world's lowest.

Table 2: The Tradability Tax: Effect of ECOWAS Sanctions on Food Prices

	(1) Niger DiD	(2) Triple-Diff	(3) Saturated	(4) Intensity
Tradable × Post	0.174***			
	(0.011)			
Niger × Post		0.020		
		(0.020)		
Tradable × Post		0.057***		
		(0.020)		
Niger × Tradable × Post		0.121***	0.142***	
		(0.022)	(0.025)	
Niger × Trad. × Full Sanctions				0.184***
				(0.035)
Niger × Trad. × Post-Lift				0.119***
				(0.028)
Observations	3,228	6,039	3,294	3,294
Within R^2	0.896	0.081	0.054	0.059
Market FE	✓			
Market-Commodity FE		✓	✓	✓
Month FE	✓	✓		
Market-Month FE			✓	✓
Commodity-Month FE			✓	✓

Notes: Dependent variable: log price (XOF/kg). Standard errors clustered at the market level in parentheses. Column (1): Niger-only DiD comparing rice (imported) to millet. Column (2): triple-difference with market-commodity and month fixed effects. Column (3): saturated triple-difference. Column (4): saturated model distinguishing full sanctions (August 2023–January 2024) from partial-lift period (February 2024 onward). $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

5.2 Event Study

Table 3 presents selected coefficients from the event study specification, which interacts monthly dummies with the Niger × Tradable indicator. Two patterns are noteworthy. First, the pre-sanctions coefficients from $t = -12$ through $t = -2$ are uniformly small and statistically insignificant, confirming no differential pre-trend in the twelve months before sanctions. Second, the effect appears immediately at $t = 0$ (August 2023, 0.165, $p < 0.001$), peaks at $t = 2{-}3$ (October–November 2023, approximately 0.316), and then gradually attenuates—consistent with the gradual easing of border enforcement beginning in early 2024.

Table 3: Event Study: Selected Monthly Coefficients

Months Relative to Sanctions	Coefficient	SE	Calendar Month
Pre-sanctions (reference: $t = -1$, July 2023)			
$t = -12$	0.033	(0.054)	Aug 2022
$t = -9$	0.030	(0.044)	Nov 2022
$t = -6$	0.020	(0.043)	Feb 2023
$t = -3$	0.031	(0.024)	May 2023
$t = -2$	-0.014	(0.040)	Jun 2023
Post-sanctions			
$t = +0$	0.165***	(0.027)	Aug 2023
$t = +1$	0.217***	(0.035)	Sep 2023
$t = +3$	0.317***	(0.026)	Nov 2023
$t = +6$	0.254***	(0.037)	Feb 2024
$t = +9$	0.199***	(0.037)	May 2024
$t = +12$	0.256***	(0.033)	Aug 2024
$t = +16$	0.128***	(0.037)	Dec 2024

Notes: Coefficients from the event study specification interacting monthly dummies with Niger × Tradable. The omitted period is $t = -1$ (July 2023). Market-commodity and commodity-month fixed effects included. Standard errors clustered at the market level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

5.3 Robustness

Table 4 demonstrates that the tradability tax is not specific to the choice of millet as the control commodity. Using sorghum instead yields an estimate of 0.151 ($p < 0.001$); using maize yields 0.181 ($p < 0.001$). Excluding Niamey, the capital, where supply chains may be less dependent on the Nigerian corridor, produces a larger estimate of 0.180—suggesting, if anything, that the tradability tax was more severe in provincial markets.

Table 5 presents two validation tests. The placebo test assigns a false treatment date

of August 2022 using only pre-sanctions data (January 2022–July 2023). The coefficient is 0.005 ($p = 0.77$)—a precisely estimated null that rules out pre-existing differential trends. Permutation inference, which randomizes the country assignment across markets 500 times, yields a two-sided p-value of 0.074, providing additional evidence against a chance finding.

Table 4: Robustness: Alternative Control Commodities and Sample Restrictions

	(1) Millet	(2) Sorghum	(3) Maize	(4) Excl. Niamey
Niger × Tradable × Post	0.121***	0.151***	0.181***	0.180***
	(0.022)	(0.013)	(0.014)	(0.013)
Observations	6,039	5,858	5,602	6,039
Within R^2	0.081	0.052	0.100	0.077
Market-Commodity FE	✓	✓	✓	✓
Month FE	✓	✓	✓	✓

Notes: Dependent variable: log price (XOF/kg). Standard errors clustered at the market level. The control commodity varies: (1) millet (baseline), (2) sorghum, (3) maize, (4) millet excluding Niamey. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5: Placebo and Permutation Tests

	Placebo (Aug 2022)	Permutation Inference
Coefficient	0.005	0.121
Standard error	(0.016)	—
p-value (conventional)	0.775	—
p-value (permutation)	—	0.074
Number of permutations	—	500
Observations	2,345	6,039
Market-commodity FE	✓	✓
Month FE	✓	✓

Notes: Left column: placebo test using August 2022 as a false treatment date on data restricted to January 2022–July 2023. The null coefficient confirms no pre-existing differential trend. Right column: permutation inference randomizing the Niger/Burkina Faso country assignment across markets (500 permutations). The two-sided permutation p-value is the share of permuted coefficients exceeding the actual estimate in absolute value.

6. Discussion

The tradability tax reveals a channel through which economic sanctions redistribute welfare within the target country. Standard accounts of sanctions focus on aggregate economic costs—GDP contractions, trade declines, financial isolation (Hufbauer et al., 2007; De Sousa et al., 2012). But within any sanctioned economy, the burden is unevenly distributed across consumers depending on their consumption baskets. Households that consume imported staples—often urban populations dependent on rice in West Africa—bear a disproportionate share of the cost, while rural households consuming locally produced millet are partially insulated.

This distributional pattern has implications for the political economy of sanctions. If the goal of ECOWAS sanctions was to pressure Niger's military government into restoring civilian rule, the mechanism operates through inflicting economic pain on the population. But the pain falls most heavily on urban rice consumers—a population that may or may not have political leverage over military rulers. Meanwhile, rural millet-producing households, who form the economic base in much of Niger's interior, experience relatively modest price impacts. The effectiveness of sanctions as a tool for democratic restoration thus depends on which segments of the population bear the cost and whether those segments can translate economic grievance into political pressure.

Several limitations deserve acknowledgment. The analysis treats all Niger markets symmetrically, but border-adjacent markets (Maradi, Zinder, Diffa) likely experienced larger supply disruptions than interior markets—a spatial gradient that future work with georeferenced data could exploit to further validate the border-closure mechanism. Burkina Faso, while the best available control, experienced its own coup in 2022 and ECOWAS suspension; the parallel-trends evidence is reassuring but an analysis with additional control countries (e.g., Benin) would strengthen the design.

The magnitude of the tradability tax—14 percent in the preferred specification, rising to 18 percent during full border closure—is large but consistent with the severity of the trade disruption. Niger's rice supply chains were effectively severed overnight. The partial attenuation after February 2024 suggests that formal sanctions enforcement, rather than structural trade reorientation, was the binding constraint: once borders partially reopened, prices began converging toward pre-sanctions levels, though they remained elevated through December 2024.

The finding also speaks to food security policy. Niger and other Sahelian countries face a fundamental trade-off between dietary diversification (which increases import dependence) and food sovereignty (which may limit nutritional variety). The sanctions episode demon-

strates that import dependence creates a vulnerability: when trade channels close, imported commodities become suddenly and sharply more expensive. Building strategic grain reserves, diversifying trade corridors, and investing in domestic rice production are all potential policy responses (Christiaensen et al., 2011), each with distinct cost-benefit profiles that this paper's estimates can help inform. The livestock and informal insurance mechanisms documented by Kazianga and Udry (2006) for Burkina Faso suggest that rural households may have some coping capacity, but urban rice consumers—the population most exposed to the tradability tax—lack these buffers.

7. Conclusion

Trade sanctions fragment food markets along the seam of tradability. When ECOWAS closed Niger's borders in August 2023, imported rice prices surged while locally grown millet barely moved—a pattern that reflects not a general economic shock but a targeted disruption of import-dependent supply chains. The tradability tax of 14 percent represents an implicit consumption levy on the most import-dependent households, one that no legislature voted for and no consumer chose. As the Sahel enters an era of recurring political instability and potential sanctions episodes, understanding this distributional channel is essential for designing economic coercion that achieves its political objectives without imposing regressive food price burdens on the populations it claims to protect.

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A. Standardized Effect Sizes

Table 6: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Rice (imported), log price	0.142	0.025	0.316	0.450	0.080	Large positive
Rice vs Sorghum, log price	0.151	0.013	0.390	0.387	0.033	Large positive
Rice vs Maize, log price	0.181	0.014	0.375	0.485	0.037	Large positive

Notes: **Country:** Niger (treated) and Burkina Faso (control). **Research question:** Do multilateral trade sanctions fragment food markets by differentially inflating prices of imported versus locally produced commodities? **Policy mechanism:** ECOWAS imposed comprehensive economic sanctions on Niger following the July 2023 military coup, including border closures with Nigeria (Niger's primary trade corridor), a trade embargo, and financial system exclusion, directly restricting the supply of imported staples while leaving locally produced grain markets operationally intact. **Outcome definition:** Log retail price per kilogram in XOF (West African CFA franc) for food commodities monitored by WFP across market locations. **Treatment:** Binary; Niger markets post-August 2023 sanctions for imported commodities (rice) relative to locally produced commodities (millet, sorghum, maize). **Data:** WFP Vulnerability Analysis and Mapping (VAM) food price monitoring, January 2021–December 2024, market-commodity-month level, 6,041 observations (rice-millet specification). **Method:** Triple-difference (country $\times$ commodity tradability $\times$ post-sanctions) with market-commodity and month fixed effects; standard errors clustered at the market level. **Sample:** Retail food prices in 55 Niger and 62 Burkina Faso markets; restricted to per-kilogram prices with non-missing observations. SDE $= \hat{\beta}/\text{SD}(Y)$ where SD(Y) is the pre-treatment standard deviation. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).