

The Short-Run Impact of Import Bans on Poverty: The Case of Nigeria (2008–2012)

Andrew Dabalen and Nga Thi Viet Nguyen

Abstract

The Nigerian government uses food import prohibition as part of policies that seeks to protect existing domestic producers and reduce the country's dependence on imports. This paper argues that such policies have negative effects on net consumers of such products due to higher prices. With 70 percent of poor households' budget spent on food, and about 13 percent of the total budget devoted to products subject to import bans, poor households are vulnerable to such trade policies. Prices of some import prohibited food products are found to be higher than what they would be in the absence of such bans. The elimination of import bans is estimated to reduce national poverty rates by as much as 2.6 percentage points.

JEL classification: D120, D310, F140, I320, O12

Since the early 1990s, many African countries have opened up their economies to global trade in response to the lost decade of the 1980s, characterized by extreme trade restrictions, economic crises, and much suffering. The easing of trade barriers has brought many benefits to African populations including wider product diversity, lower prices, and possibly positive net welfare gains. However, trade openness has also brought economic volatility as evidenced by commodity booms and busts. To protect themselves from this volatility, some countries have resorted, on occasion, to import and export bans—an urge which is aided in part by localized shocks that become amplified through trade. In West Africa, the 2005–06 Niger famine, the global food, fuel and financial crises of 2007–09 followed by the Sahel famine of 2010 highlight how households are vulnerable to these trade related shocks. While these events have been largely beyond the control of countries suffering from them, some domestic policies such as bans on imports and other trade restrictions can potentially have adverse effects on the welfare of net consumers, especially those who are already poor.

Between 2008 and 2012, Nigeria imposed import bans on products within five food groups consisting of grains and flour; vegetables, fruits and roots; processed foods; beverages; and animal products (meats,

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seafood, dairy, and eggs).¹ This policy action is not an isolated event. In June 2015, the government decreed anew that imports of additional 41 products are ineligible for foreign exchange. Although the government insisted that these products were not legally banned outright, importers cannot obtain foreign currencies from Nigerian banks, which in practical terms is no different from a ban. While the motivation for such policies is to protect producers against foreign competition², the unintended consequences for consumers ought to be investigated. What shall we expect to observe subsequent to the (unexpected) decision to restrict imports of a given set of products? The theoretical implications will dictate our empirical strategy but will also point toward its potential limitations. In our paper, the main consequence of an import ban on the general population is channeled through the price implications of such trade policy. There are several dimensions to a change in price. In the short run, an increase in price will be a positive shock to the incomes of net producers—via income effect³—while for net consumers a higher price will leave fewer resources for households to spend on other products (the income effect) but will also induce households to shift consumption towards cheaper substitutes (the substitution effect). In the long run, an import ban can also result in the reallocation of labor and capital: domestic farmers may shift their production towards banned products inducing both labor and capital movements across production sectors. For instance, farm laborers working on food crops that will see domestic expansion because of import bans will likely see their wages rise. In this paper, we abstract from the long-term factor (labor, land, and capital) market adjustments induced by changes in trade policies, and investigate what the instantaneous poverty impacts would be if current import bans in Nigeria were to be lifted.

The methodology consists of a three-step analysis. The first stage of the analysis is an evaluation of the impact of import bans on product prices. Over the time period of interest, from January 2008 to December 2012, some products ceased to be banned from imports. While we know the year the product entered or was removed from the list, we do not observe the exact month of these changes in import prohibition regimes. This precludes us from directly assessing the price reaction to exact timing of monthly changes in trade policy. Thus, comparisons will need to be made across countries, that is, comparing Nigeria with other countries; in our case, Ghana and Senegal. The analysis therefore compares price differences across countries between import-banned and nonimport-banned products. This difference-in-differences approach allows us to look at the international to domestic price gaps between banned and nonbanned products. This method thus gives an average impact of an import ban on domestic prices in Nigeria.

The second stage of the empirical strategy simulates consumption patterns in responses to changes in prices induced by a potential elimination of the import bans. We estimate demand systems by using unit values reported by households as proxies for prices and one single cross-section of household consumption data. The first stage provides us with a counterfactual price (what the price of banned product in Nigeria would be if there were no import bans), and the second stage gives us own- and cross-price elasticities, which we can use—in the third and final stage—to derive the compensating variation and hence simulate changes in poverty rates.

Our analysis confirms that some import-prohibited products accounting for a large share of Nigerian household consumption (about 13 percent of the budget of the poor) are indeed significantly more

- 1 <https://www.customs.gov.ng/ProhibitionList/import.php>. See also appendix table A1.
- 2 The government's stated intention to impose import bans is to protect domestic industries to mature, increase employment and to protect foreign reserves. However, there is scant evidence that domestic industries have emerged or employment has increased (Raballand and Mjekiqi 2010). Even though it is too early to evaluate the recent decree to exclude 41 items from accessing foreign exchange, early signs show importers cutting down on activity and shedding workers, just the opposite impact intended. See *Financial Times* (2015).
- 3 Net producers benefit from an increase in prices: a higher price for the same quantity leads to an increase in income (income effect). There are potential benefits from substitution as well if producers shift resources to produce more quantity of the banned product now that the price is higher. For consumers, assuming homothetic preferences, an increase in price will induce substitution to cheaper products, but that depends on the rate at which s/he consumes both goods and elasticity of demand (income effect).

expensive than what they would be in the absence of such bans. The average food price difference for all products ranges from 7 to 36 percent. However, these price differences vary by comparison country and product categories. Prices in Nigeria are higher than those in Ghana for all groups of banned products. But when compared to Senegal, the result is less clear cut. Although the average price gap for all banned products, over the period considered, is 7 percent higher in Nigeria, it is not statistically significant. However, prices are higher and statistically significant in Nigeria than in Senegal for grains and flour and animal products (meats, seafood, dairy, and eggs) but lower for processed foods.⁴ We find that the elimination of import bans will lead to a reduction in national poverty rates of between 2.2 and 2.6 percentage points.⁵ Our estimates also suggest that removal of import bans would lead to 2.9 percentage point reductions in rural poverty. Adjusting for welfare losses for net food producers has a negligible effect on the estimated rates of poverty reduction, even in rural areas.

The rest of this paper is organized as follows: Section I reviews the literature on product prices and poverty. Section II presents the data used in the analysis. Section III describes the empirical methodology. Results are discussed in section IV, and section V concludes.

I. Review of the Literature

The recent food price crises have triggered renewed interest in understanding the implications of increased commodity prices on poverty. The effect is empirically ambiguous because the poor can be net producers or net consumers of food. [Ivanic and Martin \(2008\)](#) find that on average higher food prices hurt the poor. Their study covers a large number of countries, but needs to assume a 100 percent pass-through between international and domestic prices, that is, no gap between global prices and the prices that the poor would pay domestically. [Brambilla and Porto \(2009\)](#), however, argue that such an assumption might not be empirically relevant. Case studies focusing on single countries are also numerous. [Friedman and Levinsohn \(2002\)](#) look at the poverty implications of the devaluation of the Indonesian rupiah subsequent to the 1997 Asian crisis, while [Gibson and Kim \(2013\)](#) analyze the impact of rice price changes in Vietnam. [Ferreira et al. \(2013\)](#) investigate the distributional implications of higher food prices in Brazil and find large heterogeneity of impact along the income distribution. [Robles and Torero \(2010\)](#) assess the impact of the global food crisis of 2007–08 on four selected Latin American countries and find a somewhat larger effect in urban compared to rural areas. [Wood et al. \(2012\)](#) evaluate the welfare impact of an increase in food prices while taking into account households' ability to substitute for cheaper products. Finally, closest to our study is [Treichel et al. \(2012\)](#) who look at the same question, that is, the effect of import bans on poverty in Nigeria. However, our study differs both in methodology and data used. In their study, the price data used are limited in the number of commodities and time coverage.

Beyond the issue of measuring the effect of an import ban on domestic prices, our paper shares with the other studies the challenge of addressing household and market adaptations to price changes. As mentioned earlier, several margins of adaptation might affect the impact evaluation of import bans on poverty. First, import bans have a direct income effect as they may increase sales for net producers of banned products and consequently wages of workers in sectors with banned products. Second, the poverty implications of higher prices will also depend on households' ability to substitute away towards cheaper commodities, which itself depends on availability of such products and households' preferences. Some of the papers in the literature have tried to deal with these issues. [Deaton \(1988, 1990\)](#) and [Friedman and Levinsohn \(2002\)](#) and [McKelvey \(2011\)](#) take into account households' substitutions

- 4 The latter product group, especially the palm and vegetable oils, are sectors that are considered to be dominated by monopolies in Senegal ([Mbaye et al. 2015](#)).
- 5 However, compared to Dakar prices poverty rates remain unchanged in the absence of import bans. This is because, as discussed above, overall average price difference between Dakar and Nigerian cities are not statistically significant.

towards lower quality goods when prices increase. [Ferreira et al. \(2013\)](#) on the other hand consider the production or general equilibrium effects of trade shocks transmitted through labor markets.

II. The Data

To evaluate the impact of import bans on product prices in Nigeria, we use price data from the Nigerian National Bureau of Statistics (NBS), which contains monthly price observations for urban areas of 36 states and the Federal Capital Territory (FCT), Abuja, over the period January 2008 to December 2012. State price data will henceforth be used as proxies for city-level prices in subsequent analyses. There are approximately 230 individual food products with observed prices in the data. However, the number of products observed varies by state, which probably reflects consumption heterogeneity across the country in addition to data availability. For instance, Adamawa state has 240 food products in 2010 while Jigawa state has only 175 products in the same year.

As counterfactual prices, we take price data from Senegal's Agence Nationale de la Statistique Démographique (ANSD), which contain monthly price observations for 131 food products for Dakar from January 2008 to October 2012. We also have price data from Ghana's Statistical Service, which provide monthly price observations for 88 food products from the cities of Accra and Tamale, and 83 food products from the city of Kumasi from January 2008 to December 2012. In order to calculate the price differences across countries, we identify and match the same food products and their prices in each pair of countries (Nigeria and Senegal, and Nigeria and Ghana). When levels of disaggregation differ from one country to another, we aggregate prices up by taking simple averages within the relevant food products. For example, while Nigerian data provides prices of both yellow and white corn, there is only one corn price in Senegal and Ghana price data. The price of "corn" in Nigeria therefore is the average of yellow and white corn prices. Overall, there are about 65 food products that appear in both Senegal and Nigeria price data. This number is 64 for Ghana and Nigeria price data ([table 1](#)).⁶ To account for the differences in prices across countries, we convert local currencies (Nigerian naira, Ghana cedis, and Senegal CFA franc) into international dollars at purchasing power parity.

We first attempt to estimate the hypothetical prices of import-banned products in the absence of import prohibitions. We start with the officially published import prohibition list in 2012 from the Nigeria Custom Service (NCS). However, the list of prohibited products may vary on a monthly basis. Therefore, to determine whether a given product was prohibited in a given year of interest, we looked at available reports and newspaper in that year. [Table A1](#) in the appendix provides more details of the annual import prohibition lists and our sources. It is important to note that while a particular prohibition list only reflects Nigeria's trade policy at the time a report or newspaper article is published, we consider that observation as valid for the entire year. [Table 1](#) shows the number of Nigeria's prohibited and nonprohibited food products, matched to Ghana's and Senegal's products, for which price data are available.

To estimate the poverty impacts of import bans, we use household level data on consumption from the panel component of the General Household Survey (GHS) of 2010–2011 (henceforth GHS 2011) conducted by the Nigerian NBS. The survey visits households twice in 12 months: the first visit was done during the pre-planting season, while the second was carried out during the post-harvest season. This biannual survey is the first round of a long-term project to collect panel data on households, their characteristics, welfare, and their agricultural activities. The GHS 2011 was designed to cover 5,000 households from all the 36 states and the FCT of Abuja. However, for our analysis, we use 4,825 households which had complete data. It contains detailed consumption data on a total of 90 food and 82

6 The list rises to at least 86 when all three countries are used because such a list includes the products common to Nigeria-Ghana-Senegal, but also those that are uniquely Nigeria-Ghana and uniquely Nigeria-Senegal.

Table 1. Number of Matched Prohibited and Nonprohibited Food Products in Price Data Sets

Country pairs	Year	No. of prohibited food items	No. of non-prohibited food items	Total
Nigeria - Senegal	2008	29	36	65
	2009	12	53	65
	2010	12	53	65
	2011	11	55	66
	2012	10	40	50
Nigeria - Ghana	2008	26	38	64
	2009	15	49	64
	2010	14	50	64
	2011	14	51	65
	2012	11	51	62
Nigeria-Senegal-Ghana	2008	39	55	94
	2009	18	76	94
	2010	17	74	93
	2011	17	29	96
	2012	14	68	86

Source: Authors' analysis based on data from National Bureau of Statistics (Nigeria, Senegal, and Ghana).

nonfood products. It also records sources of food consumption that are either from the households' own production, purchases in the market, or gifts. If food consumption comes from households' own production or gifts, the GHS 2011 imputes a value based on prevailing market prices. Because households were visited twice, we take the average consumption of pre-planting and post-harvest visits when we estimate elasticities and poverty impacts. We take this average to smooth out sensitivity of consumption to season of fieldwork. Failure to correct for the seasonality has been shown to influence consumption and poverty rates (Jolliffe and Serajuddin 2015). Furthermore, using both visits allows to capture a more complete impact of import bans on households. For example, if a banned product was reported consumed in one visit and not the other, using only data from the visit when it was not consumed will give an incorrect impact on such a household. An important caveat on capturing impact of import bans is that because GHS collects consumption and production data mostly from small to medium size family farms, we are unable to capture the impact of trade barriers on the profits of large commercial (i.e., nonfamily) farms when estimating welfare impacts, because they do not show up in the data.

It is important to note that GHS 2011 does not contain information on prices. However, the data allow the computation of unit values, which are defined as the amount of expenditure for a particular good divided by quantity consumed. As a result, while households may face identical prices, they may have different unit values due to variations in quality of the good consumed. For instance, while it is likely that all households in the same local government area face the same prices for, say, local rice, the unit values recorded by households that bought high-quality local rice will be higher than the ones recorded by household that bought low-quality local rice. Hence, the difference in unit values may also reflect the difference in quality of a particular good. Our empirical strategy controls for quality variation and obtain pure price effect, by using the model proposed by Deaton (1988).

Table 2 summarizes some basic descriptive statistics of GHS 2011 data, where we match food items consumed by households with those in the prohibition list for 2011 (see appendix table A1). As expected, poor households in urban and rural areas devote more of their budget to food than nonpoor households in the same areas. Prohibited products absorb between 11 and 15 percent of budget share and the data shows within the same location (rural or urban) the poor and nonpoor devote similar shares of the budget to these products. Among the prohibited products, higher consumption shares go to palm oil, beef, and groundnut oil.

Table 2. Summary Statistics of Households' Budget Shares from GHS 2011 (as Share of Total Household Budget)

	National		Rural		Urban	
	Poor	Nonpoor	Poor	Nonpoor	Poor	Nonpoor
Food share	0.690	0.582	0.722	0.654	0.575	0.515
Prohibited items	0.135	0.137	0.141	0.145	0.112	0.129
Processed food						
Palm oil	0.045	0.032	0.047	0.039	0.039	0.026
Groundnut oil	0.022	0.015	0.023	0.016	0.017	0.014
Other oil	0.002	0.002	0.002	0.002	0.001	0.002
Protein						
Chicken	0.010	0.013	0.012	0.015	0.003	0.011
Duck	0.001	0.001	0.001	0.001	0.000	0.001
Other poultry	0.000	0.000	0.000	0.000	0.000	0.000
Eggs (other birds)	0.001	0.005	0.001	0.003	0.002	0.007
Eggs (chicken)	0.000	0.001	0.000	0.001	0.000	0.000
Beef	0.043	0.045	0.045	0.044	0.038	0.046
Pork	0.002	0.001	0.002	0.002	0.001	0.000
Beverage						
Water	0.001	0.004	0.001	0.003	0.003	0.005
Malt	0.001	0.006	0.001	0.005	0.002	0.006
Soft drink	0.002	0.006	0.002	0.006	0.004	0.006
Fruit juice	0.000	0.001	0.000	0.001	0.000	0.001
Nonalcol drink (oth.)	0.000	0.000	0.000	0.001	0.000	0.000
Beer	0.002	0.005	0.002	0.006	0.001	0.005
Nonfood share	0.310	0.418	0.278	0.346	0.425	0.485

Source: Authors' calculation using General Household Survey data.

III. Empirical Methodology

To assess the impact of an import ban on poverty in Nigeria, we proceed in three steps. First, we estimate the price effect of an import ban by comparing sectors and markets depending on how they are affected by a trade restriction. Second, we estimate how households adjust their consumption patterns in response to changes in prices induced by a potential elimination of the import ban. Third and finally, we derive the poverty implication of such ban.

Import Bans and Domestic Prices

It is well recognized that domestic prices differ significantly from international prices for a host of reasons that go beyond trade policy. For instance, transportation costs and border effects (e.g., domestic market structure, regulations, etc.) are often invoked as a source of the discrepancy between world and domestic prices. To isolate the role of trade policy, the key issue becomes finding the appropriate counterfactual price for a product that is subject to an import restriction. Tracking prices over time within a country under different trade regimes would require data that is unfortunately unavailable. An alternative way to identify the impact of trade restrictions is to compare prices within sectors and across countries. A cross-country analysis that would compare prices of the same product between two countries ("control" countries would be those without any trade restrictions) would need to assume that border effects are negligible across countries. In fact, the observed difference in the price of a homogeneous product in a country with an import ban and another without is the sum of both trade policy (say, import restrictions) and border effects. Thus, one needs to assume away border effects so that the price differences capture trade policy alone.

The difference-in-differences approach adopted here instead allows border effects to vary across sectors. Nonetheless our identification strategy assumes border effects to remain identical across all products within each sector and to enter additively in the price equation. A difference-in-differences strategy that consists of comparing the price of banned and nonbanned products within each sector and across countries with and without an import ban in effect would therefore account for both sectoral and cross-country unobserved heterogeneity (including the aforementioned border effects). More precisely, the empirical investigation will consist of comparing prices between products within each food category and across cities in Nigeria (e.g., Lagos, Abuja) with prices in other West African cities (Dakar in Senegal; Accra, Tamale, and Kumasi in Ghana). Because in our sample import bans are in effect in Nigeria only, prices in Senegal or Ghana capture the world price, up to an unobserved city-specific price gap. However, the price difference between two products nets out such city-specific constant: we can thus compute the difference in prices between cities where the ban is in effect and cities where it is not (first difference)⁷ and differentiate further between banned and nonbanned products (second difference).⁸

Under the assumptions made above, the adopted difference-in-differences framework will thus identify the impact of an import ban on product prices.⁹ The double difference is estimated as follows:

$$\ln P_{ij}^{cmy} = \alpha + \beta_j \text{Ban}_{ij}^{my} * N^c + \gamma_j \text{Ban}_{ij}^{my} + \delta_j N^c + \eta^c + \theta^y + \mu^m + \lambda_i + u_i^{cmy}, \tag{1}$$

where P_{ij}^{cmy} is the price in city c of product i in group j in month m and year y , Ban_{ij}^{my} is a dummy variable taking value 1 if product i in group j is prohibited in month m and year y , and zero otherwise; N^c is a dummy variable taking value 1 if city c is in Nigeria and zero otherwise. η^c , θ^y , μ^m , and λ_i are sets of city, year, month, and product fixed effects, respectively. The coefficient of interest β_j measures the average impact of an import ban – in percentage terms—on prices of the banned products in group j in Nigeria.¹⁰ Although we observe monthly variation of product prices, the variation on whether a product is banned or not is observed at the year level. Therefore, in equation (1) we cluster the estimation at the year level.

Consumption Patterns of Households

Having estimated the price differences, we turn to how households would adjust their consumption patterns in response to a change in prices following elimination of an import ban. A time series of consumption data together with product level price data at the time of the household consumption survey would have allowed us to estimate changes in demand due to product price changes. But because such data are not available, we estimate the demand system by using unit values as price proxies and one single cross-section of household information (see Deaton 1988, 1990, 1997). We start with demand and unit value function:

$$w_{ibc} = \alpha^0 + \beta^0 \ln C_{bc} + \gamma^0 z_{bc} + \epsilon_p \ln \pi_{ibc} + f_c + u_{bc}^0. \tag{2}$$

- 7 The first difference is the difference in prices of banned product b between country x with import ban policy and country y without such policy, decomposed as $\Delta P_b^{xy} = \text{Border}_b^{xy} + \text{TradePolicy}^x$. Similarly, the difference in prices of non-banned product nb between country x and country y can also be decomposed as $\Delta P_{nb}^{xy} = \text{Border}_{nb}^{xy}$.
- 8 If we assume the border effects are identical between banned and nonbanned products within each food group ($\text{Border}_b^{xy} = \text{Border}_{nb}^{xy}$), the second difference therefore nets out border effects and captures the impact of trade policy only: $\Delta P_b^{xy} - \Delta P_{nb}^{xy} = \text{TradePolicy}^x$.
- 9 This also implicitly requires assuming that the choice of which imported product to ban is not driven by considerations (e.g., political or religious) that in turn affect a domestic-international price gap.
- 10 Note that in this section we are estimating 6 DiD regressions, one each for 5 sub-samples corresponding to 5 food groups that have some products that are subject to import bans—grains and flour, beverages (alcoholic and nonalcoholic), animal products (meats, fish, dairy, and eggs), processed food products, fruits, vegetables and tubers—and a sixth DiD which is estimated for the full sample (all food products).

$$\ln w_{ibc} = \alpha^1 + \beta^1 \ln C_{bc} + \gamma^1 z_{bc} + \psi \ln \pi_{ibc} + u_{ibc}^1 \tag{3}$$

where w_{ibc} is the share of food product i in total consumption for household h living in cluster or local government area c , C_{bc} is total household consumption, z_{bc} is household demographic characteristics, π_{ibc} is the unobserved price of the food product i , and f_c is a cluster fixed effect. The coefficient of interest is ϵ_p , the price elasticity of product i . Although this function shows only the estimation of own-price elasticities, cross-price effects could also be added (see Deaton 1987) and are indeed included in our empirical results in section IV.

Because price π_{ibc} is unobserved, it is impossible to estimate the price elasticities ϵ_p and the relationship ψ between price and unit values. However, the ratio of $\psi^{-1}\epsilon_p$ can be estimated by first using (3) to write the logarithm of price, $\ln \pi_{ibc}$, in terms of the logarithm of unit value, $\ln w_{ibc}$, the logarithm of total expenditure, $\ln C_{bc}$, plus various error terms and then substituting the result into (2). This will produce a linear relationship between the budget share, w_{ibc} , the logarithm of unit value, $\ln w_{ibc}$, and the logarithm of total expenditure, $\ln C_{bc}$, plus various error terms. The coefficient on the logarithm of unit value in this equation is $\psi^{-1}\epsilon_p$.

If we write $\phi = \psi^{-1}\epsilon_p$, our variable of interest, the price elasticity ϵ_p , can stated as:¹¹

$$\epsilon_p = \frac{\phi}{1 - \phi\beta^1/\beta^0} \text{ where } \phi = \psi^{-1}\epsilon_p \tag{4}$$

We estimate this demand system for the food products consumed by households as reported in the GHS. Because unit values are available only for food products, we estimate elasticities only for food products, and obtain a full range of own- and cross-price elasticities at the product level.

Poverty Impacts

The third and final step of the analysis consists of evaluating the impact of a change in price on household welfare by estimating the compensating variation. We ask ourselves the following question: because the removal of import bans will translate into lower prices and higher utility (money-metric), how much can we take away from households’ income so that they are indifferent between facing lower prices with such lower income and facing higher prices with their original income? We start with a minimum expenditure function $C(u,p)$ which gives the minimum cost needed to obtain utility level u at price p . In first order approximation, we have:

$$\Delta \ln C_b \approx \sum_{i=1}^n w_b^i \Delta \ln P_b^i \tag{5}$$

where C_b is total consumption of household b , w_b^i is budget share of product i , and P_b^i is the price of product i . However, equation (5) does not take into account household’s substitution behavior, which means a household can consume less of the substitute products and more of the complementary product i whose prices drop in the absence of an import ban. We therefore introduce the second-order approximation (see Friedman and Levinsohn 2002):

$$\Delta \ln C_b \approx \sum_{i=1}^n w_b^i \Delta \ln P_b^i + \frac{1}{2} \sum_{j=1}^n \sum_{i=1}^n w_b^i \epsilon_{ji} \Delta \ln P_b^j \Delta \ln P_b^i \tag{6}$$

where ϵ_{ji} is the cross-price elasticities of products i and j .

One important issue has to do with the impact of the changes in prices on household welfare for net food producers because they would also experience decreased income. To properly identify net food producers, we need households’ income information, which is not available at this stage. We partially

11 We refer readers to Deaton (1988, 1997) for step-by-step explanation and detailed discussion.

address the income effect for net producers by treating the value of own-produced food as a negative expenditure (see Friedman and Levinsohn 2002). Equation (6) is then revised as follows:

$$\Delta \ln C_b \approx \sum_{i=1}^n w_{nb}^i \Delta \ln P_b^i + \frac{1}{2} \sum_{j=1}^n \sum_{i=1}^n w_{nb}^j \epsilon_{ji} \Delta \ln P_b^j \Delta \ln P_b^i - \sum_{i=1}^n w_{sb}^i \Delta \ln P_b^i - \frac{1}{2} \sum_{j=1}^n \sum_{i=1}^n w_{sb}^j \epsilon_{ji} \Delta \ln P_b^j \Delta \ln P_b^i \quad (7)$$

where w_{nb}^i is the budget share from non-own-produced food product i in household b , and w_{sb}^i is the budget share from own-produced food product. Because changes in prices $\Delta \ln P_b^j$ and $\Delta \ln P_b^i$ are derived from equation (1), and cross-price elasticities, ϵ_{ji} , is estimated in equation (4), we can compute the compensating variation specified in equation 7. This adjustment allows us to obtain the post-ban welfare for each household, which, with an appropriate poverty line can be used to compute the poverty status of households. We use the international poverty line of \$1.25 a day measured at 2005 purchasing power parity (PPP) for two reasons. First, because we are mostly interested in changes relative to a baseline, the international poverty line, a well-established and widely used measure of global living standards, serves our purpose. Second, Nigeria's official national poverty line is obtained from a different survey that is not comparable to the GHS, and simply applying it to GHS data can be controversial and inapplicable. To calculate the welfare changes from GHS data, we use spatially adjusted household consumption to account for differences in cost of living between rural and urban and between Nigeria's geopolitical zones.

IV. Results

We first report the impacts of Nigeria's import bans on prices, and then illustrate how consumers respond to such changes in prices by showing the results of own- and cross-price elasticities using GHS 2011 data. Finally, we present the implication of Nigeria's import bans for poverty.

Price Impacts of an Import Ban

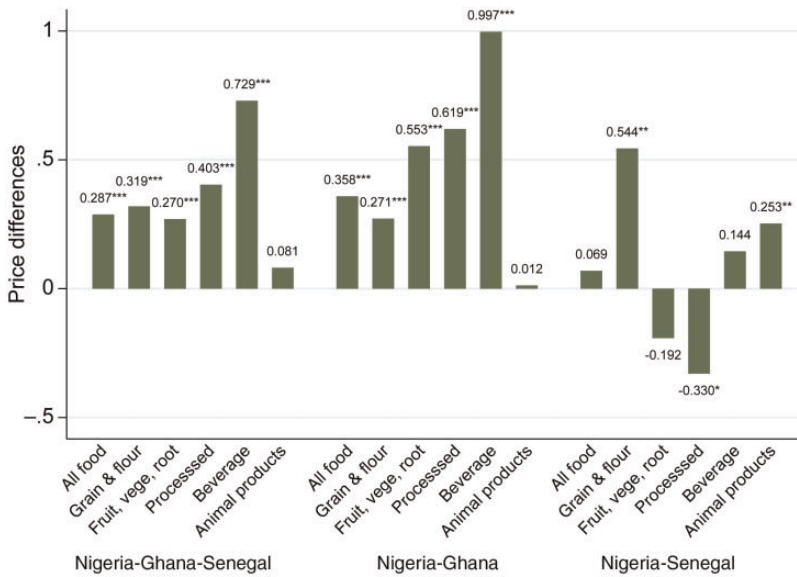
The data we use allow us to observe price differences in urban areas only. To apply the estimated price differences to rural areas, we make the implicit assumption that the urban-rural price gap is identical across products and most importantly not correlated with banned versus nonbanned status. We consider price differences between food products within each of the five broad food groups, namely, grains and flour, processed food, animal products (meat, fish, dairy, eggs), vegetable, fruits, and roots, and beverages (alcoholic and nonalcoholic), plus the full sample. As explained in section III, we allow border effects to vary across different food groups, but remain identical between banned and nonbanned products within each group.

Overall, import-banned food products are significantly more expensive in Nigeria than Ghana and Senegal. The average difference in prices of banned products over the period considered was 29 percent (Nigeria-Ghana-Senegal comparison) ranging from 7 (Nigeria-Senegal comparison) to 36 percent (Nigeria-Ghana comparison). However, the average price gap for banned products between Nigeria and Senegal is not statistically significant. Note that the estimated parameters capture the *de facto* effect of import bans. The prices used in our analysis are market prices, which means they incorporate the effect of trade policies (import bans), their imperfect enforcement, and potential smuggling. That said, poor enforcement and smuggling of banned products and potential existence of either high tariffs or quotas on nonbanned products, are all likely to lower the true price gap between banned and nonbanned products—that is, they lead to a downward bias. Therefore, our estimated price gaps should be considered lower bounds.

When aggregated into food groups, beverages and processed foods stand out as the two groups with larger price differences between Nigeria and benchmark countries (Nigeria-Ghana-Senegal and Nigeria-

Ghana comparison). Nigerian consumers pay twice as much (100 percent higher price) for banned beverages compared to consumers in Ghana. They also pay 62 percent more for processed banned foods than those in Ghana. When comparing to Senegalese consumers, Nigerian consumers pay 54 percent more for banned grains and flour. However, they pay 33 percent less, on average, for banned processed foods than their Senegalese counterparts (fig. 1). Furthermore, differences in banned product prices between Nigeria and Senegal, unlike those between Nigeria and Ghana are smaller and not always positive.

Figure 1. Impact of Import Bans on Food Prices



Source: Authors' analysis based on data from National Bureau of Statistics (Nigeria, Senegal, and Ghana).

There are two possible reasons for this. One could be that because of historical trading ties, the source of imported products and prices between Nigeria and Senegal evolve differently—for example, cocoa butter in Senegal may be from a different (say higher cost) source country than for Nigeria and Ghana. A second possibility is that because Nigeria prices are from cities spatially dispersed across the entire country, while Ghana and Senegal prices are from mostly coastal cities, the differences in prices could be due to different spatial samples. As a sensitivity check we estimate price differences between coastal Nigeria and coastal Ghana (Accra) and Senegal (Dakar); between Nigerian big cities (Lagos on the coast, Abuja in the middle, and Kano in the north), Ghana big cities (Accra on the coast, Kumasi in the middle, and Tamale in the north), and Senegal (Dakar); and between the largest cities only (Lagos in Nigeria, Accra in Ghana, and Dakar in Senegal). In any of these three cases, we find that the pattern of prices does not alter the overall conclusion. Nigerian consumers pay higher prices for banned products than consumers in Ghana and Senegal (see detailed regression results reported in [appendix tables A3–A4](#)). Our results are therefore robust to spatial samples.¹² In the rest of the analysis we present results using price differences across all cities (i.e., Nigeria-Ghana-Senegal comparison).

12 Nigeria is a big producer of many import-banned products. Although it has lost its status as the world's largest producer of palm oil, it remains the world's third largest producer (Ayodele 2010), and it is among the largest poultry producers in Africa (Sahel Newsletter 2015). Because the production of some of the banned products (e.g., animal products—beef, poultry) is being done mostly in inland areas, it is unclear that there is significant variation in prices of such products between coastal and inland cities.

Own- and Cross-Price Elasticities

To account for behavioral responses of households to price changes, own- and cross-price elasticities were estimated by the spatial variation of consumption choices and unit values in the GHS 2011 data using the method mentioned in section III. Because household consumption and prices observed in the GHS 2011 form a single snapshot, price elasticities derived from this data set reflect households' consumption patterns over the limited time span of the interview recall period only, and it may already include households' short-term response to high prices as the result of import bans. Ideally, we want to observe how these consumption patterns changed over time, especially starting with patterns before the import bans took place. However, given data limitation, we need to assume price elasticities remain unchanged over time.

We compute own- and cross-price elasticities for the full set of products reported in the household survey. However, note that our main focus is on products whose price changes are likely to have an impact on household welfare. This narrows the list to the banned products whose own- and cross-price elasticities are shown in [table 3](#).¹³ The estimated elasticities appear consistent with prior expectations. Own-price elasticities are negative for all products. The cross-price elasticities are smaller in magnitude than the own-price elasticities and vary in sign depending on whether products are substitutes or complements.

Poverty Impacts

We use the product specific elasticities and the estimated impact of bans on prices computed above to derive the compensating variation¹⁴ for each household; in other words, we determine the additional consumption, as a proportion of initial household consumption, which a household should receive in order to make it indifferent between its situation before and after the price change.¹⁵ Given the heterogeneity of household consumption decisions, income levels, and locations (whether urban or rural), we expect a large variation in measured impacts of import bans on consumption. We focus on the size of the compensating variations across the consumption distribution to understand the impact of an import ban on poverty.

This distribution of compensating variation, depicted by the locally weighted nonparametric regression lines, and by urban and rural, is captured in [fig. 2](#) (a–c). We also include the poverty line for reference. Two results stand out, except for Nigeria-Senegal comparison. First, the curve for urban households is above (closer to the horizontal line at zero) the rural curve, which suggests that rural households gain more than urban households uniformly along the distribution. [Table 2](#) shows that, overall, rural households allocated higher share of the total budget on prohibited food products, especially palm oil and chicken, than their urban counterparts, therefore profit more from price decrease.

Second, the curves are slightly but significantly sloping downward ([appendix table A5](#)), which means that better off households gain a little bit more than poorer ones (those to the left of the poverty line). While this gap narrows after partial adjustment for welfare losses for net food producers, or “net compensating variation” in short¹⁶, the negative slope remains ([fig. 2](#), d–f and [appendix table A5](#)). The slope is a bit more pronounced in urban than in rural areas. This is because, as presented in [table 2](#), richer households in urban areas, devote slightly higher shares of their consumption to these banned products than the urban poor. In addition, we find that in the GHS the share of own production in household

13 The full set of own and cross price elasticities is available from the authors upon request.

14 See [equation \(6\)](#). The compensating variation is the distance between the curve and the horizontal line at 0.

15 Because the removal of import bans leads to a price reduction, the compensating variation here is measured as the amount that need to be taken away from households to bring them to the level of utility they enjoyed before any change in prices.

16 See [equation \(7\)](#).

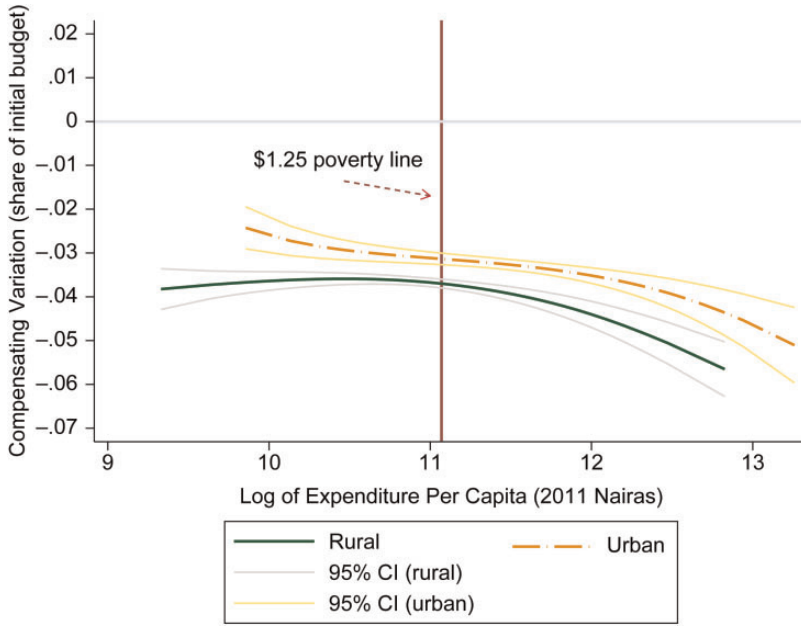
Table 3. Estimated Own- and Cross-Price Elasticities for Prohibited Products from GHS 2011

	Palm oil	Ground oil	Other veg. oil	Chicken	Duck	Other poultry	Beef	Pork	Eggs (chicken)	Eggs (oth.)	Water	Malt	Soft drink	Juice	Oth. non-alcol	Beer
Processed food	-1.116	0.041	0.013	-0.030	-0.054	-0.099	-0.073	0.048	-0.003	-0.026	-0.019	0.029	0.039	0.040	-0.088	0.011
Groundnut oil	0.160	-1.235	0.060	0.172	0.017	-0.074	0.013	0.029	-0.050	0.084	-0.082	0.027	0.069	-0.063	0.128	0.020
Other veg. oil	-0.644	0.305	-1.277	-0.072	-0.066	-0.058	0.144	0.234	-0.232	-0.040	0.115	-0.054	-0.105	-0.106	-0.342	-0.035
Animal products	0.162	0.129	0.020	-1.400	0.253	0.014	0.171	-0.115	0.003	0.078	0.043	-0.038	-0.029	0.084	0.205	-0.053
Duck	-0.009	0.073	0.654	-0.167	-0.955	-0.198	0.403	0.370	-0.705	-0.292	-0.012	-0.028	-0.331	-0.120	0.009	0.042
Other poultry	-0.172	-0.249	0.238	-0.407	0.450	-0.448	0.242	0.001	-0.032	-0.060	0.199	-0.207	-0.083	0.135	-0.275	0.044
Beef	-0.078	-0.048	0.052	-0.004	0.101	-0.013	-1.244	0.009	0.031	0.035	-0.004	-0.039	0.034	-0.046	0.153	-0.003
Pork	-0.008	-0.106	0.195	0.056	0.166	-0.712	0.050	-0.477	-0.079	-0.043	0.046	0.098	-0.051	-0.255	0.538	0.015
Egg (chicken)	-0.090	-0.118	-0.116	-0.097	0.095	0.004	0.301	0.029	-1.252	0.173	0.082	0.038	-0.026	0.088	-0.278	0.001
Egg (other birds)	0.200	-0.035	0.129	0.106	-0.007	0.055	0.084	0.119	-0.029	-1.088	0.027	-0.050	0.044	0.168	-0.140	-0.003
Beverage	-0.109	0.024	-0.064	-0.072	-0.108	0.131	0.057	0.068	-0.043	-0.001	-0.714	0.024	-0.015	0.052	-0.037	-0.015
Water	-0.119	-0.083	-0.098	0.152	-0.169	0.185	-0.027	0.011	-0.043	-0.081	0.109	-1.040	-0.034	0.116	-0.372	-0.001
Milk	-0.144	-0.063	-0.119	0.024	-0.030	0.027	-0.010	0.089	0.020	-0.098	0.053	0.004	-0.892	-0.050	-0.134	-0.043
Soft drink	0.079	-0.034	0.083	0.198	-0.261	0.025	0.128	-0.180	-0.020	0.112	0.093	0.067	0.003	-0.985	-0.172	-0.010
Fruit juice	1.091	-0.085	0.094	-0.328	-0.750	0.388	0.783	0.088	-0.675	-0.154	0.117	0.314	-0.431	0.460	-2.295	0.074
Oth. non-alcol	-0.033	-0.068	-0.003	-0.025	-0.121	0.184	0.086	0.000	-0.082	-0.068	0.022	-0.005	-0.056	0.029	-0.321	-0.638
Beer																

Sources: Authors' analysis based on data from National Bureau of Statistics (Nigeria, Senegal, and Ghana).

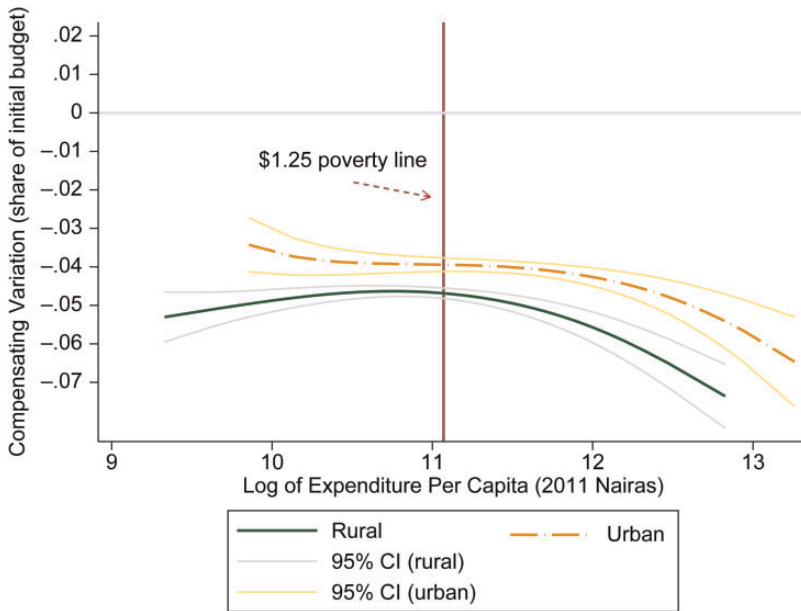
Figure 2. Compensating Variations (as percentage of household's initial consumption)

Figure 2a. Compensating Variation Nigeria-Senegal-Ghana



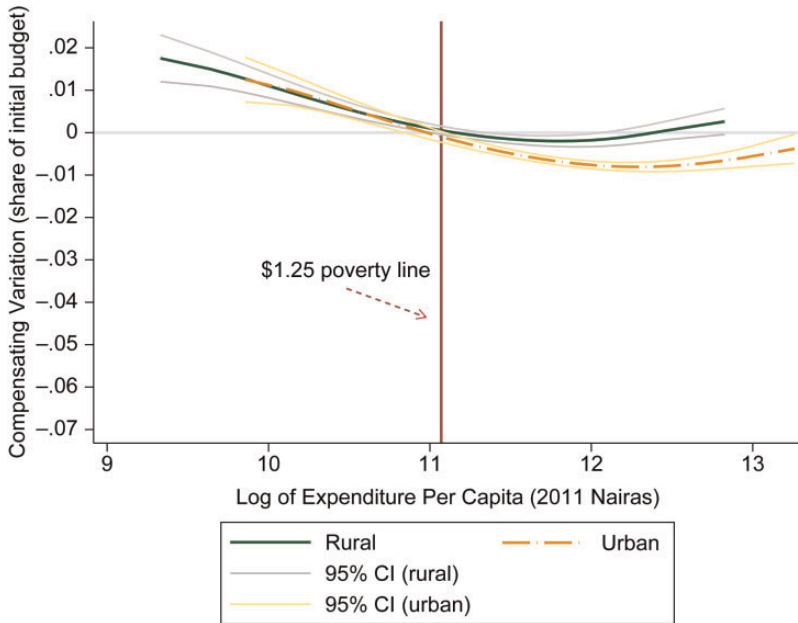
Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 2b. Compensating Variation Nigeria-Ghana



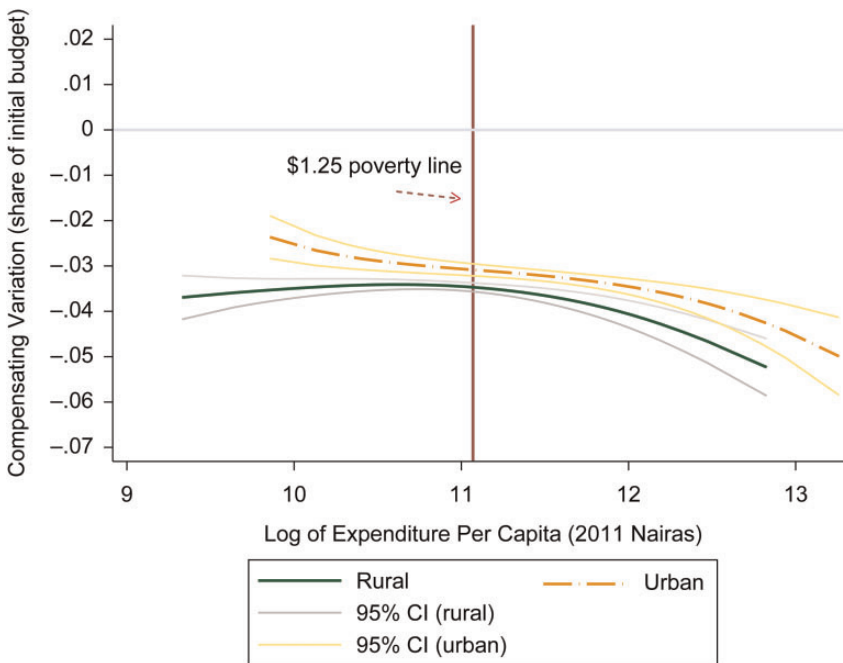
Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 2c. Compensating Variation Nigeria-Senegal



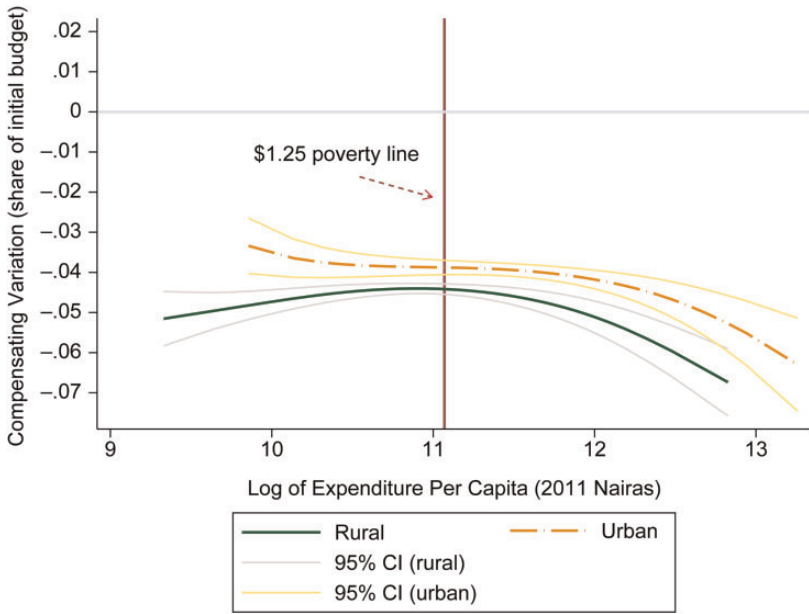
Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 2d. Net Compensating Variation Nigeria-Senegal-Ghana



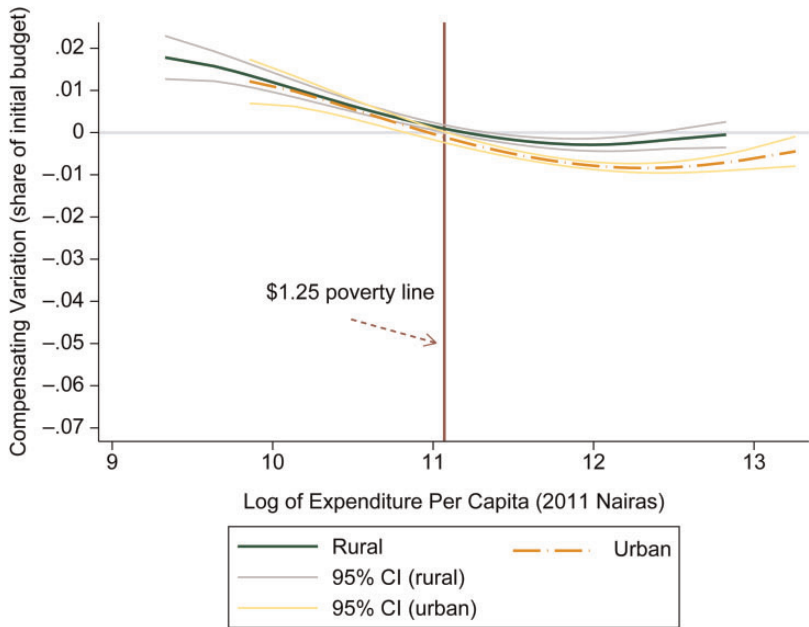
Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 2e. Net Compensating Variation Nigeria-Ghana

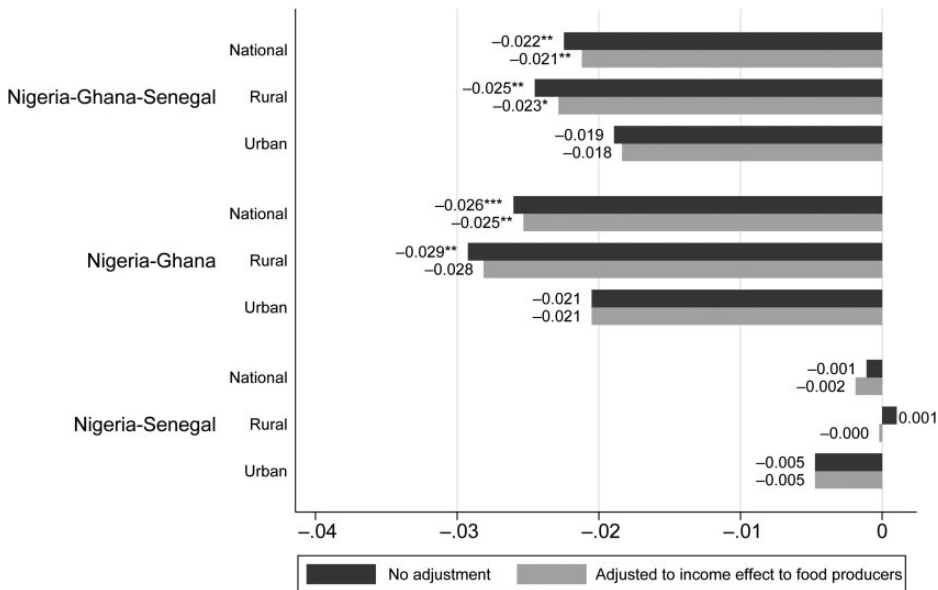


Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 2f. Net Compensating Variation Nigeria-Senegal



Source: Authors' analysis based on data from the General Household Survey 2011.

Figure 3. Imputed Changes in Poverty Rates (Percentage Points)

Source: Authors' analysis based on data from National Bureau of Statistics and General Household Survey.

consumption and the number of households engaged in own production is relatively small (appendix table A2). The observation that those at the very top of the consumption distribution gain a bit more may suggest an increase in inequality. However, empirical results show that the overall Gini index does not change.

When the comparison is between Nigeria and only Senegal, the difference between rural and urban vanishes, and the downward sloping nature of the curves is a bit more pronounced. The compensating variation is positive for the very poor—indicating that they are worse off with the elimination of the ban. This can be explained by the fact that 7 percent of the household budget of the poor in Nigeria, compared to 5 percent for the nonpoor, is spent on prohibited processed products whose prices are lower than Senegal's even with import ban regime in place (see table 2). The implication of the difference-in-difference results would mean that prices of prohibited processed products faced by the net consumers in Nigeria would increase, and this would hurt the very poor more.¹⁷

Table A6 in the appendix reports summary mean values of compensating variations and net compensating variations by decile of household consumption and illustrate the same story. First, households in rural areas gain more—compensating variation as a share of their initial consumption—than urban areas, with the exception of Nigeria-Senegal comparison. The impacts on rural household utility of the price changes induced by removal of the import bans is equivalent to an average drop of the order of 3.6 to 4.6 percent (Nigeria-Ghana-Senegal comparison) of their initial consumption values. These figures are slightly lower for urban households, somewhere between 2.9 and 4.1 percent. Second, in both rural and urban areas, more so in rural areas, the top decile benefits more from the elimination of the import ban. The gain for the bottom four deciles in rural areas is around 3.6 percent of initial consumption but 4.6 percent for the top decile. In urban areas, the bottom four deciles receive 3.0 percent of initial

17 However, welfare changes for those around the poverty line are not statistically different from 0, suggesting insignificant changes in poverty levels.

consumption while the top decile receives 4.1 percent. Third, these findings do not change much even after compensating for income losses to net producers, because as we had seen before (appendix table A2), the share of consumption from own production is very small in both urban and rural areas.

As shown in fig. 3, the elimination of import bans improves welfare: we observe that national poverty rate in Nigeria would decline by 2.2 to 2.6 percentage points (Nigeria-Ghana-Senegal and Nigeria-Ghana comparisons), and it is statistically significant. While rural poverty drops significantly by up to 2.9 percentage points, urban poverty decreases by 2.1 percentage points, but it is not statistically significant. These results do not change when we take into account the adverse effect of price change on net food producers.

V. Conclusion

Nigeria has used restrictive trade policy such as import bans with the stated aims of protecting existing domestic infant industries, spur new domestic production in some cases, increase employment and reduce its import bill. During the period of our study (2008–2012), products that make up about 13 percent of household budgets were subject to import bans. A June 2015 government decree that excludes certain products' eligibility for foreign exchange for purposes of importing would lead to an expansion of this list. This paper looks at the unintended consequences of such a policy stand on net consumers of products subject to import bans. In particular, it evaluates the impact on prices of banned products and welfare of households who are net consumers.

Our analysis finds that the prices of products that were subject to import prohibition between 2008 and 2012 were on average 29 percent higher in Nigeria than Ghana and Senegal. We also show that the elimination of import bans would result in welfare gains for the population. The magnitude of the estimates differ by the country or countries used as benchmarks. On average national poverty, measured as those living below the international poverty line of \$1.25, could be lower by 2.6 percentage points, if Ghana is used as the benchmark country. Our estimates also suggest that removal of import bans would lead to 2.9 percentage point reductions in rural poverty.

Appendix

Table A1. List of Prohibited Food Items 2008–2012

Food Commodities	2008 ^a	2009 ^b	2010 ^c	2011 ^d	2012 ^e
1. Grain and flour					
Maize, sorghum, millet	x				
Wheat flour, maize flour, cereal groats, meal, pellets	x				
2. Vegetable, fruit, roots					
Cassava/cassava products	x	x	x		
Fresh and dried fruits	x				
3. Processed food					
Vegetable oils and fats (excluding linseed and castor oils, hydrogenated vegetable fats used as industrial raw materials, olive oil in bottles)	x	x	x	x	x
Sugar confectionaries (other than chocolate)	x				
Cocoa butter, powder, cakes	x	x	x	x	x
Spaghetti/noodles (excluding lasagna, gnocchi, ravioli, cannelloni)	x	x	x	x	x
Biscuits	x				
4. Beverage					
Fruit juice in retail packs	x	x	x	x	x

Table A1. (continued)

Food Commodities	2008 ^a	2009 ^b	2010 ^c	2011 ^d	2012 ^e
Waters	x	x	x	x	x
Other nonalcoholic beverage (excluding power or health drinks)	x	x	x	x	x
Beer (bottled, canned, otherwise packed).	x			x	x
5. Animal products					
Live or dead birds, including frozen poultry	x	x	x	x	x
Pork and pork products	x	x	x	x	x
Beef and beef products	x	x	x	x	x
Mutton, lamb, goat meat	x				
Birds eggs	x	x	x	x	x

Source:

^a Traichel, Volker, 2010. "Putting Nigeria to Work, A Strategy for Employment and Growth," Appendix F, World Bank. Source:

^b BusinessDay News, July 06, 2009. Accessed Dec 2012. Available at <http://businessdayonline.com/NG/index.php/component/content/article/123-special-report/3594-import-prohibition-list>

^c USAID and West Africa Trade Hub, 2010. "Nigeria: A Gap Analysis of ECOWAS Market Integration." West Africa Trade Hub Technical Report No. 37.

^d Trade – Watch, 2011. "The African Trade & Transport Report." Issue 3, August 2011. Available at <http://www.delmas.com/site-downloads/page-downloads/news-and-report-downloads/Delmas%20Trade-Watch%20-%20Issue%203%20-%20August%202011.pdf>

^e Nigeria Customer Service, 2012. Accessed Dec 2012. Available at <https://www.customs.gov.ng/ProhibitionList/import.php>

Table A2. Budget Share of Prohibited Food Items (as Share of Household's Budget)

Decile	Consumption of prohibited items			Consumption of prohibited items that comes from own production		
	National	Rural	Urban	National	Rural	Urban
1	0.131	0.135	0.078	0.009	0.010	0.000
2	0.131	0.137	0.099	0.007	0.007	0.004
3	0.137	0.146	0.108	0.007	0.008	0.003
4	0.134	0.138	0.123	0.007	0.010	0.001
5	0.143	0.153	0.122	0.010	0.013	0.003
6	0.143	0.148	0.134	0.006	0.009	0.000
7	0.135	0.148	0.123	0.010	0.017	0.002
8	0.139	0.146	0.133	0.008	0.014	0.003
9	0.127	0.133	0.123	0.003	0.008	0.000
10	0.138	0.149	0.132	0.006	0.011	0.003

Source: Author's calculation based on data from General Household Survey 2011.

Table A3. Impact of Import Bans on Prices—Difference in Differences Regression Results

Group of food commodities	Nigeria - Ghana - Senegal ^a			Nigeria-Ghana ^b			Nigeria-Senegal ^c		
	Interaction term ^d	Number of obs	Adjusted R-square	Interaction term ^d	Number of obs	Adjusted R-square	Interaction term ^d	Number of obs	Adjusted R-square
All food basket	0.287*** (0.057)	359,726	0.888	0.358*** (0.070)	355,175	0.892	0.069 (0.082)	348,037	0.894
Grain food items	0.319*** (0.089)	34,730	0.650	0.271*** (0.068)	34,324	0.670	0.544** (0.272)	32,942	0.663
Vegetable, fruit, root items	0.270*** (0.088)	104,308	0.701	0.553*** (0.099)	102,715	0.704	-0.192 (0.140)	101,071	0.704
Processed food items	0.403*** (0.083)	89,215	0.943	0.619*** (0.089)	88,345	0.949	-0.330* (0.185)	86,959	0.945
Beverage	0.729*** (0.168)	48,751	0.902	0.997*** (0.220)	48,229	0.905	0.144 (0.164)	47,278	0.910
Animal products	0.081 (0.109)	85,150	0.880	0.012 (0.136)	83,816	0.882	0.253** (0.108)	82,156	0.888

Source: Authors' analysis based on data from National Bureau of Statistics (Nigeria, Senegal, and Ghana).

^a Sample includes prices in Nigeria (36 states and the FCT, Abuja), Ghana (Accra, Kumasi, and Tamale), and Senegal (Dakar).

^b Sample includes prices in Nigeria (36 states and the FCT, Abuja), and Ghana (Accra, Kumasi, and Tamale).

^c Sample includes prices in Nigeria (36 states and the FCT, Abuja), and Senegal (Dakar).

^d Interaction between Prohibition and Nigeria dummies.

Notes: Robust standard errors in bracket, clustered at item*year level. * significant at 10%; ** significant at 5%; *** significant at 1%. All 6 regressions include dummy for Prohibited status, dummy for Nigeria, product fixed effects, city fixed effects, month fixed effects, and year fixed effects.

Table A4. Sensitivity Analysis—Impact of Import Bans on Prices in Various Sets of Cities

Group of food commodities	Nigeria coastal cities - Accra - Dakar ^a		Nigeria big cities - Ghana big cities - Dakar ^b		Lagos - Accra - Dakar ^c				
	Interaction term ^d	Number of obs	Adjusted R-square	Interaction term ^d	Number of obs	Adjusted R-square	Interaction term ^d	Number of obs	Adjusted R-square
All food basket	0.199*** (0.059)	94,682	0.887	0.303*** (0.055)	45,456	0.859	0.262*** (0.060)	18,638	0.854
Grain food items	0.347*** (0.165)	9,066	0.598	0.367*** (0.109)	4,965	0.579	0.374*** (0.162)	1,928	0.588
Vegetable, fruit, root items	0.063 (0.111)	27,531	0.746	0.262*** (0.097)	13,182	0.744	0.181 (0.137)	5,483	0.740
Processed food items	0.019 (0.099)	22,956	0.938	0.387*** (0.091)	10,307	0.920	0.058 (0.099)	4,071	0.913
Beverage	0.582*** (0.155)	13,140	0.904	0.767*** (0.179)	6,027	0.834	0.700*** (0.170)	2,465	0.857
Animal products	0.181* (0.108)	22,764	0.870	0.099 (0.108)	11,415	0.880	0.270*** (0.113)	4,950	0.872

Source: Authors' analysis based on data from National Bureau of Statistics (Nigeria, Senegal, and Ghana).

^a Sample include prices in Nigeria states in coastal zone (Ogun, Lagos, Ondo, Edo, Delta, Bayelsa, Rivers, Akwa Ibom, and Cross River), Ghana coastal city (Accra), and Senegal coastal city (Dakar).

^b Sample include prices in Nigeria big cities (Lagos on the coast, Abuja in the middle, and Kano in the north), Ghana big cities (Accra on the coast, Kumasi in the middle, and Tamale in the north), and Senegal (Dakar).

^c Sample include prices in largest cities only (Lagos in Nigeria, Accra in Ghana, and Dakar in Senegal).

^d Interaction between Prohibition and Nigeria dummies.

Notes: Robust standard errors in bracket, clustered at item^a year level. * significant at 10%; ** significant at 5%; *** significant at 1%. All 6 regressions include dummy for Prohibited status, dummy for Nigeria, product fixed effects, city fixed effects, month fixed effects, and year fixed effects.

Table A5. Correlation between Compensating Variations and Households' Consumption

	Compensating variation						Net compensating variations					
	Nigeria-Ghana-Senegal		Nigeria-Ghana		Nigeria-Senegal		Nigeria-Ghana-Senegal		Nigeria-Ghana		Nigeria-Senegal	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Log of cons. per capital	-0.003*** (0.0007)	-0.005*** (0.0009)	-0.002** (0.0010)	-0.005*** (0.0012)	-0.008*** (0.0006)	-0.007*** (0.0007)	-0.002*** (0.0007)	-0.005*** (0.0009)	-0.001 (0.0010)	-0.005*** (0.0012)	-0.008*** (0.0006)	-0.007*** (0.0006)
Number of obs	3373	1610	3373	1610	3373	1610	3373	1610	3373	1610	3373	1610

Source: Authors' analysis based on data from General Household Survey 2011.

Note: Robust standard errors in bracket. * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variables are household's compensating variation and net compensating variations. Independent variables are log of household's consumption per capita. All regressions control for household size, gender, age, and marital status of household head.

Table A6. Summary of Compensating Variations and Net Compensating Variations by Consumption Deciles

Decile	Compensating Variations						Net Compensating Variations					
	Nigeria-Ghana-Senegal		Nigeria-Ghana		Nigeria-Senegal		Nigeria-Ghana-Senegal		Nigeria-Ghana		Nigeria-Senegal	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	-0.037 (0.0012)	-0.029 (0.0013)	-0.050 (0.0017)	-0.039 (0.0018)	0.013 (0.0016)	0.007 (0.0013)	-0.035 (0.0012)	-0.028 (0.0012)	-0.048 (0.0017)	-0.038 (0.0018)	0.013 (0.0014)	0.007 (0.0013)
2	-0.036 (0.0008)	-0.030 (0.0008)	-0.047 (0.0011)	-0.039 (0.0012)	0.008 (0.0010)	0.003 (0.0009)	-0.034 (0.0008)	-0.030 (0.0008)	-0.046 (0.0011)	-0.039 (0.0012)	0.009 (0.0008)	0.002 (0.0009)
3	-0.036 (0.0006)	-0.031 (0.0007)	-0.047 (0.0009)	-0.039 (0.0010)	0.006 (0.0008)	0.000 (0.0007)	-0.034 (0.0006)	-0.031 (0.0007)	-0.045 (0.0009)	-0.039 (0.0010)	0.006 (0.0007)	0.000 (0.0007)
4	-0.036 (0.0006)	-0.032 (0.0006)	-0.046 (0.0008)	-0.039 (0.0009)	0.004 (0.0007)	-0.002 (0.0006)	-0.034 (0.0005)	-0.031 (0.0006)	-0.044 (0.0007)	-0.039 (0.0009)	0.005 (0.0006)	-0.002 (0.0006)
5	-0.036 (0.0005)	-0.032 (0.0006)	-0.046 (0.0007)	-0.040 (0.0008)	0.003 (0.0006)	-0.003 (0.0005)	-0.034 (0.0005)	-0.031 (0.0006)	-0.044 (0.0007)	-0.039 (0.0008)	0.003 (0.0005)	-0.003 (0.0005)
6	-0.037 (0.0005)	-0.032 (0.0006)	-0.047 (0.0007)	-0.040 (0.0008)	0.001 (0.0005)	-0.004 (0.0005)	-0.034 (0.0005)	-0.032 (0.0006)	-0.044 (0.0006)	-0.039 (0.0008)	0.002 (0.0005)	-0.004 (0.0005)
7	-0.037 (0.0005)	-0.033 (0.0006)	-0.047 (0.0007)	-0.040 (0.0008)	0.000 (0.0005)	-0.006 (0.0005)	-0.035 (0.0005)	-0.033 (0.0006)	-0.044 (0.0007)	-0.040 (0.0008)	0.001 (0.0004)	-0.006 (0.0004)
8	-0.038 (0.0006)	-0.034 (0.0007)	-0.048 (0.0008)	-0.041 (0.0009)	-0.001 (0.0005)	-0.007 (0.0004)	-0.035 (0.0006)	-0.033 (0.0007)	-0.045 (0.0008)	-0.040 (0.0009)	-0.001 (0.0004)	-0.007 (0.0004)
9	-0.040 (0.0009)	-0.035 (0.0009)	-0.050 (0.0012)	-0.043 (0.0012)	-0.002 (0.0005)	-0.008 (0.0005)	-0.037 (0.0009)	-0.035 (0.0009)	-0.046 (0.0011)	-0.042 (0.0012)	-0.002 (0.0005)	-0.008 (0.0004)
10	-0.046 (0.0017)	-0.041 (0.0020)	-0.058 (0.0023)	-0.050 (0.0027)	-0.001 (0.0008)	-0.007 (0.0007)	-0.042 (0.0017)	-0.040 (0.0020)	-0.053 (0.0023)	-0.049 (0.0027)	-0.003 (0.0008)	-0.008 (0.0008)

Source: Authors' analysis based on data from General Household Survey 2011.

Note: Robust standard errors in bracket, obtained by bootstrap method.

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