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Protectionism, Evasion and Household Welfare

Evidence from Nigeria's Import Bans

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Abstract

This paper analyzes the welfare impacts of import bans in Nigeria and how these impacts are shaped by evasion. Bans were not effectively enforced, thus fostering informal trade. The imposition of bans nonetheless increased consumer prices by 9.9 percent on average. However, price increases were substantially attenuated for goods for which trade policy is harder to enforce. Import bans disproportionately hurt richer households, who likewise disproportionately benefit from evasion.

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Keywords: tax evasion, mirror statistics, trade, corruption, exporters, importers, tariffs.

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1 Introduction

While developing countries are more prone to protectionism than developed countries, they face greater challenges enforcing trade policy in part because of the prevalence of corruption (Atkin and Khandelwal, 2020; Irwin 2019; Olken and Pande 2012). Despite extensive interest in the gains from trade, little is known about how imperfect enforcement shapes the welfare impacts of trade policy and which consumers lose or benefit the most from evasion.

This paper examines the welfare implications of import bans in Nigeria and how these are modulated by trade policy evasion. First, we assess whether import bans were effectively enforced by examining their impact on informal trade—a means of circumventing the bans. Second, we exploit rich CPI micro data to examine how much import restrictions have contributed to price inflation. To assess the extent to which price pressures are attenuated by imperfect enforcement, we examine how heterogeneity in price responses to import bans varies with product-level measures of susceptibility to evasion. Our primary measure of the "ease of evasion" is based on the responsiveness of evasion gaps (i.e., reporting discrepancies between source country export statistics and formal import records) to tariffs in a sample of countries comparable with Nigeria. Products for which the evasion gaps are highly responsive to tariffs are more easily evadable products. For robustness, we also proxy the ease of evasion with the ratio of value to transport costs (because more valuable products are more likely to be smuggled) and with a similarity index that proxies how easily a banned product might be misclassified as a similar non-banned one, based on how alike their descriptions are. Third, we assess the distributional impacts of import restrictions and evasion using the 2018-2019 Nigeria Living Standards Survey, effectively asking: is evasion pro-poor?

Import bans in Nigeria offer a suitable laboratory to assess the relationship between protectionism, evasion and household welfare for a number of reasons. To start with, Nigeria is notoriously

protectionist. It has repeatedly resorted to import bans to protect domestic industries, limit exchange rate fluctuations and minimize macroeconomic volatility. Importantly, the sectoral composition of import bans appears highly idiosyncratic: it is hard to anticipate which sectors will be targeted for bans. Second, import bans do not (directly) generate tax revenue, which facilitates analysis of their welfare effects. Third, Nigeria suffers high levels of corruption. A large share of Nigeria's imports are unrecorded and hence not taxed. A rough back-of-the-envelope calculation, detailed in the next section, suggests that customs revenues could be approximately a third higher absent evasion. Last but not least, it has longitudinal price data and household survey data that can be used to quantify the welfare effects of evasion.

Our main findings can be summarized as follows. Import bans are not effectively enforced. Many banned goods are traded informally and the imposition of bans triggers further increases in evasion (proxied by discrepancies between the exports to Nigeria reported by source countries and the formal imports recorded in Nigerian customs data). Import bans increase prices by 9.9% on average. However, these price increases are attenuated by evasion. Goods for which it is harder to enforce (/easier to evade) trade policy exhibit significantly lower prices increases. For example, the prices of goods with below median evadability ("ease of evasion") increase by 12.4% on average when bans are imposed, while those of goods with above median evadability do not exhibit a statistically significant change in response to bans.

Finally, we quantify the first-order welfare impacts of both bans and evasion using a stylized household model that we calibrate with household survey data. By increasing prices, bans erode real incomes with relatively rich households being disproportionately impacted. Both rich and poor households suffer reduced real incomes because bans increase the costs of their consumption baskets. However, poor households derive a larger share of their incomes from banned goods. Higher incomes due to higher prices offset some of the adverse effects. A stylized counterfactual

simulation shows that enhanced enforcement of bans would impose greater welfare losses on high-income households. By implication, evasion enhances welfare by mitigating these losses and disproportionately benefits the rich. These results abstract from potential changes in bribe payments and may not generalize beyond Nigeria. Nonetheless, the framework can be applied to other contexts.

This paper builds on and aims to contribute to several strands of literature. First, it highlights evasion as an explanation for the limited pass-through of tariffs and import bans to consumer prices (Fajgelbaum et al., 2020, Goldberg and Hellerstein, 2008, Cavallo et al. 2021, Nicita 2009, Marchand 2012). Our work complements Sequeira (2016)'s finding that corruption is an explanation for the low responsiveness of trade to tariff liberalization. In environments rife with corruption, protectionist policies such as import bans are poorly enforced to start with.

Second, we contribute to the literature on tax and tariff evasion by quantifying their welfare effects (Slemrod, 2007, Fisman and Wei, 2004, Demir and Javorcik, 2020, Mishra et al. 2008). This literature has predominantly focused on quantifying the revenue losses associated with evasion, and, to a lesser extent, which firms and bureaucrats perpetrate evasion (Anne et al. 2023, Chalendard et al. 2020, Chalendard et al., 2023, Rijkers et al., 2017). To our knowledge our study is the first to quantify the consumer gains associated with trade policy evasion.

Third and related, in doing so and by quantifying who pays for protectionism we contribute to the literature on the distributional impacts of trade (see e.g. Costinot and Rodriguez Clare, 2014, Fajgelbaum and Khandelwal, 2016, Porto 2006, and Antràs, de Gortari and Itshkoki 2017). Our work is particularly closely related to Dabalen and Nguyen (2018) who focused on a subset of our sample period (2008-2012) and showed that import bans increased prices and poverty, and that of Atkin and Donaldson (2015) who show that intermediaries capture a large share of the surplus of the gains from trade, especially in remote locations relative to more

proximate locations.

The remainder of this paper is organized as follows. The next section discusses our data and introduces our proxies for evasion and evadability. Section 3 presents evidence suggesting bans were not effectively enforced. Bans stifled formal trade yet informal trade was highly resilient and even increased. Section 4 shows that bans contributed to price inflation, but that their inflationary effects were substantially attenuated by evasion: price increases were significantly lower for goods for which trade policy is harder to enforce. The distributional impacts of import bans and evasion are assessed in section 5. A final section concludes.

2 Data and Evasion Measures

2.1 Data

This paper combines several sources of data, described below. All variable definitions, their sources, and the periods over which they are available are summarized in Appendix Table A1.

Nigeria's trade policy. We hired a law firm to assemble a dataset of Nigeria's trade policies spanning the period 2001-2020. They collected annual information on tariffs, levies, VAT rates, and import bans at the HS6 product level.[1] The total tax rate paid by importers is calculated as the sum of tariffs, levies, and VAT. The set of goods subject to bans is varied and varies over time, which facilitates identification.

Meat, pharmaceuticals, textiles, leather, and apparel are among the most frequently banned categories (see Appendix Table A3 and A4). Banned goods are more likely to be consumer and agricultural products, and less likely to be capital goods, time-sensitive, critical, dual-

[1]This data gathering effort comprised recovering electronic information and combing numerous government documents such as laws, decrees, directives, circulars, and, for a select subset of goods, press publications.

use, or characterized by high relationship-specificity ("stickiness"). This pattern aligns with the government's import-substitution objectives.[2] Bans are not explicitly country-targeted, but products from China and India are more frequently banned than those from high-income countries (Appendix Table A7).

The overall prevalence of bans is linked to macroeconomic conditions (Appendix Figure A2). Bans occur more frequently when interest payments are high and the balance of payments is weak. In contrast, total debt service and oil prices show only weak and statistically insignificant associations with bans. These patterns suggest that the government uses import bans as a tool to manage foreign exchange reserves.

To gain further insight into which products are prone to bans, we visited Nigeria and interviewed investment professionals and several members of the tariff committee, the legislate authority in charge of recommending trade policy changes to the Minister of Finance, who in turn makes recommendation to the President, who has the ultimate decision making power. A recurring theme was that bans are often idiosyncratic and heavily influenced by access to the executive branch. In practice, decisions on which specific goods to impose bans (or to whom to grant exemptions from these) appear driven primarily by political access rather than by economic considerations.

Trade policy of ECOWAS countries. Information on import tariffs imposed by countries other than Nigeria, which we use to calculate measures of "evadability" (i.e. the "ease of evasion") is taken from Feodora Teti's Global Tariff Database (v_beta1-2024-12) from Teti (2024). We use the Applied Tariff (Ad Valorem Component) as our primary measure of tariff protection. When this is missing, we substitute it with the Applied Tariff including Ad Valorem

[2]See Appendix Table A5 for a list of banned products and Appendix Table A6 for Probit models predicting ban propensity based on product characteristics. The explanatory power of these models is limited, suggesting that it is hard to predict which goods will be banned.

Equivalents, which closely approximates the Most Favored Nation (MFN) rate. Information on import bans imposed by such countries is taken from the United Nations Conference on Trade and Development Trade Analysis and Information System (UNCTAD-TRAINS) database on non-tariff measures (United Nations Conference on Trade and Development, 2022).

Trade flows. Data on formally recorded trade flows by country, HS6 product, and year come from COMTRADE. This provides information on Nigerian imports for the period 2001-2003 and 2006-2020.[3]

Consumer Price Index (CPI) micro data. CPI micro data were obtained from the Nigerian Bureau of Statistics (NBS). The data are available for the period 2001-2012 and 2015-2019.[4] The price series are unbalanced as the number of products and markets covered has expanded over time, from 70 in the beginning of the sample period to 509 at the end.[5] While price data are available monthly, we use annualized data to match the frequency with which we observe bans.

Household survey data. Information on household budget and income shares and total household spending was taken from the 2018-2019 Nigeria Living Standards Survey, which covered 22,110 households and is nationally representative.

Harmonizing these different datasets required building concordances between the Harmonized System of the trade policy data and the various sui generis classifications of the Consumer Price Index microdata and the household survey data. Variable definitions and additional information on the coverage of the data is provided in Appendix B.

[3]Note that there is no information in COMTRADE on Nigerian bilateral trade flows for 2004 and 2005. However, we do have information on the trade flows that partners record sending to Nigeria for the period 2001-2020.

[4]We were not able to access the data for 2013 and 2014 despite repeated requests to the National Bureau of Statistics in Nigeria.

[5]See Appendix Table A2.

2.2 Measuring evasion and evadability

Evasion gaps. To measure potential evasion, we follow Fisman and Wei (2004) and exploit reporting discrepancies of trade flows by exporting and importing countries. As is customary, we focus on both the intensive margin and the extensive margin. Specifically, we compute the "trade gap" as the discrepancy between exports of product p from source country s to receiving country i in year t recorded in the source country, $\log(Exports_{pist})$ (often referred to as "mirror imports"), and imports of that same product p coming from country s in year t, $\log(Imports_{pist})$, recorded in receiving country i:

$$G_{pist} = \log(Exports_{pist}) - \log(Imports_{pist}). \tag{1}$$

This measure is a proxy for evasion. If imports of product p are reported correctly in receiving country i, then they must be close to reported exports to country i from source country s. Since exports are typically reported as Free on Board (FOB), i.e. excluding transport and insurance costs, while recorded imports are often calculated in terms of Cost Insurance Freight (CIF), small discrepancies reflecting transportation and insurance costs are expected.

To capture extensive margin responses we use a dummy for "lost exports," which is defined as observing positive exports to Nigeria in source country export data but zero imports in Nigeria for that same HS6 product. We confine our sample to products for which we have at least one year with positive exports to (i.e. positive "mirror imports") or positive imports into Nigeria during our sample period (2001-2020).

Evadability. We use three proxies to quantify a product's "evadability," the ease with which trade policy can be circumvented. Our preferred measure relies on mirror statistics: we compute

product-specific evasion elasticities by estimating

$$G_{pist} = \beta_T \tau_{pist} + \mu_{st} + \mu_{it} + \epsilon_{pt}, \tag{2}$$

where τ_{pist} is the bilateral tariff, and μ_{st} and τ_{it} are source-country*time and importing country*time fixed effects. We are interested in the estimated coefficient β_T, which captures the correlation between evasion gaps and tariffs. This is a measure of the "ease of evasion" or "evadability," which we denote Ev_p. This is because a positive (conditional) correlation between evasion gaps and tariffs is suggestive of potential evasion. For example, importers may underreport the prices of the goods they are importing. Alternatively, they may choose to misclassify goods subject to high tariffs as goods that are not. Even though there will always be discrepancies between exports and import because of transport costs and insurance, these discrepancies should not be systematically correlated with tariffs and/or import bans once source and destination characteristics are controlled for and tax compliance is perfect.

In the implementation of this regression, we focus on imports of all continental countries that are members of the Economic Community of West African States, excluding Nigeria, it's immediate neighbours, Cabo Verde (an island), as well as Togo and Ghana as these countries are sources of substantial informal flows into Nigeria.[6] We shall refer to this group as "comparator" ECOWAS countries. We also exclude years in which these comparator countries impose import bans themselves. Comparator ECOWAS countries have tariff schedules and trade patterns that are very similar to those observed in Nigeria. This is shown in Appendix Table A8, which documents the correlation between HS6 product level import shares in Nigeria and those in other ECOWAS countries that are not its immediate neighbors, islands, or sources of informal

[6]That is we focus on Burkina Faso, Côte d'Ivoire, Guinnea, the Gambia, Guinea Bissua, Mali, Senegal, Sierra Leone. Note that we exclude Cabo Verde because it is an island and hence its evasion and trade patterns might differ from those of continental ECOWAS countries.

trade flows (in column 1), and the correlation between tariffs in Nigeria those countries (in column 2). Import shares in Nigeria are strongly correlated with those in the comparator ECOWAS countries, with an average HS6-level import share correlation of 0.84. By contrast, the average correlation with OECD countries is much lower, at 0.40 (see bottom row). A similar pattern holds for tariffs (column 2): Nigerian tariffs are also highly correlated with those in the comparator ECOWAS countries, with an average correlation of 0.81. These patterns are consistent with our product-level measure of "evadability" being predictive of, but not driven by, evasion in Nigeria.

A recurrent problem with regressions based on trade flows is how to deal with the log of zero. To accommodate such zeros, we add a constant ("1") to both source country exports and Nigerian imports when calculating G_{pist}. As pointed out by Chen and Roth (2023), the use of this transformation complicates the interpretation of the trade gap as a *percentage* of total trade reported by exporters. It should not, however, alter the ordinal ranking of the ease of evasion across products. To assess the robustness of our results, we follow the recommendations in Chen and Roth (2023) and estimate Poisson regressions.

To save space, we relegate the results of the "evadability" regression to Appendix Figure A3, which presents results by ISIC 2 chapter, and to Appendix Table A9, which presents the top 10 HS6 products with the highest and lowest evadability coefficients. There is a lot of variability in the ease of evasion but, in general, it appears that agricultural products, textiles and garments are most prone to evasion, while manufactured beverages are least prone to evasion.

Alternative Proxies. We also consider two alternative proxies for the ease of evasion.

One proxy is *Value relative to transport costs*. Using COMTRADE, we calculate the ratio of import value to transport costs, calculated as the Free on Board (FOB) value divided by the difference between the Cost, Insurance, and Freight (CIF) import value and the FOB

import value. A higher ratio indicates lower transport costs and is associated with greater ease of evasion (or, alternatively, stronger incentives to evade trade policies). The results of this exercise are presented in Figure A4. Transport costs are relatively high for mining products, vegetables and fish. Cement, tomatoes, and cucumbers feature in the list of the top 10 products with highest transport costs shown in Appendix Table A11.[7]

The other proxy is *Similarity (ease of misclassification).* Misclassification is one potential way to circumvent import bans. To assess how hard this might be for a given product, we construct a measure of how similar its description is to those of other products. Specifically, we compute pairwise textual similarity scores across all HS6 product descriptions using a pre-trained sentence transformer model (SBERT), which converts each description into a numerical vector. We then calculate cosine similarity between these vectors, with higher values indicating more similar text. For each product, we define its misclassification potential as the average similarity score among the top quartile of most similar products that are not banned. Intuitively, the more similar a product is to others, the easier it may be to misclassify it.

In order to test the validity of these measures, Appendix Table A12 presents regressions that correlate our three proxies for the ease of evasion ("evadability," value to transport ratio, and ease of misclassification) with evasion gaps observed in the group of comparator ECOWAS countries over the period 2000-2020. All three proxies for the ease of evasion correlate strongly with evasion gaps in ECOWAS countries as is shown in column 1, 3 and 5, even after conditioning on tariffs, as is shown in columns 2, 4, and 6. To sum up, these proxies do appear to be predictive of informal trade flows.

[7]The mathematical construction of the variable is $r = \frac{fob}{cif - fob}$ where r denotes the value to transport costs ratio.

3 Were Import Bans Effectively Enforced?

This section analyzes whether import bans were effectively enforced. We first present descriptive and qualitative evidence before turning to event studies.

3.1 Descriptive evidence

Table 1 presents descriptive statistics on mirror imports, imports, and evasion gaps categorized by whether or not imports are banned and by low and high tariffs. Mirror imports consistently exceed formally registered imports, attesting to substantial informal trade flows into Nigeria.

In Panel A, we report statistics based on the log(1+) transformation, which captures both the extensive and intensive margin of evasion. The average evasion gap G_{pist} for all products is 1.04, suggesting that a substantial share of registered imports goes unrecorded. Evasion gaps are significantly higher for products that are subject to above median tariffs than for products subject to below median tariffs, consistent with the notion that evasion gaps are indicative of evasion. The discrepancy between mirror flows and officially recorded trade is particularly high for goods subject to bans: banned goods exhibit significantly higher evasion gaps on average compared to their non-banned counterparts.[8] These differences are not only statistically significant, but also economically meaningful. A back of the envelope calculation suggests that if customs authorities were collecting tariffs based on mirror flows rather than reported imports (that is if evasion gaps were all zero), tariff revenues would be approximately 33.3% higher.[9]

When we focus only on observations for which we observe both positive mirror imports, the conventional measure of the evasion gap, which we denote G^I_{pist}, only captures the "intensive

[8] Note that we observe positive imports for some products that are banned which could reflect either (i) measurement error, including imperfect concordance of HS6 codes to import prohibition lists and/or (ii) exemptions for these import prohibition granted by the president himself.

[9] Of course this calculation abstracts from potential behavioral responses.

Table 1: Descriptive Statistics

			Banned			Tariff			All
			Yes	No	Diff	High	Low	Diff	
A. Overall Impact									
(A)	Log (1 + Mirror Imports)	Average	11.06	11.26	-0.20^{***}	11.63	11.11	0.53^{***}	11.24
		SD	5.01	5.01		4.64	5.34		5.01
(B)	Log (1 + Imports)	Average	6.80	10.62	-3.82^{***}	9.41	11.15	-1.75^{***}	10.20
		SD	6.41	5.43		5.78	5.55		5.68
(A-B)	Trade Gap	Average	4.26	0.64	3.62^{***}	2.22	-0.05	2.27^{***}	1.04
		SD	5.77	4.36		4.75	4.36		4.68
	Observations		8120	64762		28828	32837		72882
	HS Products		1034	3995		3542	2718		4049
B. Intensive Margin									
(C)	Log (Mirror Imports)	Average	12.62	12.85	-0.24^{***}	12.80	13.03	-0.23^{***}	12.83
		SD	2.99	2.86		2.97	2.89		2.88
(D)	Log (Imports)	Average	11.88	12.78	-0.90^{***}	12.27	13.36	-1.10^{***}	12.71
		SD	3.37	2.81		2.91	2.73		2.87
(C-D)	Trade Gap	Average	1.57	0.25	1.32^{***}	0.97	-0.26	1.23^{***}	0.35
		SD	2.71	2.31		2.53	2.12		2.38
	Observations		4405	50673		21365	25371		55078
	HS Products		797	3828		3003	2551		3903
C. Extensive Margin									
	Mirror Imports > 0	Average	0.90	0.89	0.01^{***}	0.92	0.86	0.06^{***}	0.89
		SD	0.30	0.32		0.27	0.35		0.31
	Imports > 0	Average	0.65	0.85	-0.20^{***}	0.79	0.84	-0.04^{***}	0.82
		SD	0.48	0.36		0.40	0.37		0.38
	Lost Exports	Average	0.33	0.09	0.24^{***}	0.17	0.08	0.09^{***}	0.12
		SD	0.47	0.29		0.37	0.27		0.33
	Orphan Imports	Average	0.03	0.05	-0.02^{***}	0.03	0.06	-0.04^{***}	0.05
		SD	0.17	0.21		0.16	0.24		0.21
	Observations		8120	64762		28828	32837		72882
	HS Products		1034	3995		3542	2718		4049
D. Tariffs									
	Tariffs	Average	20.41	12.37	8.04^{***}	20.72	5.91	14.81^{***}	13.20
		SD	8.07	8.72		6.80	2.56		8.99
	Observations		6854	59170		32508	33516		66024
	HS Products		989	3911		3542	2718		4049

Notes: The table reports descriptive statistics on trade flows recorded in Nigeria and by partner countries, separately for banned and non-banned products, and by tariff level (above- and below-median tariffs). The last column pools all products. Panel A shows the overall impact (using the log + 1 transformation) for mirror imports, imports, and trade gap. Panel B shows the same statistics for the intensive margin (using the log transformation). Panel C shows the extensive margin using dummies. First it presents two dummy variables that take value 1 if mirror imports or imports are strictly positive and 0 otherwise, and then a dummy for lost exports that takes value 1 if mirror imports are strictly positive but imports are zero and 0 otherwise. It also presents a dummy for orphan imports which takes value 1 if imports are positive for that product, but mirror imports are zero, but 0 otherwise. We only include products for which we ever observe either positive imports and/or positive mirror imports (products for which we never observe either positive mirror imports or positive imports are excluded). The source for trade data is COMTRADE and for tariffs Nigeria Customs Service. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

margin" of trade policy evasion. In Panel B, we report an average evasion gap of 0.35 and, as before, a bigger gap for higher tariffs products and for banned products.

In Panel C, we look at the extensive margin using dummies that indicate positive trade flows. For 89% of observations in our sample, mirror imports are positive. By contrast, imports are positive for only 82% of the observations. When we focus on the sample of products subject to bans these discrepancies are even larger: for HS6 products subject to bans we observe positive mirror imports in 90% of the cases and we also observe positive imports in 65% of the cases. By contrast for goods that are not subject to bans we observe positive mirror imports for 89% of all observations and positive imports for 85% of all observations.

We define a lost export dummy equal to one when mirror data report positive exports to Nigeria, but no corresponding formal imports are recorded. 33% of all goods that are banned fall into this category. By contrast, only 9% of goods not subject to bans exhibit the same pattern. Evasion is thus much more prevalent for banned goods. By contrast, the likelihood of observing orphaned imports, that is positive imports into Nigeria but no corresponding mirror imports, is much lower, approximately 3%, for banned goods and roughly 5% for goods not subject to bans.

Finally, note that goods subject to import bans typically are subject to higher tariffs than goods that are not (Panel D).[10] As a result we might expect higher evasion gaps for these products—and by implication more informal trade—even in years when these goods were not subject to bans. It is thus important to control for potential confounders when assessing the relationship between import bans and evasion.

How does evasion happen in practice? We conducted field interviews in Nigeria with customs officials, informal traders, and civil servants tasked with administering trade policy. All three

[10]By implication, they are also subject to higher total tax rates. These results are available upon request but not presented here to conserve space.

groups emphasized that the most common form of evasion is informal trade across porous land borders, enabled by difficult terrain, security constraints, and widespread collusion between traders and customs agents. These findings are consistent with survey evidence on bribes paid at the Benin border by Bensassi and Jarreau (2019). Golub and Mbaye (2023) emphasize that such informal trade is often embedded in networks organized along ethnic or religious lines, which help sustain trust and coordination. Goods are typically transported at night, often with security escorts, and bribes are routinely paid at checkpoints. Several sources noted that smuggling banned goods is largely a matter of willingness to pay. Evasion via seaports is also common and primarily occurs through misdeclaration of goods.

3.2 Event study estimates

To evaluate the impact of bans on imports and evasion we use difference-in-difference estimators that compare the evolution of evasion gaps for products subject to the imposition or removal of bans to the evolution of evasion gaps for goods that were never banned. To address concerns about heterogeneous treatment effects arising from the staggered (and non-absorbing) adoption of bans, we use the local projections difference and difference estimators proposed by Dube et al. (2025). We use products that were never banned as the control group. This local projection difference-in-difference model is appropriate since the dynamics of ban imposition are mostly driven by the foreign exchange needs of the government and the cross-product variation in bans is highly idiosyncratic in nature (recall our discussion of Nigeria's trade policy in section 2). The event study approach allows us to further address this issue by examining the existence of pre-tends in the data. In addition, our event study regressions control for the interaction between the absence of bans and taxes (the sum of tariffs, levies and VAT), to account for the fact that we would anticipate bigger gaps for goods subject to higher tariffs.[11] This design also

[11] Results controlling for taxes are shown, but results are very similar when controlling for tariffs alone. These are omitted for brevity but available upon request.

relies on the assumption of no spillovers across goods.

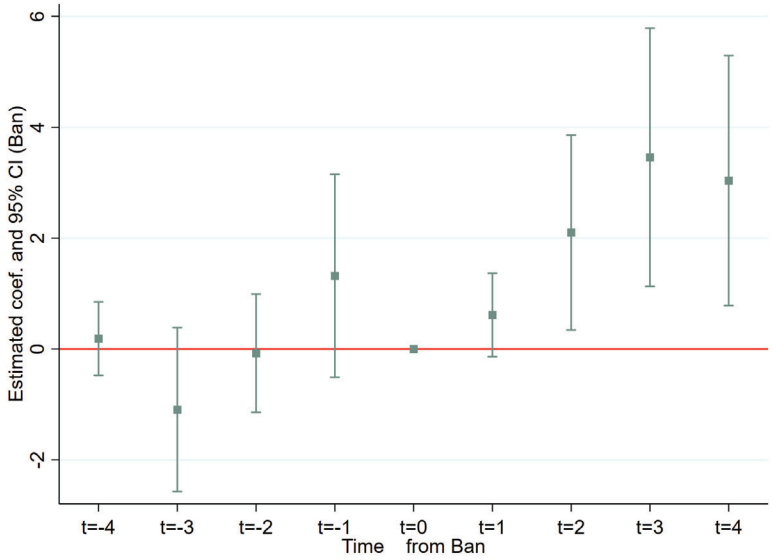
We distinguish between the impact of the imposition of bans from their removal when estimating event studies to allow for asymmetric effects of bans. These may arise because ban imposition has an immediate impact, whereas the resumption of trade after bans are lifted may take a bit more time because it requires re-entry of importers which could entail complementary investments such as supplier search. In addition, perceptions about whether the liberalization is permanent may shape responses: if firms think that bans are likely to be reintroduced they may be hesitant to respond. Third and related, they may anticipate the imposition of other forms or protectionism in lieu of bans. Fourth, some firms are exempted from bans by the President. While we were not able to get data on exemptions, it is possible that their prevalence, and by implication the stringency of bans, varies over time. More pragmatically, it turns out that the parallel trends assumption that underpins our identification strategy is more plausible for ban impositions than for removals: the null hypothesis of parallel trends is often rejected for bans removals but not for ban impositions.

Figures 1a and 1b present event study results for the imposition and removal of bans, respectively, using four periods before and after the policy change. The underlying regression results are presented in Appendix Table A13. The event studies clearly show that the imposition of bans leads to a sizable increase in the trade gap. We find no evidence of significant pre-trends, although the trajectory of gaps leading up to the ban is somewhat noisy. To aggregate the treatment effects, we compute the average impact over the four post-treatment periods. On average, the $\log(1 + \text{gap})$ increases by 2.31 across the four post-ban periods, an effect which is significant at the 5% level. In contrast, Figure 1b shows that ban removal is associated with a decline in the trade gap. However, the average effect across the four post-removal periods is a statistically insignificant decline of 1.46 in the $\log(1 + \text{gap})$. It is reassuring, nevertheless, that

no pre-trends show up in the ban removal case either. Taken together, these results strongly suggest that bans induce evasion.

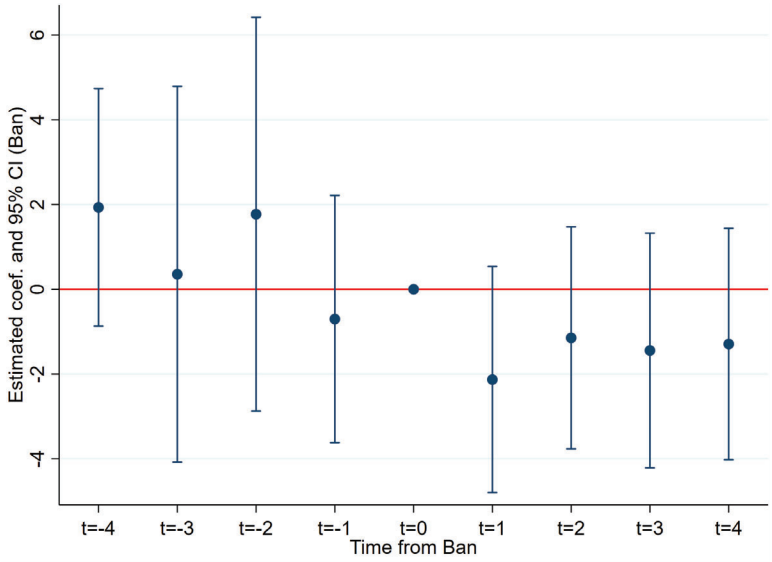
Figure 1: Event Study Estimates of the Impact of Bans on Evasion

(a) Impact of imposition of bans on log (1+evasion gap)



Notes: Figure shows the results of a local projection difference-in-difference estimation (Dube et al. (2025)) of the impact of the imposition of bans on the evolution of log (1+evasion gap), controlling for $(1 - \text{Ban}) \times$ Taxes. The figure plots estimated coefficients with 95% confidence intervals.

(b) Impact of ban removal on log (1+evasion gap)



Notes: Figure shows the results of a local projection difference-in-difference estimation (Dube et al. (2025)) of the impact of the removal of bans on the evolution of log (1+evasion gap), controlling for $(1 - \text{Ban}) \times$ Taxes. The figure plots estimated coefficients with 95% confidence intervals.

In the Appendix, we present a range of robustness checks. The results are robust to using the

event-study estimator of De Chaisemartin and d'Haultfoeuille (2024) as is shown in Appendix table A14. The results are also robust to using the log of the trade gap instead of the log(1+gap) transformation, to using only the lost exports dummy, and to excluding controls for taxes (Table A15). Estimates based on conventional two-way fixed effects regressions, which are unbiased under homogeneous treatment effects across cohorts and time, are also broadly similar (Appendix Table A16).

As a final robustness test, to account for the large number of zeros in the trade data and the highly skewed distribution of trade flows, we also estimate Poisson pseudo-maximum likelihood (PPML) specifications, as recommended by Chen and Roth (2023). We examine the impact of bans on mirror imports, reported imports, and the prevalence of lost exports. Because PPML's orthogonality condition implicitly places greater weight on large trade flows, PPML estimates are more sensitive to large positive outliers. This is particularly relevant in our context, as trade statistics from low-income countries are often less reliable and more prone to reporting errors than those from high-income countries, which generally maintain higher reporting standards (Carrère and Grigoriou (2015), Kellenberg and Levinson (2019), Mitikj and Kaushik (2024)). A few erroneous reports of large export volumes from partners can introduce substantial noise in the PPML estimates relative to Ordinary Least Squares estimates. To address this concern, we estimate PPML regressions separately for the full sample of trade partners (Panel A of Table A17), for high-income countries only (Panel B of Table A17), and for China (panel C of Table A17), which is Nigeria's most important source of imports. On average, high-income countries account for 56.6% of Nigeria's reported imports and 49.2% of mirror imports over the sample period, while China alone accounts for 18.5% of reported imports and 27.7% of mirror imports.

As shown in Panel A, results using the full sample suggest that mirror imports (column 1) fall more steeply in response to import bans than reported imports (column 2), a pattern

inconsistent with increased evasion and likely driven by measurement error in the mirror data. In contrast, Panel B focuses on trade with OECD countries, where reporting quality is higher. The results in this subsample align more closely with those reported above: reported imports decline significantly more than mirror imports following bans, consistent with an increase in evasion. Panel C shows a similar pattern for trade with China: reported imports fall more sharply than mirror imports in response to bans, further supporting the evasion interpretation.

To summarize, the results presented in this section attest to ineffective enforcement of import bans, and substantial informal trade in prohibited products. While bans dampened trade, many products that were banned continued to be smuggled into Nigeria and the actual trade response was much smaller than Nigeria's formal trade statistics might suggest.

4 The Impact of Import Bans on Prices

Now that we have established that the bans curbed trade and induced evasion, we analyze how annual prices responded to the introduction of bans, and whether price impacts vary with the ease of evasion. To do this, we estimate event studies of the impact of bans, as before, using the CPI microdata, and log price as the dependent variable.

Figure 2 presents the results of local projections difference-in-differences event studies, using products that were never banned as controls. The underlying event studies are also presented in Appendix Table A18. The analysis covers a two-year window before and after the imposition or removal of bans.[12] The introduction of bans is associated with a significant increase in prices as is shown in Figure 2a. The average price increase over the two years following a ban is 9.9%, with no evidence of significant pre-trends, suggesting that the inflationary effects can plausibly

[12]The event window is shorter than in the trade gap analysis due to missing price data for 2013 to 2014. Additionally, the price data are based on a more aggregated product classification than the trade data, limiting cross-sectional variation.

be attributed to the bans themselves. Conversely, Figure 2b shows that the removal of bans tends to be followed by price declines. However, a slight pre-trend is observed, making this result harder to interpret causally.

The magnitude of price responses varies with the ease of evasion. We conduct three tests. To start with, Figure 2c disaggregates the analysis by above- and below-median evadability. We find that products that are harder to evade ("Low Evadability" products) exhibit substantial price increases following the imposition of a ban. On average prices increase by 12.4% for this group. In contrast, for more easily evadable goods with above-median evadability ("High Evadability" products), price responses are muted and statistically insignificant. In addition, pre-trends prior to ban imposition cannot be entirely ruled out for this group (in sharp contrast with the "Low Evadability" products).

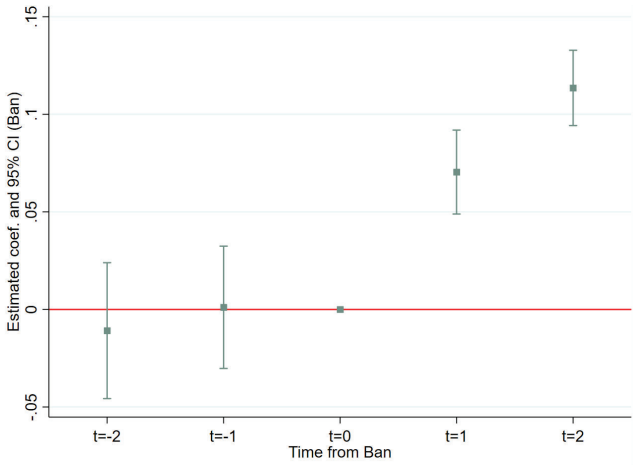
Second, a similar pattern emerges when splitting the sample by the ratio of product value to transport costs (Figure 2d). After the imposition of bans, goods with a low value relative to transport costs, which are arguably more difficult to smuggle, experience price increases (with no detectable pre-trends). Instead, goods with higher value relative to transport costs, which are presumably easier to smuggle, experience substantially smaller price increases (with more sizeable pre-trends).

Third, we split the sample by ease of misclassification based on the product similarity index (Figure 2e). Banned goods that are more similar to other non-banned goods, thus presumably easier to misclassify, exhibit a much lower price response to bans than goods for which misclassification is more difficult.[13]

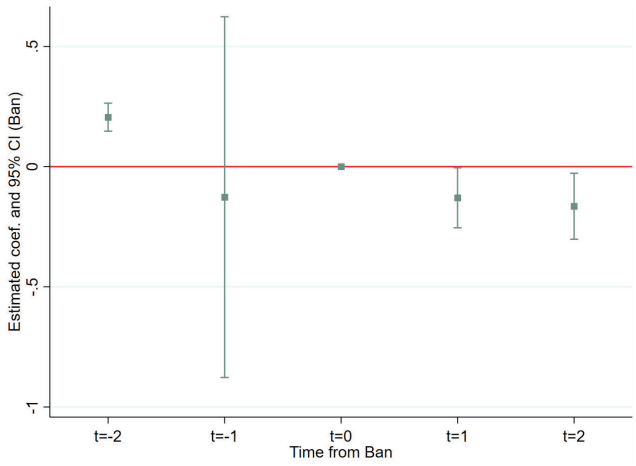
[13]The results are similar when we do not include controls, as is shown in A19. Ban removal typically is associated with significant price declines for goods for which evadability is low and insignificant declines for goods for which evadability is high, but there are significant pre-trends, which complicates the causal interpretation of these patterns. Appendix A20 presents conventional two-way fixed effects estimates of the impact of bans on prices which are only unbiased if there is no heterogeneity in impact of bans over time.

Figure 2: Impacts of Bans on Log Prices

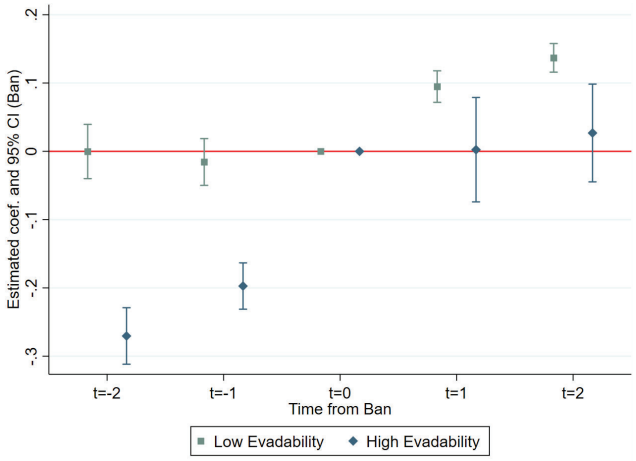
(a) Ban imposition



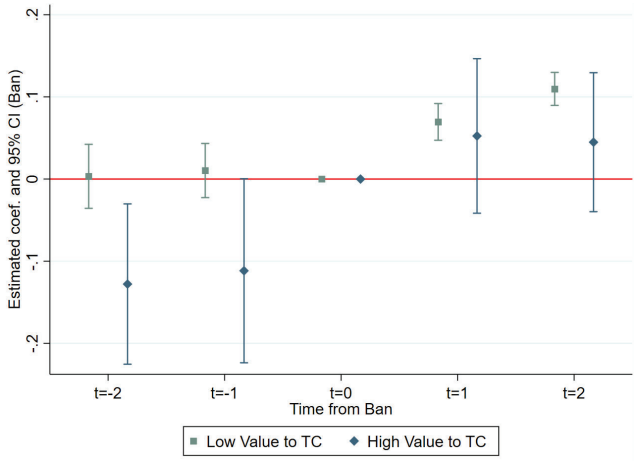
(b) Ban removal



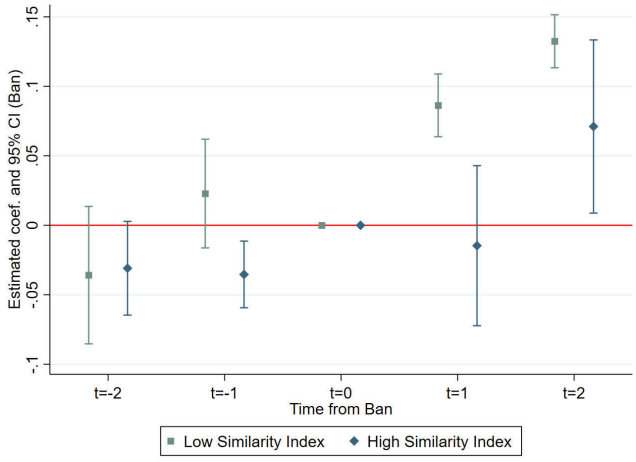
(c) Imposition, by evadability



(d) Imposition, by value-to-transport-cost



(e) Imposition, by similarity index



Notes: All panels show results from a local projection difference-in-difference estimation following Dube et al. (2025), examining the effects of bans on log prices, controlling for $(1 - \text{Ban}) \times \text{Taxes}$. Panels a and b show the average effects of ban imposition and removal, respectively. Panels c, d, and e explore heterogeneity by evadability, value-to-transport-cost ratio, and similarity index. Figures plot estimated coefficients with 95% confidence intervals.

Overall, these findings show that the imposition of imports bans increases consumer prices, but less so for goods that are easier to smuggle into Nigeria. While the impact of bans on prices ultimately depends on several factors, including demand elasticities and the structure of domestic supply chains, the patterns documented in this section are consistent with the idea that (lack of) enforcement modulates the inflationary effects of trade bans.

5 Distributional impacts of import bans and evasion

In this section, we take a first pass at assessing the welfare impacts of ban-induced price changes and of the price moderating effects of evasion. To do so, we use a highly stylized model of households as consumers and producers a la Deaton (1989) to derive first-order welfare effects and we measure them using household survey data (see also Artuc et al. (2021)). We quantify the welfare effects at baseline evasion levels and compare those with a counterfactual scenario where import bans are more stringently enforced.

5.1 Framework

We follow Deaton (1989) to characterize the behavior of households as consumers and as income earners. As consumers, households choose a consumption bundle to maximize utility, given prices and income. To earn income, we assume that households have a factor endowment and a technology that can be used to produce an array of products so that household income is the sum of the profits earned in all feasible activities. The household can also earn wage income in labor markets. We also assume income is equal to expenditures.[14] This is the simplest possible setting to study the welfare effects of bans and we adopt it here because it does not require strong structural assumptions.

[14]This rules out saving, debt and dynamic considerations.

In our Deaton (1989) setting, the first-order welfare effect of a change in the price of a banned good i is:

$$\frac{dV_i^h}{y^h} = \left(\phi_i^h - s_i^h\right) d\ln p_i, \tag{3}$$

where dV_i^h is money-metric welfare effect caused by the change in price p_i, y^h is household income (equal to expenditure), ϕ_i^h is the income share derived from the sales of good i and s_i^h is the share of good i in the consumption bundle of household h.[15] The interpretation of this equation is straightforward. After a price change caused by the imposition or removal of a ban, the first-order effects on real income can be approximated with the corresponding income and expenditure shares. In the case of the imposition of bans, prices increase, net-consumers lose real income but net producers gain. This first-order approximation only captures the direct, short-run welfare impacts of price changes. It does not take into consideration potential adjustment of consumption and production choices, or dynamic effects more generally.

To calculate the impacts of all bans combined, we sum the changes in welfare in (3) over all traded goods i to get:

$$\widehat{V}^h = \sum_i \left(\phi_i^h - s_i^h\right) d\ln p_i, \tag{4}$$

where $\widehat{V}^h$ is the proportional change in household real income.

To evaluate the welfare impacts of import bans and of evasion, we proceed as follows. We first calculate a baseline using the price changes estimated in Figure 2a (and Table A18). We use the pooled post period estimate for the imposition of bans which suggests that the imposition of bans increases prices by 9.9% on average. For the counterfactual, we work with a scenario in which we assume that each product falls in the "low evadability" category and assume that

[15] Note that we are not allowing for impacts on wages and non-traded family enterprise income and expenditure (see e.g. Nicita (2009), Porto (2006), Artuc et al. (2019)).

bans instead increase prices by 12.4% (the pooled post period average for goods that are not easily evaded, see Figure 2b and Table A18).

Before turning to the results, we should note that our counterfactual is highly stylized. It may be difficult and costly to improve enforcement for those goods that are highly evadable. Moreover, we ignore potential responses in customs by implicitly assuming that the elasticity of corruption to bans is constant. However, customs officers may endogenously raise the cost of evasion in response to stronger enforcement incentives. Our primary goal is to explore the short-run, on-impact, direction of the distributional effects of evasion on households represented in the national household surveys.

5.2 Results

Exposure to the price effects of import bans varies enormously across the income distribution. Table 2 Panel A documents that households on average derive 14.24% of their incomes from goods that are banned and spend approximately 32.70% of their budgets on these goods in part because many of the banned goods are food items. Figure 3a shows that the share of income derived from selling banned items drops sharply with income (the long-dashed blue line). While households in the poorest quintile derive 31.85% of their incomes from selling goods subject to bans such as livestock, maize, and sorghum (see Appendix Figure A6), households in the top income quintile derive only 5.02% of their incomes from selling such products, presumably in part because richer households are less likely to be farmers. The share of household expenditure dedicated to purchasing banned items such as palm oil and groundnuts oil (see Appendix Figure A7) also falls with income, but less precipitously (see the short-dashed green line in Figure 3a). On average, households in the bottom quintile of the income distribution spend 38.53% of their incomes on goods that one is not allowed to import legally, while the richest quintile spends 27.28%. Note that net exposure, the difference between net consumption and net income shares,

increases with income.

The *income* gains associated with the higher prices of household output due to bans are presented in Panel B of Table 2 and are depicted in Figure 3b. On average household incomes are 1.38% higher because of the bans, with poor households benefiting the most. The poorest quintile enjoys gains of 2.99% of initial income whereas the richest households gain only 0.49% on average.

However, these income gains are more than offset by increases in the costs of living (Panel C of Table 2). On average the losses associated with a higher cost of consumption triggered by import bans are equal to 3.23% of initial incomes. Poorer households are considerably more exposed to the attendant losses, with the bottom quintile losing –3.81% of their real incomes and the top quintile losing –2.70%.

The resulting net welfare effect, which is simply the sum of the income and consumption effects, is presented in Panel D. On average real incomes decline by –1.85% because of the bans. The poor suffer proportionately less, however. While they suffer the largest increases in the cost of consumption they also experience the highest income gains, which partially offset the increases in the cost of living. This is clearly seen in Figure 1b. The losses in the poorest quintile (quintile 1) are –0.82%, much smaller than the losses in the richest quintile (quintile 5), –2.20%. Bans thus reduce average real incomes yet reduce inequality. In Nigeria, bans have progressive welfare effects. Nonetheless, bans lead to an increase in the poverty headcount rate of 1.34% (see Panel E).

Table 2 and Figure 3b also show how the welfare losses would change if bans were more strongly enforced. In this counterfactual, prices would be 2.5 percentage points higher (12.4% versus 9.9%) because the ameliorating effects of evasion are shut down. As a result, the income gains become bigger for all households (1.73% compared to 1.38% on average), but they are relatively

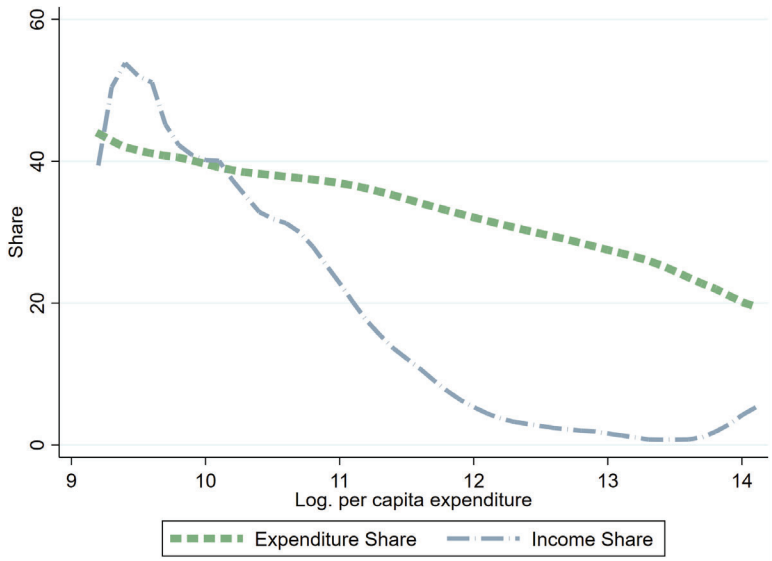
Table 2: Distributional Impact of Bans

Panel A: Prevalence of Bans on Income and Expenditure (NLSS)				
	Ban = 0	Ban =1		
Income	85.76	14.24		
Expenditure	67.30	32.70		
By quintile of income				
	Income		Expenditure	
	Ban = 0	Ban =1	Ban = 0	Ban =1
Quintile 1	68.15	31.85	61.47	38.53
Quintile 2	81.01	18.99	64.13	35.87
Quintile 3	86.97	13.03	66.76	33.24
Quintile 4	92.14	7.86	69.02	30.98
Quintile 5	94.98	5.02	72.72	27.28
Panel B: Change in Income				
	Baseline	Counterfactual	Difference	
Quintile 1	2.99	3.75	0.76	
Quintile 2	1.83	2.30	0.46	
Quintile 3	1.27	1.59	0.32	
Quintile 4	0.77	0.96	0.19	
Quintile 5	0.49	0.62	0.12	
Non Poor	0.80	1.01	0.20	
Poor	2.40	3.00	0.60	
Average	1.38	1.73	0.35	
Panel C: Change in Expenditure				
	Baseline	Counterfactual	Difference	
Quintile 1	-3.81	-4.78	-0.96	
Quintile 2	-3.55	-4.44	-0.90	
Quintile 3	-3.29	-4.12	-0.83	
Quintile 4	-3.06	-3.84	-0.77	
Quintile 5	-2.70	-3.38	-0.68	
Non Poor	-2.98	-3.74	-0.75	
Poor	-3.68	-4.61	-0.93	
Average	-3.23	-4.05	-0.82	
Panel D: Change in Welfare				
	Baseline	Counterfactual	Difference	
Quintile 1	-0.82	-1.03	-0.21	
Quintile 2	-1.71	-2.15	-0.43	
Quintile 3	-2.02	-2.53	-0.51	
Quintile 4	-2.29	-2.87	-0.58	
Quintile 5	-2.20	-2.76	-0.56	
Non Poor	-2.18	-2.73	-0.55	
Poor	-1.28	-1.61	-0.32	
Average	-1.85	-2.32	-0.47	
Panel E: Change in Poverty				
	Baseline	Counterfactual	Difference	
Headcount Ratio	1.34	1.67	-0.33	
Squared Poverty Gap	0.53	0.68	-0.15	

Notes: Table shows how exposure of Nigerian households to import bans varies across the income distribution (Panel A), and then income, expenditure, welfare, and poverty changes (Panel B to E) associated with bans. The baseline scenario uses the observed level of evasion. The counter-factual scenario simulates what the welfare impact of bans would be if all products had an ease of evasion equal to the average of goods with below median evadability. Coefficients to perform the simulations are the pooled post coefficients taken from Table A18, column (1), i.e 9.9% for the baseline, and column (3), 12.4%, for goods below median evadability. Expenditures on and incomes from banned products are calculated from the Nigeria Living Standards Survey (NLSS) 2018-2019.

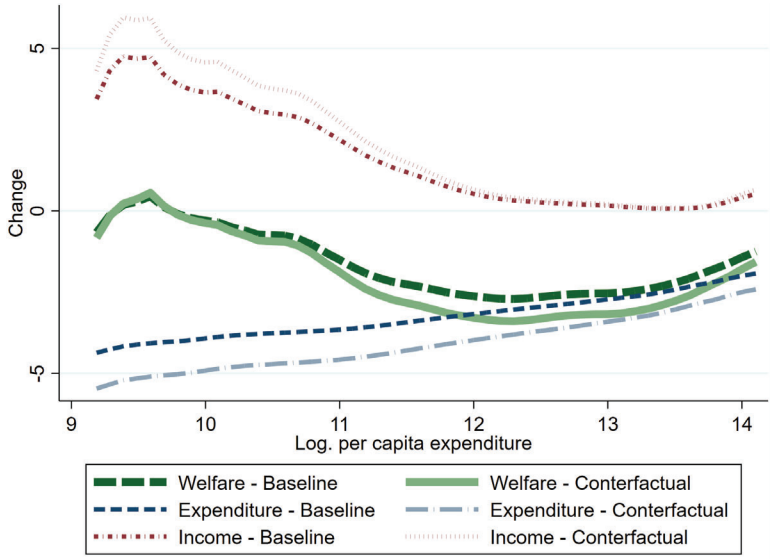
Figure 3: Welfare Impacts of Bans

(a) Expenditure and Income shares of Banned Products



Notes: Figure shows smoothed values from a kernel-weighted local polynomial regression of household's expenditure and income share spent in banned products on log per capita expenditure. Expenditures on and incomes from banned products are calculated from the Nigeria Living Standards Survey (NLSS) 2018-2019. The dashed line represents expenditure shares while the long dash dotted line represents income shares.

(b) Distributional Impacts



Notes: Figure plots smoothed estimates from a kernel-weighted local polynomial regression of household welfare changes due to bans. Specifically, it shows welfare effects from changes in expenditure due to bans, welfare effects from changes in income due to bans, and the overall net welfare effect (the sum of the expenditure and the income effect). The baseline scenario uses the observed level of evasion. The counter-factual scenario simulates what the welfare impacts of bans would be if the evadability of all goods was equal to the average of goods with below median evadability. Expenditures on and incomes from banned products are calculated from the Nigeria Living Standards Survey (NLSS) 2018-2019. The long-dashed line corresponds to the baseline change in welfare, while the solid line corresponds to the counter-factual change in welfare. The dashed line corresponds to the baseline change in expenditure, while the long dash dotted line represents the counter-factual change in expenditure. The short dash dotted line corresponds to the baseline change in income, while the dotted line represents the counter-factual change in income.

much larger among the poor. The gains of the poorest quintile are 3.75% (2.99% in the baseline) while the gains of the richest quintile are only 0.62% (0.49% in the baseline). In turn, the cost of living also increases for all households, but even more so for the poorest ones. The average loss is –4.05%, ranging from –4.78% for the poorest households and –3.38% for the richest ones. In the end, on average, the counterfactual price increases cause expenditure losses for the poor that are mostly offset by the additional income gains. Instead, richer households suffer a bigger costs of living effect, without the corresponding increase in income.

In other words, better enforcement would exacerbate the welfare losses associated with import bans, and be particularly harmful to the real incomes of the rich. Evasion (the baseline) is thus welfare enhancing but the rich benefit disproportionately from smuggling and informal trade relative to the poor.[16]

Appendix Figure A8 examines effects separately for rural and urban households. Rural households are less adversely affected by bans because they derive a larger share of their income from banned goods (as is shown in Figure A8a). In both urban and rural areas the share of income derived from selling banned goods falls with income, but it falls more abruptly for urban households (because the non-poor urban households are less engaged in agriculture). This partially offsets the losses from increased living costs, especially in rural areas. Among urban families, this offsetting effects is stronger at the middle of the income distribution. As a result, evasion, which offsets the impacts of bans, disproportionately benefits middle— to upper middle class urban households (as is shown in Figure A8b).

[16]These calculations abstain from considering the gains from smuggling industry itself. Without knowledge of who the customs officials are in the household surveys and without proper estimates of the changes in bribes income, the identification of the welfare losses of enhanced enforcement on those custom officers are difficult to calculate.

6 Conclusion

This paper explores the welfare implications of import bans in Nigeria and how they interact with trade policy evasion. Import bans are widespread in Nigeria, and motivated by a desire to protect domestic industries and manage macroeconomic stability. Our first finding is to document thriving informal trade in banned items, suggesting ineffective enforcement. Informal trade flows are shown to increase in response to the imposition of bans. Second, import ban impositions increase consumer prices by 9.9% on average. However, evasion mitigates the inflationary pressures bans induce because goods with higher evasion exhibit significantly lower price hikes. Third, we document that bans on average reduce real household incomes. While net producers of banned goods benefit from price increases as it increases their profits, the majority of households are net consumers and consequently are adversely impacted by price increases. Rich households are more heavily impacted by bans because they derive only a small share of their incomes from selling banned items. By implication, bans reduce average incomes and repress inequality. Evasion, by contrast, reduces the inflationary impacts of bans and, by implication, disproportionately benefits the rich. Stricter enforcement of bans would disproportionately harm the wealthy. While evasion is welfare enhancing overall, it also exacerbates inequality. In other words, evasion is pro-rich. Examining whether this finding generalizes to other settings is an interesting avenue for further research.

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Supplemental Material for "Protectionism, Evasion and Household Welfare. Evidence from Nigeria's Import Bans"

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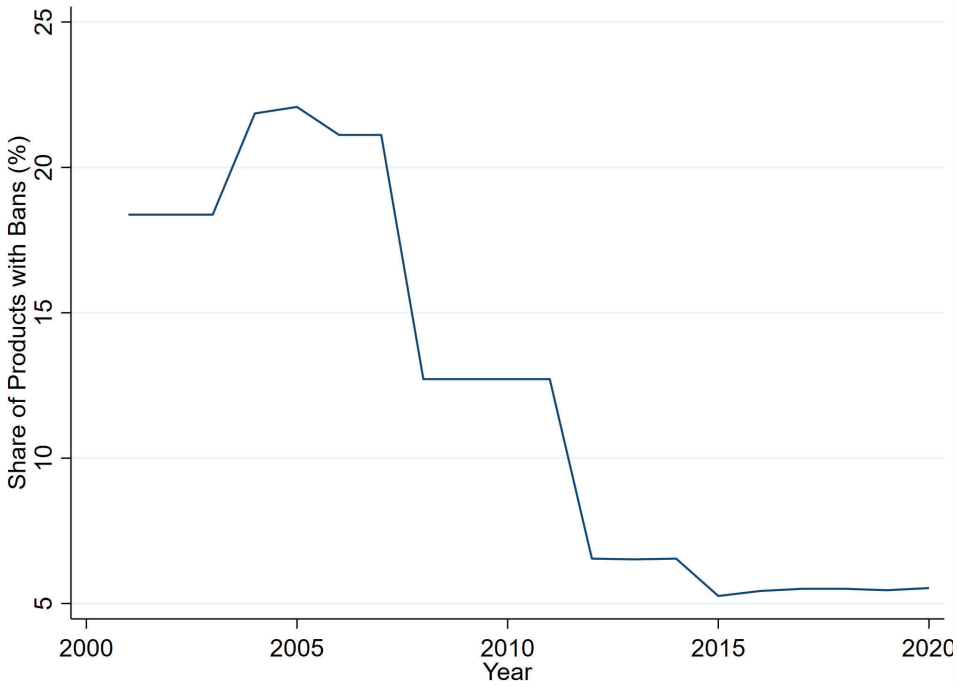
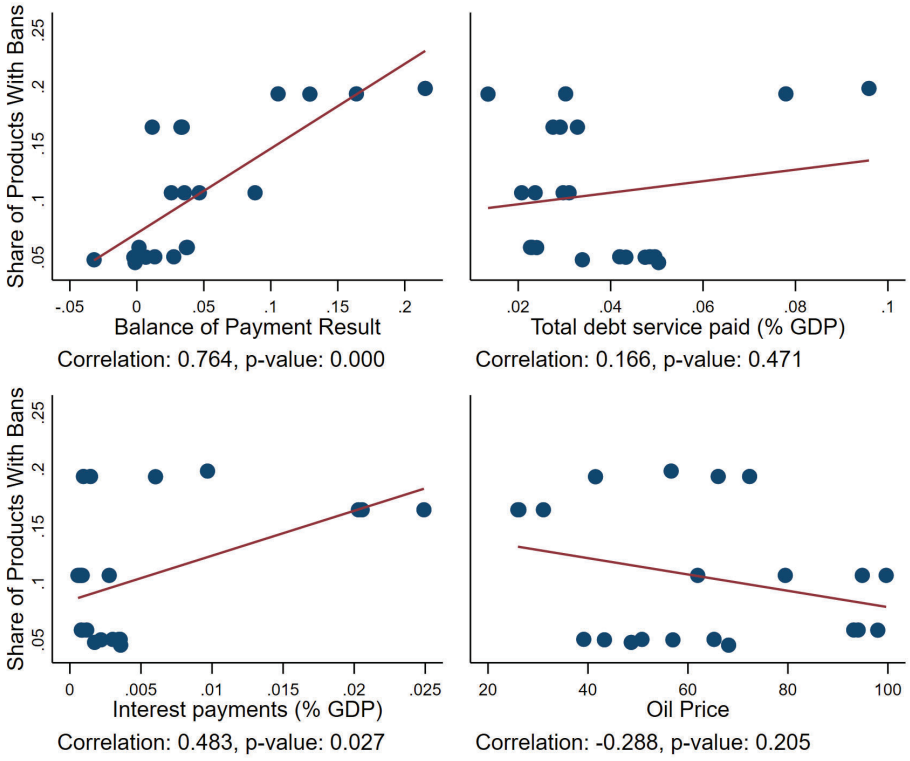
A Additional Figures

Figure A1: Evolution of the share of products subject to bans



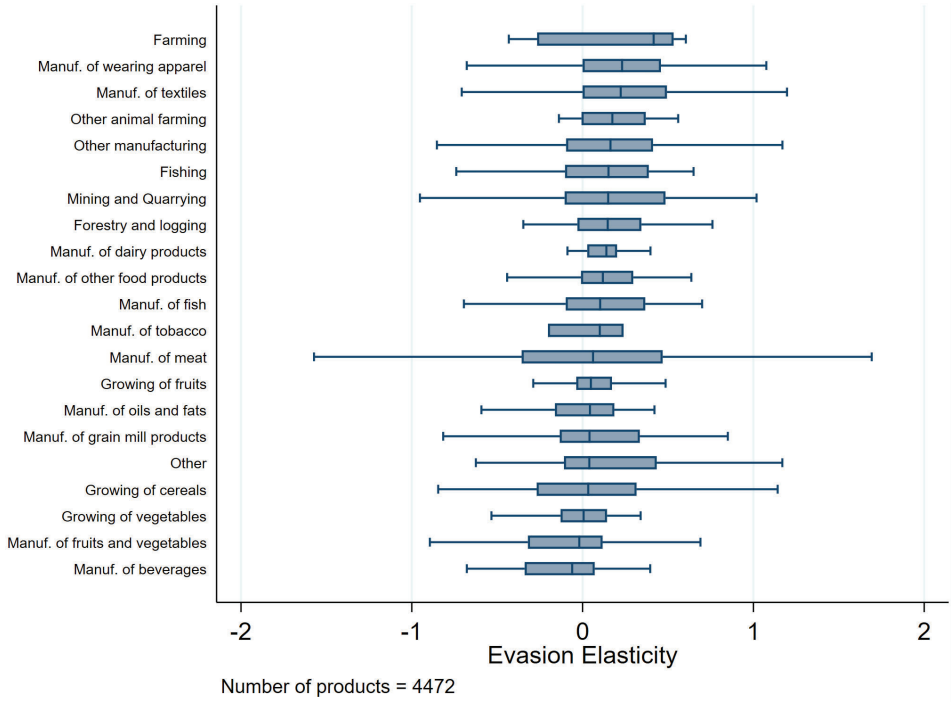
Notes: The figure shows the share of 10-digit Nigerian HS classification products that are subject to bans in Nigeria over the period 2001-2020.

Figure A2: Prevalence of Bans and Macroeconomic Conditions



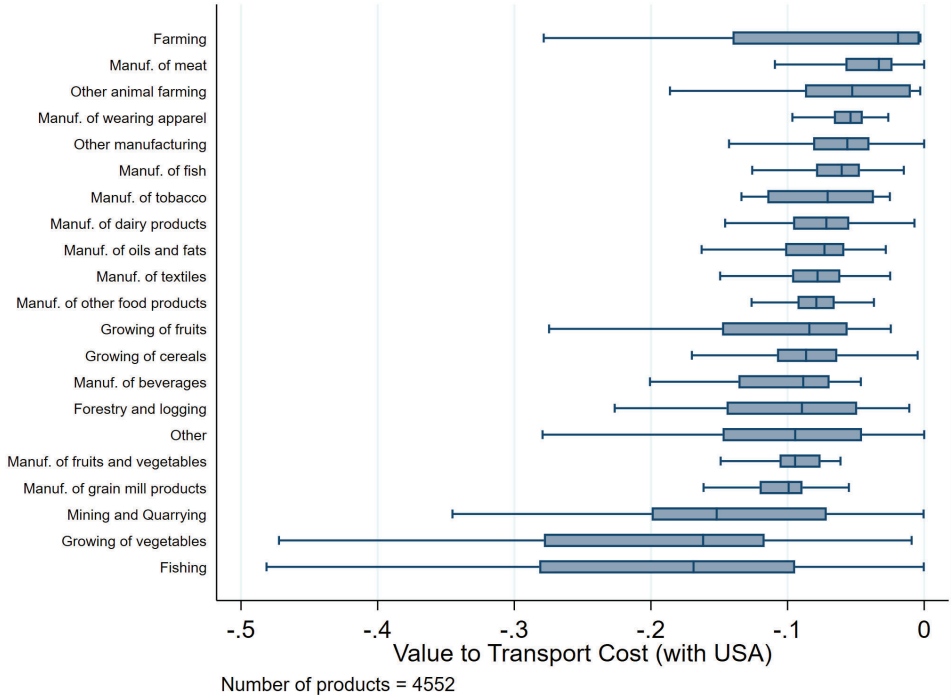
Notes: The figure plots the share of products under import bans in Nigeria (10-digit HS level) against selected macroeconomic indicators from 2001–2020. Each panel shows a scatterplot with a fitted linear trend, with correlation coefficients and p-values reported below. Indicators are: balance of payments (top-left), total debt service/GDP (top-right), interest payments/GDP (bottom-left), and international oil price (bottom-right).

Figure A3: Ease of evasion estimates by product group



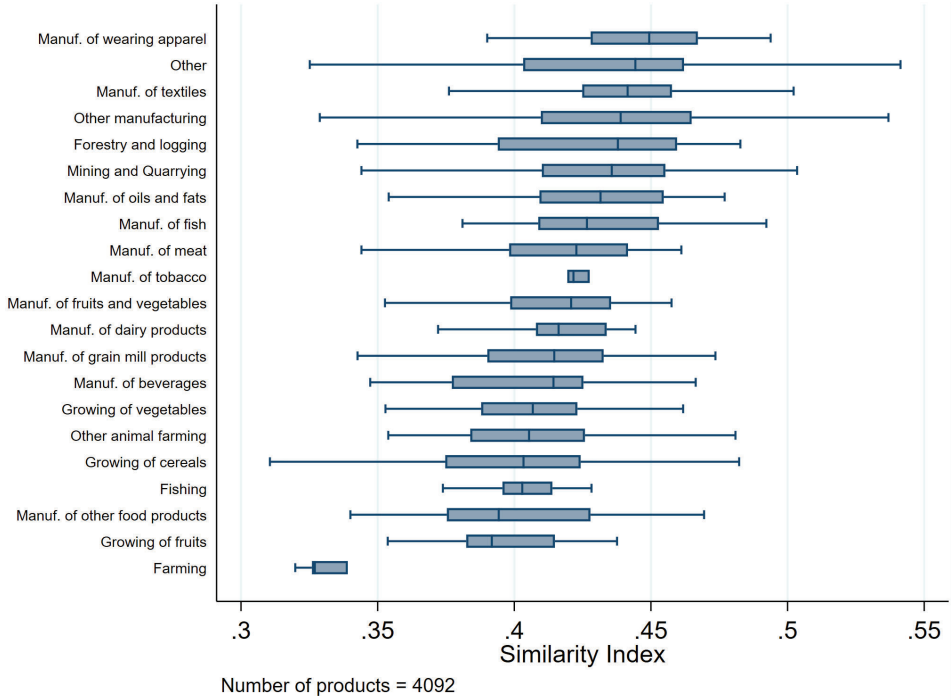
Notes: Figure shows the distribution of ease of evasion coefficients for different sectors. For each sector the box plots show the median, 25th and 75 percentiles. The box plot whiskers represent the largest and smallest values within 1.5 inter quartile ranges (IQR) from the upper and lower quartiles, respectively. Outliers are omitted from the figure. Ease of evasion values at the product level are calculated from a regression analysis of bilateral evasion gaps between ECOWAS countries that are not neighbors of Nigeria and source countries on tariffs after controlling for country-pair-year fixed effects. We also exclude Cabo Verde for being an island, with probably an evasion technology different from the rest of continental countries. The list of countries included in the regressions are Burkina Faso, Côte d'Ivoire, Guinea, The Gambia, Guinea-Bissau, Mali, Senegal, and Sierra Leone. Regressions are calculated at the HS 6-digit level using bilateral trade data from COMTRADE and tariff data from Teti (2024). The sample contains 834 468 observations. Higher values indicate greater ease of evasion.

Figure A4: Value to transport costs by product group



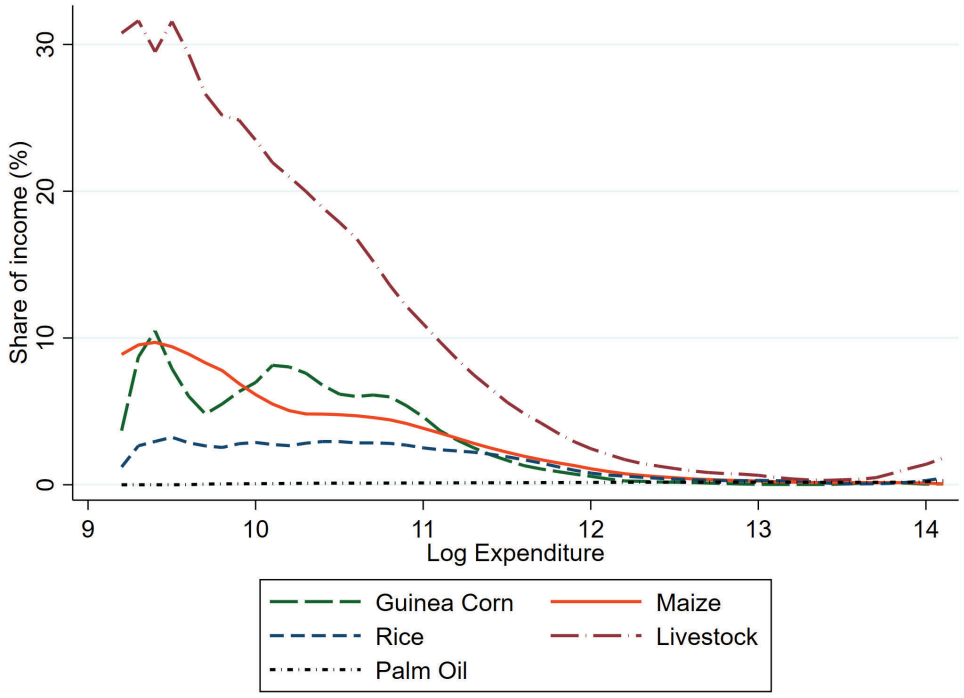
Notes: Figure shows the distribution of value-to-transport-cost ratios by product group. For each sector, the box plots show the median, 25th, and 75th percentiles. Whiskers represent the largest and smallest values within 1.5 inter quartile ranges (IQR) from the upper and lower quartiles, respectively; outliers are omitted. The ratio is calculated using COMTRADE data as the FOB (Free on Board) import value divided by the difference between CIF (Cost, Insurance, and Freight) and FOB values. Higher values indicate lower transport costs and arguably greater ease of (and/or returns to) evasion.

Figure A5: Similarity Index by product group



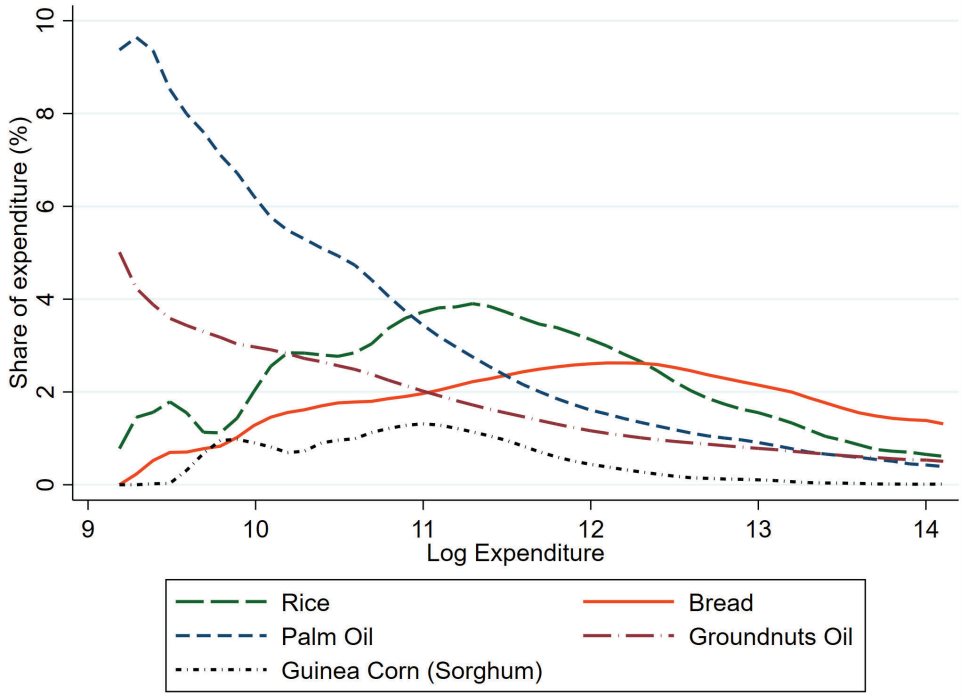
Notes: This figure shows the distribution of misclassification potential by product group, proxied by a similarity index. Box plots report the median, 25th, and 75th percentiles; whiskers reflect the largest and smallest values within 1.5 IQR from the quartiles, excluding outliers. The similarity index is constructed by computing pairwise cosine similarity across HS6 product descriptions using sentence embeddings from a pre-trained transformer model (SBERT). For each product, we calculate the average similarity to the top quartile of the most similar non-banned products, with higher values indicating greater potential for misclassification.

Figure A6: Income derived from banned goods versus income per capita



Notes: This graph presents local polynomial estimates of the share of household income derived from banned goods, plotted against log per capita expenditure. The analysis focuses on the five goods with the highest average income share.

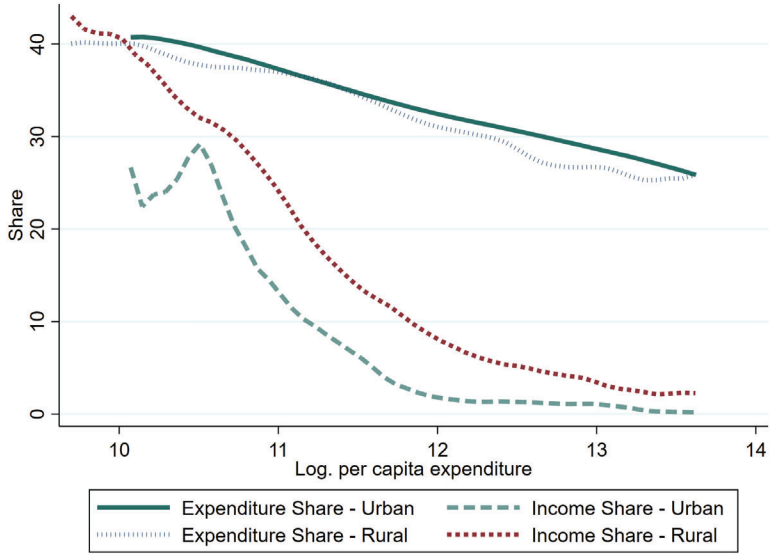
Figure A7: Spending on banned products versus income per capita



Notes: This graph presents local polynomial estimates of the share of household spending allocated to banned goods, plotted against log per capita expenditure. The analysis focuses on the five goods with the highest average expenditure share.

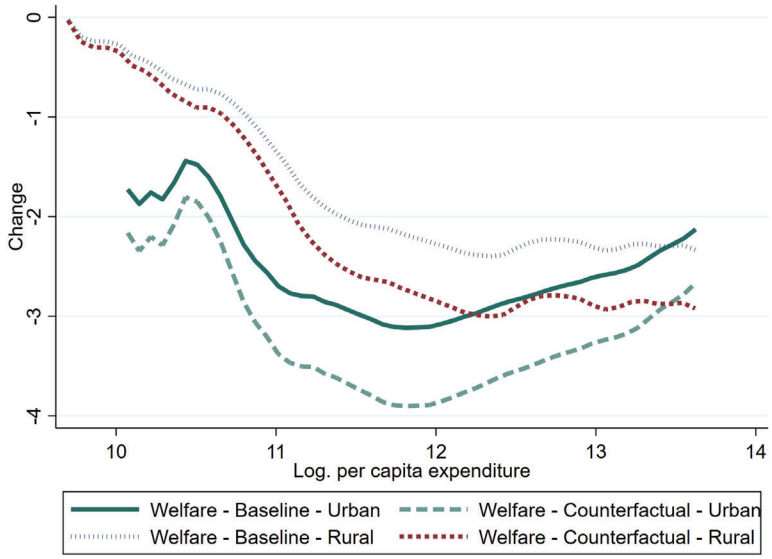
Figure A8: Welfare Impacts of Bans - Rural vs Urban

(a) Expenditure and Income shares of Banned Products



Notes: Figure shows smoothed values from a kernel-weighted local polynomial regression of household's expenditure and income share spent on banned products on log per capita expenditure, separately for rual and urban households. Expenditures on and incomes from banned products are calculated from the Nigeria Living Standards Survey (NLSS) 2018-2019.

(b) Distributional Impacts



Notes: Figure shows smoothed values from a kernel-weighted local polynomial regression of household's welfare changes due to bans, separately for rural and urban households. The baseline scenario uses the observed level of evasion. The counter-factual scenario simulates what the welfare impacts of bans would be if the evadability of all goods was equal to the average of goods with below median evadability. Expenditures on and incomes from banned products are calculated from the Nigeria Living Standards Survey (NLSS) 2018-2019.

B Additional Tables

Table A1: Variable definition and sources

Variable	Period	Description	Source
Ban	2001-2020	Dummy = 1 if product is banned from importation into Nigeria	Nigeria Customs Service Federal Ministry of Finance Online Publications
Price	2001-2012, 2015-2020	Product level consumer price	Nigeria Bureau of Statistics
Imports	2001-2003, 2006-2020	Product-origin imports reported by Nigeria	COMTRADE
Mirror Imports	2001-2003, 2006-2020	Product-origin exports to Nigeria reported by partners	COMTRADE
Trade Gap	2001-2003, 2006-2020	Difference between mirror imports and imports	COMTRADE
Lost Exports	2001-2003, 2006-2020	Dummy = 1 if mirror imports are positive but imports are zero	COMTRADE
Nigerian Tariffs	2001-2020	Tariff imposed on imported products	Nigeria Customs Service
ECOWAS Tariffs	2000-2020	Tariff imposed on imported products in ECOWAS countries	Teti, Fedora. A. (2024)
Taxes	2001-2020	Sum of tariff rate, VAT rate and levies. The total tax rate paid by importers	Nigeria Customs Service Federal Ministry of Finance Online Publications
Ease of Evasion ("Evadability")	2000-2020	A proxy for how difficult it is to evade trade policy. Measured as the elasticity of bilateral evasion gaps with respect to tariffs, estimated using a sample of ECOWAS countries, notably Burkina Faso, Côte d'Ivoire, Guinea, The Gambia, Guinea-Bissau, Mali, Senegal, and Sierra Leone	COMTRADE
Value to Transport Cost	2023	Ratio of import value to transport costs, calculated as FOB value divided by the difference between CIF and FOB import value	COMTRADE PLUS
Similarity Index	2001-2020	The average cosine similarity between the text description of the HS6 product and the top 25% most similar descriptions of other HS6 products that are not subject to a ban. Textual similarity between two HS6 product desciptions is measured using a pre-trained sentence transformer model (SBERT), which embeds each product description into a numerical vector. Cosine similarity between these vectors captures how closely related the texts are, with higher values indicating greater similarity. A higher similarity index suggests that a product may be more easily (mis)classified as a non-banned item.	Own calculations based on COMTRADE HS6 product descriptions

Notes: Table presents the description and sources for all variables used in the paper.

Table A1: *(continued)*

Variable	Period	Description	Source
Income shares	2018-2019	Share of household income derived from a specific product	Nigeria Living Standards Survey (NLSS)
Expenditure shares	2018-2019	Share of household expenditure on a specific product	Nigeria Living Standards Survey (NLSS)
Consumer Good	.	Dummy = 1 if the product is classified as a final consumption good	WITS*
Intermediate Good	.	Dummy = 1 if the product is classified as an intermediate input used in production	WITS*
Capital Good	.	Dummy = 1 if the product is classified as capital equipment or machinery	WITS*
Raw Material	.	Dummy = 1 if the product is classified as an unprocessed primary input or raw material	WITS*
Differentiated Product	.	Dummy = 1 if the product is considered differentiated (non-homogeneous) based on product type	Rauch (1999)
Critical Use	.	Dummy = 1 if the product is deemed critical for basic needs or essential services	USA Executive Orders 14017 and 14123
Dual Use	.	Dummy = 1 if the product can be used for both civilian and military or strategic purposes	Regulation (EU) 2021/821
Time Sensitive	.	Dummy = 1 if the product is perishable or otherwise highly time-sensitive in trade	Hummels and Schaur (2013)
Stickiness Index	.	A product-level index of relationship stickiness estimated from the average duration of firm-to-firm trade relationships, conditional on match quality, capturing switching costs and search frictions.	Martin, Mejean and Parenti (2023)
Agricultural Product	.	Dummy = 1 if the product belongs to the agricultural sector	WITS*
Industrial Product	.	Dummy = 1 if the product belongs to the manufacturing or industrial sector	WITS*
Petroleum Product	.	Dummy = 1 if the product is petroleum-based or derived from fossil fuels	WITS*

Notes: Table presents the description and sources for all variables used in the paper. *World Bank. (2025). WITS Reference Data – HS Classification Concordances and Product Groups. Retrieved July 4, 2025, from https://wits.worldbank.org/referencedata.html

Table A2: CPI and HS6 products covered

	Price data (CPI microdata)		Trade data (HS6)	
Year	Products covered	Share With Ban (CPI)	Products covered	Share With Ban (HS6)
2001	70	20.00	4049	18.37
2002	70	20.00	4049	18.37
2003	70	20.00	4049	18.37
2004	70	35.71	4049	21.86
2005	70	40.00	4049	22.08
2006	70	37.14	4049	21.12
2007	473	45.88	4049	21.12
2008	474	36.50	4049	12.72
2009	474	36.50	4049	12.72
2010	471	36.52	4049	12.72
2011	42	33.33	4049	12.72
2012	42	33.33	4049	6.54
2013	.	.	4049	6.52
2014	.	.	4049	6.54
2015	509	24.56	4049	5.26
2016	509	25.15	4049	5.43
2017	509	25.74	4049	5.51
2018	509	25.74	4049	5.51
2019	508	25.79	4049	5.46
2020	508	25.98	4049	5.53

Notes: Table shows the number of products covered each year, both in the CPI data (CPI products) and in the trade data (HS6 classification), as well as the share of products subject to bans each year.

Table A3: CPI Products Subject to an Import Ban, 2001–2020

- Adire made of guinea brocade
- Agbada buba and sokoto (men) guinea brocade
- Air conditonal (national 1.5 hp)
- Akpu Uncooked Fermented c
- All Buttered Croissant(Br
- Ankara wax prints multicolour,made in nig, of low
- Ankara wax prints multicolour,made in nig,of high
- Apples Golden Delicious
- Asepso soap
- Avogado Pear
- Babies dresses (for female) 2 yrs old
- Babies dresses(for male) 2yrs old
- Babies,dungaree (jump suit)
- Bacon
- Bar soap ;key soap
- Bath towel ;medium size
- Bathroom slippers foam sole
- Beans Cake(Akara)
- Bed Linen
- Bedsheet;ready made;printed fabric polyester
- Beef Bone in
- Beef Feet
- Beef Head
- Beef,boneless
- Bicycle tube; diamond china for men's bicycle
- Bicycle tyre ; diamond china for men's bicycle
- Big exercise book; 60 leaves
- Blanket made in nigeria
- Bleach (in plastic btl.750ml); parazone
- Blouse (short sleeve) cotton
- Bournvita 450g
- Boy's Raincoat
- Boy's short (knicker)
- Boys sandal: famad (bata) product
- Brassiere:plain not reinforced
- Bread UnSliced
- Bread sliced 500g
- Breastcoat (single breasted) no belt,2sides pocke
- Burham cement
- Can Coke
- Can Fanta
- Car Wash
- Cassava flour (Sold loose
- Chewing Gum Bubba One Wra
- Children's sandal:rubber sole upper leather: famad
- Chocolate(Samco)
- Chopper bicycle (for children)
- Coca-cola 35cl btl.
- Corn beef (exeter)
- Corn flour 2kg
- Cotton george print
- Crepe bandage 2inches
- Cushion chair:wooden frame with spring, with arm
- Dangote cement
- Date Palm fruit (Debenu)
- Delta Soap
- Dettol Instant hand Sanitizer
- Disinfectant :dettol in plastic bottle 250ml
- Dried meat (grass cutter) (indicate weight)
- Dust Pan Plastic
- Dusting powder ; standard size, 250gm.
- Eagle cement
- Eko(agidi/kafa)
- Electric bulb; 60 watts (plain)
- Elephant blue detergent 200g
- Elephant cement
- Embroidery lace;made in nig.,of medium quality
- Exercise book 2a; 20 leaves
- Eye drop: visine 15ml.
- Fansidar ; a sachet of 3 tablets
- Flat Bread
- Flour Cake
- Fritters (puff-puff)
- Frock Women
- Fruits(Guava)
- Furniture Wardrobe
- Gari white,sold loose
- Gari yellow,sold loose
- Girl's Raincoat
- Girl's blouse
- Girl's leather shoe
- Girl's sandal
- Girls dresses (ready made gown)
- Goat Meat Bone in
- GrapeFruits(other fruit)
- Groundnut Roasted
- Groundnut oil: 1 bottle, specify bottle
- Guinea brocade :made in nigeria
- Guinea corn flour (sold l
- Hand Woven Cloth
- Handkerchief (cotton)
- Hanger; plastic type
- Head tie, nylon scarf
- Honda, 175cc japan
- Ketchup
- Khaki drill:100 percent cotton
- Kitchen cupboard; ordinary unpolished with 3 shelv
- Kitchen stool;ordinary unpolished
- Kluvex Instant hand Sanitizer
- Kuka Dried
- Kuka fresh
- Lacasera Drink
- Limca 35cl.
- Linen: sewing linen materials
- Linoleum (carpet) plastic type multicolour
- Live Agric Chicken
- Live Duck
- Live Local Chicken
- Live guinea fowl (medium)
- Liver
- Louvre frame , with 8 blades
- Macaroni 500g
- Maize Flour Yellow (Sold
- Maize in cobs:fresh
- Malt Drink (Maltina)
- Malta-Guinness 35cl
- Maltonic 35cl
- Mango
- Mat; made of natural fibre (specify size)
- Mattress (local) filled with cotton
- Mattress;all foam;product from a reputable coy.
- Medicated plaster
- Men's bicycles, raliegh single with rear carrier
- Men's brief: (pant double seat) made in nig.
- Men's dresses safari suit; short sleeve
- Men's other (size 40 type) upper ; leather heel
- Men's other leather shoe lennards
- Men's raincoat:polyester material
- Men's shirt long sleeve
- Men's shoe:a good famad (bata) product
- Men's sock; polyamide material
- Men's t-shirt short sleeve
- Men's trouser;made of terylene
- Mens Footwear half shoe
- Men's sandals; a good
- Milo 450g
- Milton sterilizing fluid ; 500ml.
- Minced Meat
- Minced Pork
- Moin moin
- Motor cycle type; 1 tyre (dunlop)
- Mutton:sheep meat
- Native dress; kaftan ready made
- Natural Swan Water
- Natural water swan in pla1.5 liters
- Nigercem cement
- Nodules(Indomie)
- Orange
- Orange Juice
- Orange juice: natural vegfru in 250ml.cardboard pa
- Ordinary chair; (table chair with some foam attach
- Ordinary chair;all wooden,standard size without ar
- Ovaltine 450g
- Oxtail
- Palm oil: 1 bottle,specify bottle
- Pant boys ;65 percent polyester
- Pant girls:double seat
- Passat 2.0cc automatic
- Pawpaw
- Pears oil
- Pencil with eraser (h.b)
- Penicillin ointments ; 20gm.
- Peppermint; Trebor one ro
- Pepsi
- Petticoat:half length polyamide
- Peugeot 206 with a/c bestline
- Peugeot 307 saloon with a/c
- Pillow mixture of grass and cotton
- Pillow; foam filled
- Pineapple
- Plastic basin; 60cm diameter
- Plastic bucket; with metal handle
- Plastic cup; about 25cl
- Plastic plate
- Poplin; 65 percent polyester ,35 percent cotton
- Pork Feet
- Pork Head
- Pork Meat
- Printed fabric:65 percent polyester, 35 percent cotton
- Pure water
- Refrigerator 300 litres thermocool
- Rice Local(short-Grained)
- Rice Long-Grained
- Rice Medium Grained
- Rice agric sold loose
- Round Bread
- Rug; single colour, simplest type
- Salad cream (heinz)
- Sausage beef (gala)
- Schweppes
- Semovita 10kg
- Semovita 2kg
- Serving dishes medium size
- Sewing thread
- Shirt boys ;100 percent cotton
- Singlet (boys)
- Singlet (girls) cotton sleeves
- Singlet, sleeveless; made in nig.
- Sirloin Steak
- Skin meat : (ponmo)
- Skirt; terylene material
- Socks (boys)
- Spike Shoes
- Sponge
- Sponge Cake
- Sugar granulated : in cellophane bag ; 500g
- Sugar in cube one Pkt. St
- Suitcase medium
- Suzuki ,125cc as100 japan
- Sweet Bread
- Synthetic materials for sewing
- Table cover ready made(made of rubber)
- Tennis shoes canvas: most common type
- Terylene made in nig. price of 1.25 yds
- Ties (100 percent polyester , 9cm wide at bottom)
- Tinned Tomatoe (Derica)
- Toilet roll:of good quality
- Toilet soap:lux (one tablet 90g)
- Tomato Puree
- Tooth paste ; close up , size of 37gm.
- Toyota Camry 2.0cc
- Toyota Corolla 1.8cc
- Travelling bag (medium)
- Trousers boys
- Two-piece suit (coat and trouser) terylene
- Vegetable oil:1 bottle,specify bottle
- Vicks lemon plus
- Wash hand basin 40cm x 55cm
- Washing powder 'omo' brand 200gm,price of one pkt.
- Water (cost of 25 litres jerry can)
- Water closet:complete set local, abeokuta
- Wheat Bread
- Wheat flour: prepacked (golden penny 2kg)
- Women Footwear half shoe
- Women hand bag (medium size)
- Women hand bag (small size)
- Women sandals famad (bata) size 38 glued,upper thi
- Women's raincoat
- Women's brief; 100 percent polyamide double seat
- Women's gown (ready made)
- Women's sandal lenard product
- Women's shoe:a good famad(bata) product
- Women's shoes a good lenard product
- Women's slippers:low heal :made of leather
- Wooden bed;frames and bed stead,made of wood
- Wool; plain colour, price per yard
- Writing table; well polished , 3 drawers on one si
- Yam Flour- (Sold loosed)
- Yamaha 125cc china
- veal Chops

Notes: This table lists CPI products that were subject to an import ban at any point between 2001 and 2020.

Table A4: Prevalence of Bans by HS Section

HS2	Description	Average Ban
01	Animals; live	0.222
02	Meat and edible meat offal	0.693
03	Fish and crustaceans, molluscs and other aquatic invertebrates	0.000
04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	0.000
05	Animal originated products; not elsewhere specified or included	0.030
06	Trees and other plants, live; bulbs, roots and the like; cut flowers and ornamental foliage	0.016
07	Vegetables and certain roots and tubers; edible	0.007
08	Fruit and nuts, edible; peel of citrus fruit or melons	0.111
09	Coffee, tea, mate and spices	0.000
10	Cereals	0.222
11	Products of the milling industry; malt, starches, inulin, wheat gluten	0.053
12	Oil seeds, grains, medicinal plants, and fodder	0.000
13	Lac; gums, resins and other vegetable saps and extracts	0.000
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	0.000
15	Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes	0.390
16	Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof	0.051
17	Sugars and sugar confectionery	0.068
18	Cocoa and cocoa preparations	0.561
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	0.259
20	Preparations of vegetables, fruit, nuts or other parts of plants	0.109
21	Miscellaneous edible preparations	0.024
22	Beverages, spirits and vinegar	0.202
23	Food industries, residues and wastes thereof; prepared animal fodder	0.000
24	Tobacco and manufactured tobacco substitutes	0.000
25	Salt; sulphur; earths, stone; plastering materials, lime and cement	0.029
26	Ores, slag and ash	0.000
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0.000
28	Inorganic chemicals and compounds of precious or rare metals	0.000
29	Organic chemicals	0.000
30	Pharmaceutical products	0.444
31	Fertilizers	0.000
32	Tanning extracts, dyes, pigments, paints, and inks	0.000
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0.004
34	Soap, detergents, waxes, candles, modeling pastes, and dental waxes	0.341
35	Albuminoidal substances; modified starches; glues; enzymes	0.000
36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	0.000
37	Photographic or cinematographic goods	0.000
38	Chemical products n.e.s.	0.000
39	Plastics and articles thereof	0.043
40	Rubber and articles thereof	0.036
41	Raw hides and skins (other than furskins) and leather	0.000
42	Leather goods, saddlery, travel bags, and animal gut articles	0.477
43	Furskins and artificial fur; manufactures thereof	0.000
44	Wood and articles of wood; wood charcoal	0.000
45	Cork and articles of cork	0.000
46	Manufactures of straw, esparto or other plaiting materials; basketware and wickerwork	0.000
47	Pulp of wood or other fibrous cellulosic material; waste and scrap of paper or paperboard	0.000
48	Paper and paperboard; articles of paper pulp, of paper or paperboard	0.092
49	Printed books, newspapers, and printing industry products	0.050

Notes: This table reports the average prevalence of import bans by HS Section, using data from 2001 to 2020 (excluding 2004 and 2005 due to missing data). The reported values reflect averages over time and across HS 6-digit products within each HS2 Section.

Table A4: *(continued)*

HS2	Description	Average Ban
50	Silk	0.208
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	0.167
52	Cotton	0.249
53	Vegetable textile fibres; paper yarn and woven fabrics of paper yarn	0.374
54	Man-made filaments	0.460
55	Man-made staple fibres	0.304
56	Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables and articles thereof	0.121
57	Carpets and other textile floor coverings	1.000
58	Fabrics; special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery	0.303
59	Industrial textile fabrics and coated textiles	0.101
60	Fabrics; knitted or crocheted	0.278
61	Apparel and clothing accessories; knitted or crocheted	0.469
62	Apparel and clothing accessories; not knitted or crocheted	0.484
63	Textiles, made up articles; sets; worn clothing and worn textile articles; rags	0.457
64	Footwear; gaiters and the like; parts of such articles	0.725
65	Headgear and parts thereof	0.000
66	Umbrellas, sun umbrellas, walking-sticks, seat sticks, whips, riding crops; and parts thereof	0.000
67	Prepared feathers, artificial flowers, and hair articles	0.028
68	Stone, plaster, cement, asbestos, mica or similar materials; articles thereof	0.000
69	Ceramic products	0.000
70	Glass and glassware	0.018
71	Pearls, precious stones and metals, imitation jewellery, and coins	0.000
72	Iron and steel	0.000
73	Iron or steel articles	0.000
74	Copper and articles thereof	0.000
75	Nickel and articles thereof	0.000
76	Aluminium and articles thereof	0.000
78	Lead and articles thereof	0.000
79	Zinc and articles thereof	0.000
80	Tin; articles thereof	0.000
81	Metals; n.e.s., cermets and articles thereof	0.000
82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof, of base metal	0.011
83	Metal; miscellaneous products of base metal	0.000
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	0.025
85	Electrical machinery, equipment, and parts; sound and TV recorders and accessories	0.001
86	Railway and tramway locomotives, rolling stock, track fixtures, and signalling equipment	0.000
87	Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof	0.323
88	Aircraft, spacecraft and parts thereof	0.000
89	Ships, boats and floating structures	0.000
90	Optical, measuring, and medical instruments and parts	0.000
91	Clocks and watches and parts thereof	0.000
92	Musical instruments; parts and accessories of such articles	0.000
93	Arms and ammunition; parts and accessories thereof	0.000
94	Furniture, bedding, lighting, illuminated signs, and prefabricated buildings	0.649
95	Toys, games and sports requisites; parts and accessories thereof	0.021
96	Miscellaneous manufactured articles	0.068
97	Works of art; collectors' pieces and antiques	0.000

Notes (continued): See above.

Table A5: Correlation Matrix Product Characteristics

Variable	Ban	Evadability	Value to Transport Cost	Similarity Index
Consumer Good	0.202***	0.008	0.029*	-0.009
Intermediate Good	-0.016	0.002	-0.057***	0.108***
Capital Good	-0.228***	0.002	0.274***	-0.021
Differentiated Product	0.019	0.007	0.223***	0.012
Critical Use	-0.195***	0.013	0.120***	-0.047***
Dual Use	-0.189***	-0.013	0.158***	0.104***
Time Sensitive	-0.137***	-0.034**	0.069***	0.164***
Stickiness Index	-0.277***	-0.008	0.061***	-0.014
Agricultural Product	0.114***	-0.035**	-0.159***	-0.236***
Industrial Product	-0.114***	0.035**	0.159***	0.236***
Petroleum Product	-0.009	0.007	0.010	-0.001
Raw Material	0.017	-0.019	-0.316***	-0.133***

Notes: This table presents the correlation between different product characteristics. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A6: Probit: Ban Determinants

	Import Ban		
	(1)	(2)	(3)
Consumer Good	1.035***		1.073***
	(0.089)		(0.098)
Intermediate Good	0.463***		0.430***
	(0.090)		(0.098)
Differentiated Product	0.101**		0.107**
	(0.049)		(0.053)
Critical Product	−0.532***		−0.532***
	(0.093)		(0.101)
Dual Use	−0.396***		−0.411***
	(0.093)		(0.102)
Time Sensitive	−0.706***		−0.742***
	(0.115)		(0.128)
Stickiness Index	−0.571***		−0.596***
	(0.043)		(0.047)
Agricultural Good	0.084		0.116
	(0.077)		(0.083)
Raw Material	−0.136		−0.209
	(0.144)		(0.157)
Year FE	No	Yes	Yes
Observations	75180	80980	75180
Pseudo R^2	0.157	0.053	0.222

Notes: This table presents probit models of ban propensity. Standard errors are clustered by product and presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A7: Average share of ban by main import origin countries

	All Products Total Imports	Ever Ban Share	Never Ban Share
China	158135.3	32.6	49.6
Netherlands	58261.6	6.5	16.4
United States	55513.1	21.9	37.8
India	35217.2	41.5	44.2
Great Britain	31475.1	20.7	50.0
France	25575.0	21.2	37.0
Germany	21595.9	18.6	64.5
Korea, Rep.	20988.6	17.1	73.7
Italy	16320.4	14.4	67.8
Brazil	16026.8	19.9	23.3
All	609503.6	20.3	47.4

Notes: This table presents the average prevalence of bans (across HS6 categories) by country of origin for the top 10 most important countries of origin. All refers to all import origins, not just the top 10.

Table A8: Correlation of HS6 Trade and Tariff Patterns Between Nigeria and Other Countries

	Import shares	Tariffs
Burkina Faso	0.87	0.81
Côte d'Ivoire	0.20	0.83
Guinea	0.84	0.74
Gambia, The	0.70	0.35
Guinea-Bissau	0.45	0.85
Mali	0.88	0.83
Senegal	0.69	0.82
Sierra Leone	0.78	0.71
Ecowas average*	0.84	0.81
OECD	0.40	0.45

Notes: Column 1 shows the correlation between Nigeria's import shares (at the HS6 product level) and those of selected ECOWAS countries used in constructing the evadability index. The second-to-last row reports the average correlation across these countries, while the bottom row shows the correlation with the OECD average. Column 2 presents the correlation between Nigeria's tariffs and the tariffs applied by these same trade partners.
* Only calculated over ECOWAS countries included in this table.

Table A9: Ease of Evasion Elasticities

Whole CPI Sample	
Average	0.14
Standard Deviation	0.90
Min	-5.22
P10	-0.53
P25	-0.17
P50 (Median)	0.07
P75	0.34
P90	0.69
Max	10.97
10 products with largest elasticities	
Product	Evasion Elasticity
Pant boys ;65% polyester	10.97
Tergal: wool fabric;55% polyester; 45% wool	5.97
Chicken feet	4.44
Chicken Wings	4.44
Gizzard	4.44
Yam flour: prepacked (poundo yam) 1 kg	2.92
Lip sticks (jacklin)	2.85
Shea Butter(ori or okwma/doli or mai-kadanya)	2.85
Men's other leather shoe lennards	2.39
Women's shoes a good lenard product	2.39
10 products with smallest elasticities	
Product	Evasion Elasticity
Beef Feet	-1.11
Skin meat : (ponmo)	-1.11
Beef Head	-1.11
Oxtail	-1.11
Goat Meat Bone in	-1.63
Printed fabric "fancy" 100 % cotton	-1.73
Printed fabric:65% polyester, 35% cotton	-1.73
Bongo Drum	-1.82
Video recorder sony model ed115	-2.16
Cotton wool; 100gm.	-5.22

Notes: This table presents descriptive statistics for the ease of evasion coefficients, including summary measures for the full sample and values for the 10 products with the highest and lowest estimated elasticities. Product-level ease of evasion estimates are derived from regressions of bilateral evasion gaps on tariffs, using trade between ECOWAS countries that do not share a border with Nigeria and source countries, controlling for country-pair-year fixed effects. Cabo Verde is excluded due to its island status, and Ghana and Togo are excluded due to substantial informal trade flows with Nigeria. The analysis includes Burkina Faso, Côte d'Ivoire, Guinea, The Gambia, Guinea-Bissau, Mali, Senegal, and Sierra Leone. Regressions are conducted at the HS 6-digit level using bilateral trade data from COMTRADE and tariff data from Teti (2024).

Table A10: Value to Transport Cost Ratios

Whole CPI Sample	
Average	-0.09
Standard Deviation	0.05
Min	-0.43
P10	-0.14
P25	-0.11
P50 (Median)	-0.08
P75	-0.05
P90	-0.04
Max	-0.00
10 products with largest ratios	
Product	Value to Transport Cost Ratio
Gizzard	-0.00
Chicken Wings	-0.00
Chicken feet	-0.00
Pork Meat	-0.00
Live guinea fowl (medium)	-0.00
Live Duck	-0.00
Pork Head	-0.01
Pork Feet	-0.01
Fresh milk industrial	-0.01
Fresh Milk(Nono)	-0.01
10 products with smallest ratios	
Product	Value to Transport Cost Ratio
Eagle cement	-0.23
Nigercem cement	-0.23
Onion bulb	-0.27
Sand : washed	-0.29
Sand : erosion	-0.29
Kuka fresh	-0.29
Gravels washed	-0.30
Pawpaw	-0.37
Tomato	-0.43
Cucumber	-0.43

Notes: Table shows descriptive statistics for the value-to-transport-cost variable for the whole sample, along with the 10 products with the highest and lowest values. The value-to-transport-cost ratio at the product level is calculated using import data from COMTRADE as the FOB (Free on Board) value divided by the difference between the CIF (Cost, Insurance, and Freight) value and the FOB value. A higher ratio indicates lower transport costs and higher ease of (or returns to) evasion.

Table A11: Similarity Index Estimates

Whole CPI Sample	
Average	0.42
Standard Deviation	0.04
Min	0.33
P10	0.38
P25	0.40
P50 (Median)	0.42
P75	0.45
P90	0.47
Max	0.52
10 products with largest similarity scores	
Product	Similarity Index
Iron nails: 10cm (i.e 4 inches)	0.52
Frying Pan medium	0.52
Sauce Pan	0.52
Metal bucket; big size	0.52
Cooking pot; cast iron with 3 legs (medium)	0.52
Enamel plate; standard size	0.52
Tablespoon: stainless steel	0.51
Fork stainless steel	0.51
Hanger; plastic type	0.51
Sponge	0.51
10 products with similarity scores	
Product	Similarity Index
Mattress (local) filled with cotton	0.34
Mattress;all foam;product from a reputable coy.	0.34
Mat; made of natural fibre (specify size)	0.34
Writing and drawing Children book	0.34
Hand mirror	0.34
12 inch by 18 inch mirror 5mm	0.34
Gambling (Snooker)	0.33
Playing Cards	0.33
Matches:prices of one box	0.33
Magic shaving powder (specify)	0.33

Notes: Table shows descriptive statistics for the similarity index for the full sample, as well as the 10 products with the highest and lowest similarity scores. The index is constructed by computing pairwise cosine similarity between HS 6-digit product descriptions using sentence embeddings from a pre-trained transformer model (SBERT). For each product, we calculate the average similarity to the top quartile of most-similar non-banned products. Higher values indicate greater textual similarity to other goods, and thus a higher potential for misclassification and evasion.

Table A12: Ease of Evasion Measures - Validation

	Log (Trade Gap + 1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Tariffs +1)		0.065***		0.067***		0.067***
		(0.011)		(0.011)		(0.011)
Evadability	0.016**	0.015**				
	(0.008)	(0.008)				
Value to Transport Costs			0.143	0.399*		
			(0.208)	(0.211)		
Similarity Index					0.592**	0.813***
					(0.248)	(0.258)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Source country FE	Yes	Yes	Yes	Yes	Yes	Yes
Importing country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1274080	963507	1256133	945746	1134676	854904
R-squared	0.066	0.069	0.066	0.069	0.066	0.068

Notes: The table presents OLS regressions of evasion gaps in ECOWAS countries other than Nigeria on various proxies for the ease of evasion. The list of countries included in the regressions are Burkina Faso, Côte d'Ivoire, Ghana, Guinea, The Gambia, Guinea-Bissau, Mali, Senegal, Sierra Leone, and Togo. Regressions are calculated at the HS 6-digit level using bilateral trade data from COMTRADE and tariff data from Teti (2024). The sample period is from 2000 to 2020. Standard errors are presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A13: Event Study Estimates of the Impact of Import Bans on Evasion

	log (1+Trade Gap)	
	Imposition	Removal
Event time (t)	(1)	(2)
t = -4	0.186	1.932
	(0.338)	(1.427)
t = -3	−1.095	0.356
	(0.754)	(2.255)
t = -2	−0.076	1.772
	(0.544)	(2.362)
t = -1	1.319	−0.703
	(0.933)	(1.486)
t = 0	.	.
t = 1	0.614	−2.130
	(0.384)	(1.359)
t = 2	2.101**	−1.147
	(0.896)	(1.333)
t = 3	3.458***	−1.444
	(1.188)	(1.409)
t = 4	3.038***	−1.293
	(1.150)	(1.390)
Pooled Pre	−0.442	0.439
	(0.435)	(1.962)
Pooled Post	2.350***	−1.529
	(0.781)	(1.183)
N Pre	30164	835
N Post	33185	1124

Notes: the table shows the results of a local projection difference-in-difference estimation following (Dube et al. (2025)) of the impact of ban imposition (in column 1) and ban removal (in column 2) on the evolution of log (1+evasion gap), controlling for $(1 - \text{Ban}) \times \text{Taxes}$. Standard errors are presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The results are presented graphically in Figure 1.

Table A14: Event Study Estimates of the Impact of Import Bans on Evasion - Alternative Estimator

	log (1+Trade Gap)		
	Imposition	Removal	Imp. & Rem.
Event time (t)	(1)	(2)	(3)
t = -4	−0.528	−2.296***	−2.219***
	(0.404)	(0.534)	(0.511)
t = -3	−0.998	−1.737***	−1.706***
	(0.901)	(0.503)	(0.484)
t = -2	0.016	−2.834***	−2.708***
	(0.551)	(0.492)	(0.471)
t = -1	−0.568	−0.358	−0.375
	(0.774)	(0.459)	(0.428)
t = 0	.	.	.
t = 1	1.084**	0.588	0.627*
	(0.503)	(0.366)	(0.340)
t = 2	0.511	0.535	0.533
	(0.828)	(0.374)	(0.350)
t = 3	1.278	0.293	0.368
	(0.811)	(0.383)	(0.359)
t = 4	1.009	0.949***	0.954***
	(0.812)	(0.336)	(0.316)
Cumulative ATT	1.033	0.601*	0.633**
	(0.676)	(0.312)	(0.293)
N Post	31580	4164	35744

Notes: The table presents event study estimates of the impact of bans on evasion following De Chaisemartin and d'Haultfoeuille (2024). Column (1) estimates the dynamic effects of ban imposition, Column (2) estimates the effects of ban removal, and Column (3) includes both events in a single specification. The dependent variable is $\log(1 + \text{evasion gap})$. Regressions control for $(1 - \text{Ban}) \times \text{Taxes}$. Standard errors are shown in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A15: Event Study Estimates of the Impact of Import Bans on Evasion - Additional Robustness Tests

	Log Trade Gap		Lost Exports		Log (1+Trade Gap)	
	Imposition	Removal	Imposition	Removal	Imposition	Removal
Event time (t)	(1)	(2)	(3)	(4)	(5)	(6)
t = -4	0.258	1.451*	−0.006	0.211*	0.356	3.064***
	(0.292)	(0.872)	(0.009)	(0.109)	(0.335)	(0.475)
t = -3	−0.673	−0.298	−0.029***	0.136	−0.950	0.925
	(0.752)	(1.260)	(0.005)	(0.165)	(0.754)	(0.612)
t = -2	0.144	−2.072	−0.014***	0.131	0.000	2.141***
	(0.535)	(2.139)	(0.004)	(0.174)	(0.544)	(0.615)
t = -1	−0.064	−0.310	0.109*	−0.040	1.358	1.077*
	(0.544)	(1.020)	(0.063)	(0.114)	(0.933)	(0.647)
t = 0	.	.	.	.	.	.
t = 1	0.668*	1.419*	−0.002	−0.191*	0.570	−1.051**
	(0.396)	(0.826)	(0.003)	(0.102)	(0.384)	(0.463)
t = 2	2.600***	1.118	−0.004	−0.162	2.043**	−0.875*
	(0.796)	(0.786)	(0.004)	(0.100)	(0.895)	(0.513)
t = 3	1.692**	0.534	0.149*	−0.097	3.360***	0.012
	(0.720)	(1.089)	(0.080)	(0.111)	(1.187)	(0.532)
t = 4	1.649**	1.357	0.109	−0.103	2.887**	−1.147***
	(0.758)	(0.867)	(0.067)	(0.101)	(1.149)	(0.439)
Pooled Pre	−0.084	0.662	−0.021***	0.069	−0.309	1.878***
	(0.422)	(1.117)	(0.004)	(0.147)	(0.434)	(0.521)
Pooled Post	1.664***	1.747**	0.063*	−0.140	2.267***	−0.786*
	(0.643)	(0.814)	(0.035)	(0.090)	(0.780)	(0.404)
N Pre	20978	289	30164	835	30164	835
N Post	23491	464	33185	1124	33185	1124

Notes: The table reports results from a local projection difference-in-differences estimation following Dube et al. (2025), examining the effects of ban imposition (Columns 1, 3, and 5) and ban removal (Columns 2, 4, and 6) on various measures of evasion. The dependent variable in Columns 1 and 2 is the log of the trade gap. Columns 3 and 4 use a dummy for lost exports, defined as cases where mirror exports are positive but recorded imports are zero. Columns 5 and 6 use $\log(1 + \text{evasion gap})$ as the outcome. Columns 1–4 control for $(1 - \text{Ban}) \times \text{Taxes}$, while Columns 5 and 6 include no controls. Standard errors are shown in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A16: Impact of bans on trade and evasion - TWFE estimates

	Mirror Imports (1)	Imports (2)	Trade Gap (3)
Panel A: Overall Impact			
Log + 1 Transformation			
Ban	-0.969^{***}	-3.210^{***}	2.240^{***}
	(0.097)	(0.150)	(0.161)
Observations	61665	61665	61665
HS Products	4049	4049	4049
R-Squared	0.79	0.72	0.39
Adjusted R-Squared	0.77	0.70	0.35
Panel B: Intensive Margin			
Log Transformation			
Ban	-0.782^{***}	-0.408^{***}	-0.131
	(0.070)	(0.109)	(0.127)
Observations	54148	49454	46611
HS Products	3964	3949	3756
R-Squared	0.80	0.73	0.49
Adjusted R-Squared	0.79	0.71	0.44
Panel C: Extensive Margin			
Dummy > 0			
Ban	-0.033^{***}	-0.313^{***}	0.271^{***}
	(0.008)	(0.013)	(0.014)
Observations	62285	62285	61665
HS Products	4049	4049	4049
R-Squared	0.56	0.54	0.36
Adjusted R-Squared	0.53	0.50	0.31
HS FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: This table presents two-way fixed effects estimates of the impact of import bans on trade and evasion. All regressions controls for HS6 product and year fixed effects. Standard errors are clustered by product and presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A17: PPML estimation of the impact of bans on trade and evasion

	Mirror Imports (1)	Imports (2)	Lost Exports (3)
Panel A: Full Sample			
Ban	-0.610^{***}	-0.353^{***}	0.192^{***}
	(0.142)	(0.046)	(0.010)
Observations	72396	72396	72882
HS Products	4022	4022	4049
R-Squared	0.89	0.75	0.33
Panel B: High-Income Countries			
Ban	-0.178^{*}	-0.237^{***}	0.158^{***}
	(0.104)	(0.043)	(0.013)
Observations	70974	71316	61236
HS Products	3943	3962	4021
R-Squared	0.90	0.72	0.33
Panel C: China			
Ban	-0.388	-0.431^{***}	0.106^{***}
	(0.241)	(0.058)	(0.011)
Observations	59220	69210	70002
HS Products	3290	3845	3889
R-Squared	0.88	0.66	0.24
HS FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: Table shows the results of Poisson pseudo-maximum likelihood (PPML) regressions. The independent variable ban is a dummy that takes value 1 if the product is subject to an import ban and 0 otherwise. In column (1) the dependent variable is mirror imports, in column (2) imports, and in column (3) a smuggling variable that takes value 1 if both mirror imports are positive for that product and imports are zero, and value 0 otherwise. Panel A uses the Full Sample, that is all trading partners, whereas Panel B restricts the sample to high-income countries only. Panel C presents results for China, Nigeria's most important source of imports. All regressions control for tariffs interacted with a dummy for whether trade is not banned, HS 6-digit level FE, and year FE. Standard errors are clustered at the HS 6-digit level. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A18: Event Study Estimates of the Impact of Bans on Prices

	Log Price							
	Imposition	Removal	Imposition		Imposition		Imposition	
			Evadability		Value to transport costs		Similarity	
			Low	High	Low	High	Low	High
Event time (t)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t = -2	−0.011	0.206***	−0.000	−0.270***	0.003	−0.128**	−0.036	−0.031*
	(0.018)	(0.030)	(0.020)	(0.021)	(0.020)	(0.050)	(0.025)	(0.017)
t = -1	0.001	−0.127	−0.016	−0.197***	0.010	−0.112*	0.023	−0.035***
	(0.016)	(0.383)	(0.017)	(0.017)	(0.017)	(0.057)	(0.020)	(0.012)
t = 0	.	.	.	.	.	.	.	.
t = 1	0.070***	−0.130**	0.095***	0.002	0.070***	0.052	0.086***	−0.015
	(0.011)	(0.064)	(0.012)	(0.039)	(0.011)	(0.048)	(0.012)	(0.029)
t = 2	0.114***	−0.165**	0.137***	0.027	0.110***	0.045	0.132***	0.071**
	(0.010)	(0.070)	(0.011)	(0.037)	(0.010)	(0.043)	(0.010)	(0.032)
Pooled Pre	−0.013	0.099***	−0.002	−0.248***	0.010	−0.137***	−0.008	−0.043***
	(0.014)	(0.020)	(0.016)	(0.017)	(0.016)	(0.043)	(0.021)	(0.013)
Pooled Post	0.099***	−0.133**	0.124***	0.018	0.097***	0.048	0.123***	0.027
	(0.009)	(0.059)	(0.010)	(0.035)	(0.010)	(0.040)	(0.009)	(0.028)
N Pre	72358	24342	39828	30547	45587	23699	31770	37090
N Post	105252	36527	58142	44381	66486	34602	46624	53689

Notes: The table reports results from a local projection difference-in-differences estimation following Dube et al. (2025), examining the effects of ban imposition (Columns 1, 3, 4, 5, 6, 7, and 8) and ban removal (Column 3) on log prices. Columns 1 and 2 present estimates for the full sample of products, while Columns 3–8 explore heterogeneity by splitting products based on above- and below-median values of evadability (Columns 3 and 4), value-to-transport cost ratios (Columns 5 and 6), and product similarity (Columns 7 and 8). All regressions control for $(1 - \text{Ban}) \times \text{Taxes}$. Standard errors are presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The results of these estimations are presented graphically in Figure 2.

Table A19: Impact of Bans on Prices - Event Studies - Robustness

	Log Price							
	Imposition	Removal	Imposition		Imposition		Imposition	
			Evadability		Value to transport costs		Similarity	
			Low	High	Low	High	Low	High
Event time (t)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t = -2	−0.006	0.151***	0.202***	0.000***	0.172***	0.000***	0.028	−0.004
	(0.013)	(0.026)	(0.030)	(0.000)	(0.035)	(0.000)	(0.026)	(0.017)
t = -1	0.015	0.064***	−0.167	0.000***	−0.403	0.000***	0.052***	−0.027**
	(0.012)	(0.024)	(0.518)	(0.000)	(0.427)	(0.000)	(0.020)	(0.012)
t = 0	.	.	.	.	.	.	.	.
t = 1	0.050***	0.078***	−0.239***	−0.098	−0.277***	−0.029	0.081***	−0.013
	(0.010)	(0.018)	(0.080)	(0.154)	(0.082)	(0.129)	(0.012)	(0.029)
t = 2	0.074***	0.037*	−0.253***	−0.207	−0.346***	0.007	0.098***	0.058*
	(0.009)	(0.019)	(0.086)	(0.195)	(0.090)	(0.141)	(0.010)	(0.032)
Pooled Pre	0.004	0.116***	0.095***	0.000***	0.108***	0.000***	0.049**	−0.019
	(0.010)	(0.020)	(0.019)	(0.000)	(0.023)	(0.000)	(0.022)	(0.013)
Pooled Post	0.062***	0.044***	−0.221***	−0.151	−0.289***	0.017	0.093***	0.018
	(0.008)	(0.016)	(0.073)	(0.168)	(0.072)	(0.127)	(0.010)	(0.028)
Control for no ban*taxes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N Pre	73113	24440	16248	8092	16150	7544	31770	37090
N Post	107125	36821	24444	12082	24090	11464	46624	53689

Notes: The table reports results from a local projection difference-in-differences estimation following Dube et al. (2025), examining the effects of ban imposition (Columns 1, 3, 4, 5, 6, 7, and 8) and ban removal (Column 3) on log prices. Columns 1 and 2 present estimates for the full sample of products, while Columns 3–8 explore heterogeneity by splitting products based on above- and below-median values of evadability (Columns 3 and 4), value-to-transport cost ratios (Columns 5 and 6), and product similarity (Columns 7 and 8). The regressions do not include any controls. Standard errors are presented in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively.

Table A20: Price impacts of import bans

	Log Price			
	(1)	(2)	(3)	(4)
Ban	0.040***	0.040***	0.058***	0.039***
	(0.007)	(0.007)	(0.008)	(0.007)
Ban*High Evadability		−0.001		
		(0.003)		
Ban*Low Transport Costs			−0.057***	
			(0.013)	
Ban*Similarity Index				0.000***
				(0.000)
Year FE	Yes	Yes	Yes	Yes
Product-State-Area FE	Yes	Yes	Yes	Yes
Tax level dummies	Yes	Yes	Yes	Yes
Observations	300442	294759	289132	285592

Notes: Table shows the results of regressions of the log of consumer prices on import bans and interactions of import bans with proxies for the ease of evasion. Column (1) shows the baseline specification without interactions. Column (2) includes an interaction between ban and evadability. Column (3) includes an interaction between ban and a dummy = 1 if the product is above the median of the distribution of the value to transport costs ratio. Column (4) includes an interaction between ban and a measure of how similar the product is to other HS6 products. CPI data vary at the state-location-product-year level and come from the Nigeria Bureau of Statistics. Standard errors are clustered two ways, by product and by state-location type. ***, **, * indicate significance at the 10%, 5% and 1% significance level respectively.