

Import Bans in Senegal Onion Sector

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Introduction

Onion represents a major crop in Senegal, especially in the Vallée and Niayes regions. It constituted 45% of vegetable production and 7% of total agricultural output in 2023, with consistent growth over the past two decades at an annual rate of 10%. Yet, despite rising domestic production, Senegal remains the largest onion importer in ECOWAS, with imports accounting for 32% of regional imports (AATM, 2021), yielding a persistent trade deficit. While onion production regularly exceeds demand, imports continue to rise due to significant post-harvest losses resulting from poor agricultural practices (Beye et al., 2019). Therefore, the trade deficit is growing at 3.3% per year (FAOSTAT, 2023).

Since 2003, Senegal has imposed periodic import bans, quotas, and high tariffs to protect local farmers, aiming for self-sufficiency and stable supply. These measures raised domestic production and prices but disrupted markets and hurt consumers. These measures seem to enable onion producers to sell their products without facing competition from foreign products, while increasing their income (MAER, 2018). The objectives of this policy interventions claimed by the government are to foster self-sufficiency in onions and to ensure a steady, uninterrupted supply, thereby reducing dependence on imports while providing producers with a decent income (Yechou and Enghien,

2021). However, it is well known that these quantitative restrictions usually yield a net welfare loss with a significant negative impact on consumers (Artuc et al., 2026).

This policy brief provides an in-depth analysis of onion import restrictions in Senegal, focusing on their effects on prices, trade, and welfare. The analysis combines econometric evidence and a spatial partial equilibrium model to quantify the impacts of trade restrictions and their removal. The results show that the ban led to a significant and heterogeneous increase in local prices over the period, reaching 92% at the peak of the effect. Local producers benefitted from the price increase when they sell their product at this precise moment while consumer welfare is reduced. The removal of the ban would increase consumer welfare and intra-African trade but at the expense of local producers, undermining the self-sufficiency objective set by the government.

Methodology

A two-step approach is employed for this analysis. In the first step, an econometric model is used to assess the impact of the ban on the domestic prices of onion by estimating an ad valorem equivalent of the ban using differences-in-differences (DID) approach. In the second step, we built a multi-country partial equilibrium model integrating the AVEs (ad-valorem equivalent) previously estimated to account for the effects of these non-tariff barriers on market (prices, production, and consumption), trade flows and welfare. Finally, we simulate the removal of these barriers to compare their effects with the reference situation.

Evaluation of the ad-valorem equivalent of onions restriction in Senegal

To estimate the price impact of the ban on onion imports in Senegal, we applied a differences-in-differences method developed by Chaisemartin and D'Haultfoeuille (2026). In this way, it is possible to determine the ad-valorem equivalent of the ban as the price impact of the measure. The traditional differences-in-differences approach (DID) is used to analyze the changes in outcome over two periods between a treatment group g that switches from untreated to treated, and a control group n that remain untreated at both periods. The latter is limited when i) the number of periods of treatment is more than once, ii) the treatment is non-binary, iii) the lagged treatment may affect the outcome, iv) the treatment group may switch on and switch off, and v) the control group is not fixed and may vary over the time, hence the use of the approach proposed by Chaisemartin and D'Haultfoeuille (2026).

The study focuses on the import ban applied since 2004. The ban increased from 4 months to 8 months over the period 2004-2021. To track it over time, we mobilize the monthly local prices recorded in each

region over the period. Thus, over the period 2004-2021, we constructed a treatment group determined by the product, the region and the year in which the prices were recorded. It is important to keep in mind that the starting period of the ban is not homogeneous across the years. Consequently, each region in a given year can be considered both a treatment group (when subject to the ban) and, at other times, a control group due to this heterogeneity. We model this using a binary treatment indicator that allows groups to enter and exit treatment status. The main value added of this approach is to consider intertemporal treatment effects in the context of heterogeneous impacts. The counterfactuals used are the monthly local prices of rice, maize, tomato and onion when a delay (month) is present in the intervention.

It is important to note that the counterfactual is not fixed in this approach. Depending on the treatment period, the control group considered is the group that followed the same path as the treatment units but was not treated or did not continue to be treated. This complex design provides a solution to the endogenous bias arising from the reverse causality between policy implementation and local price dynamics. In addition, we also add national stocks and the presence of onion imports as control variables to test the parallel trend hypothesis since these variables influence local price dynamics.

The structure of the spatial partial equilibrium model

A partial equilibrium model was developed to track the impact of the price increase coming from the ban across a range of outcomes: prices of other goods, trade flows between ECOWAS member countries, the rest of Africa and the rest of the world, production and consumption. The model has bidirectional trade flows, meaning that a country can both import and export the same product, in accordance with the differentiated product assumption by place of origin (Armington, 1969). In each country, production depends on onion price using an iso-elastic production function. Producers can supply their product either on the local market or export markets according to a Constant Elasticity of Transformation function.

On the demand side, in each country, a representative consumer maximizes a double-stage utility function. The consumer first chooses an aggregate amount of onions to consume. At the second stage, the consumer buys different varieties from either local producers or the regional and international markets. In both decisions a Constant Elasticity of Substitution function is used. To be consistent with the partial equilibrium approach, consumer income is assumed to be constant.

Finally, trade flows between countries are included in the model. Trade flows from country r to country s take place when the supply price of variety r in country r plus the cost of trading between r and s is equal to the demand price of variety r in country s . The cost of trading includes transportation costs from r to s , a custom duty to cross the border between r and s and the ad valorem equivalent of the ban.

Data sources

To carry out the analysis, we used different sets of data from different sources. For the first step, we use monthly domestic prices of onion, rice, maize and tomato from the Senegalese Market Regulation Agency (ARM)) over the period 2004-2018, available across the 11 administrative regions (defined before 2008). The Market Regulation Agency has set up a nationwide market information system, monitoring 174 permanent markets and 182 weekly markets. For the second step, the main sources of data come from ECO-ICBT, FAO, and United Nations COMTRADE to have the maximum coverage of trade data in the ECOWAS area. Onion production and consumption by country are taken from FAOSTAT (2018).

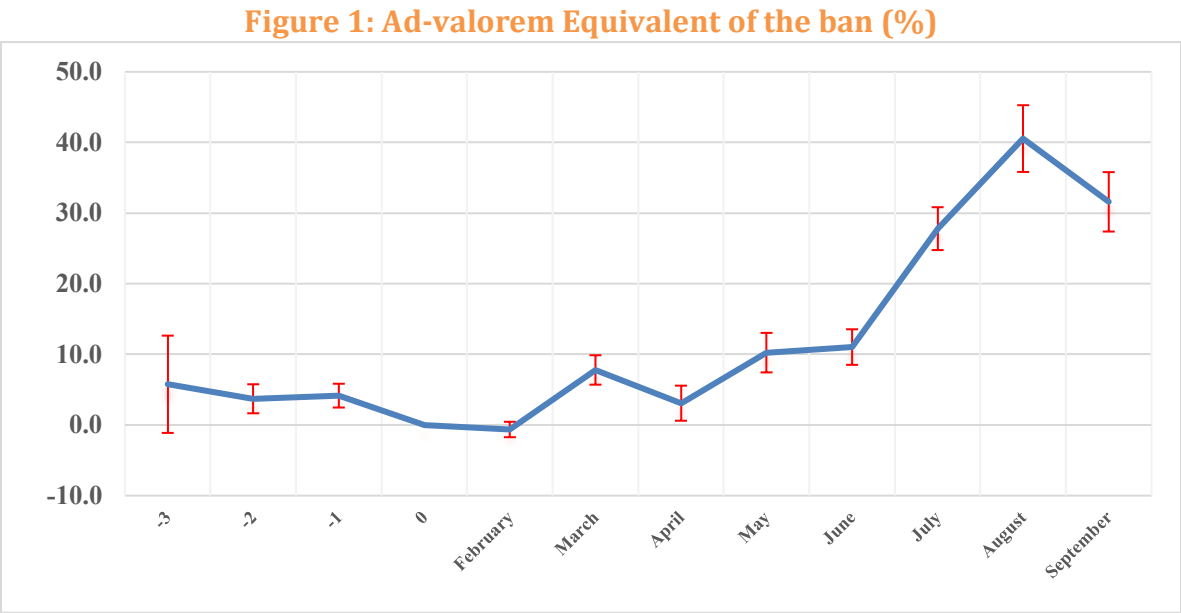
Data on tariffs applied to imports and exports of goods, considering the Common External Tariff applied in the ECOWAS zone are taken from the MacMAp-HS6 database (2016 and 2019) which provides information on tariff lines. Transport costs data comes from the CILSS database (2018) and the World Bank's Doing Business Database (2015). The data from Market Regulation Agency in 2022 allows us to estimate the effects of imports restrictions on domestic prices. The exchange rates used to convert local currencies into dollars to give the same currency unit come mainly from the IMF (2018).

Results

What is the AVE of import bans?

The results presented in Figure 1 show the impact of the ban on imports over the months following the set-up of the measure. Placebos are jointly insignificant (F-test p-value=0.09). For this outcome, the parallel trend assumption which is the backbone of the validity of the DID approach is verified. Overall, the measure, increases local prices, although with a lag, the highest impact being observed at the end of the ban period. This lag in the ban's effective implementation is likely due to the presence of stocks of imported products in the domestic market. From February to May, the impact of the measure is below 10%, rising from 11% in June to 41% in August, and falling to 32% in September even though the official period of the ban ends in August. This pattern shows the heterogenous impact of the ban over the official period of the restriction. In addition, it raises two key issues for the onion sector. On the one hand, the non-significant impact over the starting period of the measure (February) and the low significant impact in the middle period of the ban (March, April, May, June) are in line with the presence of large stocks of imported onions and the excess supply resulting from domestic production. Indeed, the actual enforcement of the ban does not always coincide with its official entry into force. ,In addition some importers try to build up significant

stocks of onions in the two months preceding the ban. On the other hand, the significant impact at the end of the ban period is in line with the monopoly position that benefits the local variety and the reduction in the supply from domestic production.



Note: Test of joint nullity of the placebos: p-value = .09; Red bars represent confidence intervals
 Source: ARM (2022)-FAOSTAT (2018), Author’s calculation

Expected benefits from lifting the ban

The main effect of an import ban is to generate higher domestic prices to protect local producers and reduce international trade flows. Therefore, lifting the ban yields the opposite results. The external variety becomes cheaper, and consumers will partly shift towards this source, the magnitude of the shift being given by the changes in prices and the elasticity of substitution between the two varieties. As a result, the reduced demand for the local variety leads to lower producers and consumers’ prices in the domestic markets. Our results show that the former is reduced by 3% and the latter by 5.6%. Consequently, domestic sales fall (-1.5%) and imports increase. As seen in Table 1, the relaxation of the import ban favors an increase in supplies from both regional (30.74%) and international trading partners (27.90%).

Table 1: Variation in trade and local sales of onions in volume – (%)

	BEN	BFA	CIV	GHA	MLI	NER	NGA	SEN	TGO	RECO	RAFR	RWLD
BEN	0.00										0.01	
BFA	0.00	0.00	0.01	0.00	-0.02				0.00			
CIV	0.00	0.00	0.01	-0.01	-0.02				0.00	-0.01		0.02
GHA			0.01	0.00								0.02
MLI		0.01	0.03		0.00							
NER	0.00	0.00	0.01	0.00		0.00	0.00					
NGA	0.00			0.00		0.00	0.00					
SEN			3.01		2.61	2.63		-1.49		2.62		3.02
TGO	0.00			0.00					0.00			
RECO										0.00		
RAFR	-0.01	-0.01	0.00	-0.02	-0.03	-0.02	-0.02	30.74	-0.01	-0.02	-0.01	0.01
RWLD	-0.04	-0.05	-0.03	-0.05	-0.06		-0.06	27.83	-0.04	-0.05	-0.04	-0.02

Note: Exporters in row; Importer in column; local sales in diagonal

BEN: Benin; BFA: Burkina Faso; CIV: Cote d'Ivoire; GHA: Ghana; MLI: Mali; NER: Niger; NGA: Nigeria
SEN: Senegal; TGO: Togo; RECO: Rest of ECOWAS; RAFR: Rest of Africa; RWLD: Rest of the World

Source: Authors' computation from the partial equilibrium model

The increased competition from lifting the ban in the local markets results in a decline in both consumer and producers' prices. The impact is positive for consumers. They are estimated to gain in aggregate by USD19.25 million. This is offset by the negative impact of lower prices on producers. In total producer losses are estimated at USD 7.33 million. The government gains from lifting the ban as tariff revenues increase by USD2.69 million. At the national level, lifting the ban increases collective welfare, as adding across consumers, producers and the government, yields a net positive balance of USD14.61 million.

Outside of Senegal producers in the rest of Africa and in the Rest of the World (Senegal suppliers) see their welfare increase while consumers register a loss. Indeed, the redirection of flows from the rest of the world to Senegal penalizes those consumers that will face higher prices in their markets. However, overall, the Rest of the World registers a net (collective) welfare gain as the change in producer's surplus offsets the loss for consumers.

Table 2: Variation of welfare indicators- millions of USD

Country/Region	Total Welfare	Consumers surplus	Producers surplus	Government
Benin	0.00	0.00	0.00	0.00
Burkina Faso	0.00	0.00	0.00	0.00
Cote d'Ivoire	-0.02	-0.02	0.00	0.00
Ghana	0.00	0.00	0.00	0.00
Mali	0.00	0.01	0.00	0.00
Niger	0.00	0.00	0.00	0.00
Nigeria	0.00	0.00	0.00	0.00
Senegal	14.61	19.25	-7.33	2.69
Togo	0.00	0.00	0.00	0.00
RECO	0.00	0.01	0.00	0.00
RAFR	0.05	-0.40	0.52	-0.07
RWLD	3.10	-8.77	12.90	-1.03

Source: Authors' results from partial equilibrium model

Note: RECO: Rest of ECOWAS; RAFR: Rest of Africa; RWLD: Rest of the World

Conclusion

This Brief uses the case study of onion import restrictions in Senegal to highlight the harmful effects of trade bans. The objective of the government introducing the ban is to promote better remuneration for producers and target self-sufficiency. Yet the results show that the measure led to a significant increase in local prices, increasing over time. The price increase averaged 63% and reached 92% at its peak, creating large gains for local producers. The total removal of the ban would increase the welfare of consumers, who would benefit from lower prices. Domestic producers, on their part, will be affected by the competition, resulting in lower margins. An interesting result is that the removal of restrictions on imports further benefits trade with the rest of Africa.

Overall, the national net welfare effect suggests that the removal of restrictions yields a positive outcome as the decline in the producer's surplus is offset by the increase in consumers. In addition, the analysis showed that the objective of guaranteeing decent income for producers as well as becoming self-sufficient in onions production may not be achieved. Furthermore, the quality of local onion is often judged lower than that of imported onions, which affects its competitiveness. Support policies designed to increase yields, reduce post-harvest losses and improve product quality through standards and certification are more effective and less distorting (Bernard et al. 2017).

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