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Impact of Cashew Nut Trade Policy on Household and Government Revenues in Senegal: A Dynamic Computable General Equilibrium Model Analysis

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Abstract

The objective of this paper is to assess the medium and long term sectoral impacts of a trade policy on the cashew nut sector in Senegal. Thus we used the dynamic computable general equilibrium model which was inspired by the dynamic PEP model (PEP-1-t) developed by Decaluwé et al (2010) to simulate the impact of a 10% tax on raw cashew nut exports on the sectors of activity and on household and government income. The accounting framework of the model is the 2017 Senegal Social Accounting Matrix (SAM), from which we disaggregated the agricultural branch to isolate the cashew sector. The results of the simulation showed that a policy of taxing raw cashew nut exports from Senegal at a rate of 10% would have a negative impact in the medium and long term on the value added of the cashew nut sector, as it would decrease over the period 2017 to 2022. This decline would be explained by a drop in export demand for the product, which is linked to the sector's loss of competitiveness. On the other hand, this policy would benefit the other sectors, particularly the agricultural sector for which the value added would increase during the period. This policy would also negatively

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affect the income and savings of urban and rural households. However, the government would benefit from the measure since its income would increase over the period.

Keywords: Dynamic computable general equilibrium model, Households, Cashew nuts, Senegal, Export tax

1. Introduction

Agriculture is a very important sector in sub-Saharan Africa, through its contribution to job creation, wealth creation and in reducing food insecurity for the rural population. However, agricultural productivity is relatively low in Africa compared to other developing countries (Hemming et al. 2018). In other words, agricultural production growth in Africa comes mainly from an increase in factor quantities (Denning et al. 2009; Hemming et al. 2018), while productivity is the only way to develop the sector (Diouf, 2020).

The agricultural sector is the driving force of the primary sector in Senegal and is a main source of income for most rural households. Agriculture has a special place in the Emerging Senegal Plan (PSE), which serves as a reference framework for public policies over the period 2014-2035. It contributes 62.8% of the value added of the primary sector and 9.4% of national GDP (SEN. ANSD, 2020).

Like most Sahelian countries, Senegal is facing a relatively difficult food situation due to the gap between national production and the growing needs of the population. Several causes are generally put forward to explain this situation. These are mainly the decline in soil fertility, low price incentives and the abandonment of agricultural support policies (Kidane et al. 2006). Thus, there is a decline in farmers' income.

In order to improve their financial situation, most farmers diversify their agricultural activities by investing more in cash crops such as cashew nuts. Cashew nut production has expanded rapidly in Senegal due to the income it provides to producers and the high global demand for cashew nuts, especially from Asian countries. This growing demand for raw cashew nuts is having a positive impact on cashew plantations in the country.

Cashew (*Anacardium occidentale*) is a species belonging to the Anacardiaceae family, native to tropical America, and cultivated in tropical areas for the production of cashew nuts (or cashew) and cashew apple (Sero et al. 2020.) It is a growing cash crop in Africa due to the export of its nuts (Dedehou et al. 2015) Cashew cultivation has been selected among the high value-added agricultural sectors to be promoted because of its strong capacity to contribute to job creation and improve the income of the most vulnerable populations, especially youth and women (Sero et al. 2020). This agricultural activity helps to solve both economic, social and environmental problems in

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the world (Tandjiékpon et al. 2003; Dwomoh et al. 2008; Hammed et al. 2008; Yabi et al. 2013; Balogoun et al. 2014). Cashew exports are a potential source of foreign exchange for producing countries. In West Africa, Nigeria is the leading producer of the product, followed by Cote d'Ivoire and Benin (Balogoun et al. 2015). For the latter, cashew represents the country's second agricultural export product after cotton (Houndahouan et al.2018).

The main constraints to cashew production are related to maintenance difficulties, pest attacks, fire and nut theft (Balogoun et al. 2015). But also, cashew anthracnose is a dreaded disease for cashew production, it can cause up to 72% of cashew production losses under favorable conditions for its development (Houndahouan et al. 2018). In addition, climate change affects cashew plantation production (Tchétangni et al. 2016). Indeed, according to the authors, prolonged drought followed by a rainfall deficit, poor distribution of rainfall are the most recorded climatic events and constitute the major constraints to cashew production in the commune of Savalou in Benin. The other causes that lead to the decrease in cashew tree yields are animal rambling and poor plant material used by cashew orchard owners.

Thus, appropriate measures such as access to agricultural credits, development of integrated pest management methods as well as training and sensitization of producers must be taken by stakeholders at various levels (State, researchers, technical and financial partners) in order to provide solutions to the problems that plague cashew production (Balogoun et al. 2015).

Cashew nuts can be used for several purposes. They can be consumed in the form of "snacks" in the same way as peanuts, but also, they can enter the composition of products in the chocolate or confectionery industry (Ndiaye et al. 2017). Nuts can also be used in the form of powder, granules in the food industry of biscuit, pastry and yoghurt (Ricau, 2013). They can also be processed into butter to be used as sandwich dough.

However, Senegalese cashew nuts are mainly exported in unprocessed form through entrepreneurs from India. Thus, it is estimated that between 75-95% of the national production would be exported in raw form, whereas by carrying out shelling and primary processing activities, local economic operators can capture additional income of up to 16% of the consumer selling price in export markets (UNCTAD, 2017).

Despite this significant level of exports, no tax related to this activity has been implemented in Senegal so far, which constitutes a loss of revenue for the state, since export taxes are very often used by developed countries to generate income. It is therefore important to analyse the response of the cashew sector and other sectors to exogenous shocks. The interest of this study is to understand the sectoral effects of the introduction of a tax on raw cashew

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nut exports, but also the impact of such a policy on household and government income in Senegal.

According to Liefert and Westcott (2016) there are four main reasons for implementing an export tax or other form of export restriction: i) to generate revenue; ii) to exploit the country's market power by increasing the price of the good sold in the world market; iii) to allow domestic processors using the exported good as an intermediate input to have a cost advantage over foreign competitors; iv) and to lower the price of the product for the benefit of local consumers with the aim of improving food security. But there are no best practices in tax reform policy (Jason, 2020) and the agricultural sector is considered the most difficult sector to tax (Criclivaia, 2016 and Rajaraman, 2004). Since 2004, inputs specific to the agricultural sector have been exempt from Value added tax (VAT) in Senegal (Diouf, 2020). Tax incentives have been ineffective in improving agricultural productivity, indeed, the higher the weight of exemptions in production costs, the less productive the plot is (Diouf, 2020). This relationship could come from a decrease in allocative efficiency. In other words, farmers have overinvested in exempted inputs, at the expense of inputs subject to VAT, which have no significant effect on productivity. It is therefore necessary to remove the policies that cause VAT residuals, which would make VAT exemptions unnecessary, by including agriculture in the scope of VAT and removing exemptions for finished products (Diouf, 2020).

Several works have shown that export taxes are, on the one hand, a source of increased state revenue and, on the other hand, a factor that negatively affects the income of domestic producers (Liefert and Westcott, 2016; Bouet and Debucquet, 2010; Josling et al. 2009). Thus Araujo- Bonjean and Chambas (2001) proposed a coherent, incentive-neutral levy system based as much as possible on the contributory capacity of farmers. They advocate an income tax levied on exports, complemented by a property tax. The extension of the value-added tax to all agricultural products would avoid distortions against producers by shifting the burden of this tax to consumers. On the other hand, price increases due to the introduction of an export tax negatively affect the poorest consumers and seriously threaten food security (Josling et al. 2009).

This work is part of the debate related to the effects of an export tax on the revenues of stakeholders in the sector. Thus, the main objective of the work is to simulate the medium- and long-term impact of a 10% tax on raw cashew nut exports on the income of stakeholders in Senegal.

In order to achieve this objective, we assume that a 10% tax on raw cashew nut exports would affect government and household income in the medium and long term. This hypothesis is linked to the measure taken by some producing countries such as the Ivory Coast to apply a 10% tax on raw cashew

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nut exports. The cashew sector is the subject of much attention from the governments of producing countries and from researchers, due to its growing economic weight.

For the simulation, we will use the dynamic computable general equilibrium model based on the dynamic PEP model (PEP-1-t) developed by Decaluwé et al. (2010).

For the rest of the paper, section 2 is about the methodological framework that allows to present the structure of the model, the data of the model and the closure of the model, section 3 will be devoted to the presentation and discussion of the results, section 4 will conclude and finally section 5 will present policy recommendations.

2. Methodological framework

As mentioned above, this study evaluates and empirically analyses the impact of a fiscal policy on the cashew nut sector (export tax). The impact of this policy can be analyzed through simulations that can be carried out using computable general equilibrium (CGE) modeling.

Computable general equilibrium models (CGE models) are widely used to analyze the effects of policy changes and/or shocks on the economy as in general. They address the length of time it takes for an economy to move from one equilibrium to another in response to a policy change or shock. For this purpose, a recursive-dynamic computable general equilibrium (CGE) model is used in this study.

A dynamic computable general equilibrium specification has advantages such as: the possibility not only to generate a medium- and long-term trajectory, but also to analyse structural changes over time.

2.1. Model specification

In principle, the simulation results obtained through a CGE model depend largely on the assumptions made on the functional forms (Cobb-Douglass or Leontief function, for example), the parameters adopted in the production and demand functions (transformation elasticity's or substitution elasticity's), the balancing mechanisms (investment/savings equilibrium, etc.) and the macroeconomic closure (classical or Kaldorian closure, etc. and the choice of exogenous variables). Our model starts from the basic PEP dynamic computable general equilibrium model (PEP-1-t) developed by Decaluwé et al. (2010). The detailed and/or complete specification of this model will not be presented for the sake of simplicity. Nevertheless, the key structures of the model and the specificities for the needs of this analysis will be described. The model assumes a small economy for which world prices are given (i.e., price taker).

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- ***Production structure***

The industries or sectors carry out production t. by maximizing their profits in perfect competition, considering the prices of inputs and factors. The production technology is described by the production and value-added equations for each period. Within each sector, including the cashew sector, output (XS) is expressed as a Leontief function combining fixed shares of value added (VA) and intermediate consumption (CI):

$$XS_{j,t} = \min\left[\frac{CI_{j,t}}{io_j}, \frac{VA_{j,t}}{v_j}\right] \quad (1)$$

In the market sectors, value added is a CES function that combines composite labour (LDC) and composite capital (KDC):

$$VA_{j,t} = BA_j^{VA}\left[\beta_j^{VA} LDC_{j,t}^{-\rho_j^{VA}} + (1-\beta_j^{VA}) KDC_{j,t}^{-\rho_j^{VA}}\right]^{-\frac{1}{\rho_j^{VA}}} \quad (2)$$

Value added is formulated differently in different sectors: in the non-market sector, value added is a CES function that combines composite labour and public capital.

The total intermediate consumption (CI) of an industry is a fixed part of its output:

$$CI_{j,t} = io_j XS_{j,t} \quad (3)$$

The demand for the composite good (DI) is a fixed share of the total intermediate consumption of sector j. Each product i represents a fixed share (aij) of the total intermediate consumption of sector j:

$$DI_{i,j,t} io_j CI_{j,t} \quad (4)$$

The factors of production (composite labour and composite capital) are combined according to a constant elasticity of substitution (CES) function, while the various intermediate inputs are used in fixed proportions (Leontief function). The demand for labour and capital in each industry is determined by the first-order profit-maximization condition.

The productivity factor $\left(B_j^{VA}\right)$is a function of human capital $\left(KH_{j,t}\right)$research and development$\left(RD_{j,t}\right)$physical investment $\left(IP_{j,t}\right)$ and the ratio of aggregate public capital to private capital in the sector $\left(\frac{KDpubG_t}{KDpriv_{j,t}}\right)$and the sensitivity of productivity to these different arguments, given by the respective elasticity's ε_k , ε_r et ε_i .

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The overall stock of public capital creates a positive externality $\left(KDpubG_t\right)$ or each productive activity that affects the overall productivity of the sector's factors.

The productivity factor B will thus be affected by the distribution of the flow of public investment between human capital, research and development and physical investment, but also by the magnitude of the externalities from which the sector benefits and the elasticity of productivity to the various arguments:

$$B_j^{VA} = \overline{B}_{j,t}\left[\left(KH_{j,t}\right)^{\varepsilon_k}\left(RD_{j,t}\right)^{\varepsilon_r}\left(IP_{j,t}\right)^{\varepsilon_i}\left(\frac{KDpubG_t}{KDpriv_{j,t}}\right)^{\varepsilon_k}\right] \quad (5)$$

- ***Agents[1] : Government income and savings***

Government revenue (YG) is equal to the sum of total government revenue from taxes on production and imports (TPRCTS), total government revenue from other taxes on production (TPRODN), transfers received from other institutions (YGTR), including direct taxes collected from households (TDHT) and firms (TDFT), as well as the remuneration of capital (YGK):

$$YG_t = YGK_t + TDHT_t + TDFT_t + TPRODN_t + TPRCTS_t + YGTR_t \quad (6)$$

Total government revenue from taxes on production and imports is equal to the sum of indirect taxes (TICT) on domestic sales, export taxes (TIXT), import taxes (TIMT):

$$TPRCTS_t = TICT_t + TIMT_t + TIXT_t \quad (7)$$

Total indirect taxes (TICT) are equal to the sum of indirect taxes collected on domestic sales:

$$TICT_t = \sum_i TIC_{i,t} \quad (8)$$

Total import taxes (TIMT) are equal to the sum of import taxes collected on imported products:

$$TIMT_t = \sum_m TIM_{m,t} \quad (9)$$

Total export taxes (TIXT) are equal to the sum of export taxes collected on exported products:

$$TIXT_t = \sum_x TIX_{x,t} \quad (10)$$

Import taxes (TIM) are a linear function relating the tariff rate (ttim), the world price (PWM), the exchange rate (e) and the quantities imported (IM):

$$TIM_{i,t} = ttim_{i,t} PWM_{i,t} e_t IM_{i,t} \quad (11)$$

[1]At this level we present only a specification of the Government agent insofar as one of its main sources of income is at the centre of our analysis.

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Export taxes (TIX) are a linear function of the export tax rate (ttix), the world price (PE) and the quantities exported (EXD):

$$TIX_{i,t} = ttix_{i,t}\left(PE_{i,t} + \sum_{ij} PC_{ij,t} tmrg^{x}_{ij,t} \right) EXD \tag{12}$$

The government's savings are calculated as the difference between government revenues (YG), government expenditures (G) and transfers to other agents:

$$SG_t = YG_t - \sum_{agng} TR_{agng,govt,t} - G_t \tag{13}$$

- ***Interactions with the outside world***

To consider the constraints of Senegalese exporters on the external market, we introduce an export demand function into the model. This function has a finite elasticity and is a function of the ratio between the world price and the fob price. Indeed, local producers are obliged to reduce their export price to increase their market share abroad. Therefore, an increase in imports of one group of goods and services requires an increase in exports of other groups of goods and services in order to maintain a balanced current account. The exchange rate, the change in inventories is also fixed.

$$EXD_{i,t} = EXD_i^0 \, pop_t \left[\frac{e_t PWX_{i,t}}{PE_{i,t}^{FOB}} \right]^{\sigma_i^{XD}} \tag{14}$$

Producers maximize their profit, given the constraints of the domestic and foreign markets (CET function). They substitute local sales for foreign sales and vice versa, given the relative shares of their sales in the two markets, the domestic and foreign sales prices, and the transformation elasticity of the CET function.

$$EX_{j,i,t} = \left[\frac{1-\beta_{j,t}^{X}}{\beta_{j,t}^{X}} \frac{PE_{i,t}}{PL_{i,t}} \right]^{\sigma_{j,i}^{X}} DS_{j,i,t} \tag{15}$$

The domestic product supply of the importing industries is a combination of imports (IM) and production sold locally (DD), defined according to a constant elasticity of substitution (CES) function, commonly known as the "Armington function"; in which $B_i^M, \beta_i^M et \rho_i^M$ are, respectively, the scale parameter, the relative shares of imports, and the elasticity of substitution of the CES function.

$$Q_{i,t} = B_i^M \left[\beta_i^M IM_{i,t}^{-\rho_i^M} + \left(1-\beta_i^M\right) DD_{i,t}^{\rho_i^M} \right]^{\frac{-1}{\rho_i^M}} \tag{16}$$

The level of imports is derived from the cost minimization of the "Armington function". Domestic agents substitute imports for local sales, and vice versa,

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given the relative shares of imports, prices, and the elasticity of substitution of the Armington function.

$$IM_{i,t} = \left[\frac{\beta_i^M}{1-\beta_i^M} \frac{PD_{i,t}}{PM_{i,t}} \right]^{\sigma_i^M} DD_{i,t} \tag{17}$$

- ***Model Dynamics***

On the dynamic side, the economy is driven by capital accumulation and population growth. The increase of capital through investment is the main source of economic growth. Investment covers the depreciation of capital and contributes to its accumulation from one period to another.

The end-of-period sectoral private capital stock $\left(KD_{k,j,t+1}\right)$is equal to the beginning-of-period stock $\left(KD_{k,j,t}\right)$net of the consumption of fixed capital (or depreciation) of the period at a rate $\left(\delta_{k,j}\right)$plus the volume of capital accumulated during the period $\left(IND_{k,j,t}\right)$.

$$KD_{k,j,t+1} = KD_{k,j,t}\left(1-\delta_{k,j}\right) + IND_{k,j,t} \tag{18}$$

Public investment demand is the product of the average price of public capital and the sum of public sector investment demand.

$$IT_t^{PUB} = PK_t^{PUB} \sum_{k,pub} IND_{k,pub,t} \tag{19}$$

Private investment demand is the product of the average price of private capital and the sum of investment demand from the private sector.

$$IT_t^{PRIV} = PK_t^{PRIV} \sum_{k,bus} IND_{k,bus,t} \tag{20}$$

The average price of capital (private or public) is a weighted sum of consumer prices, the weight being the relative share of the demand for good or service i in the aggregate demand for investment (by origin):

$$PK_t^{PUB} = \frac{1}{A^{K-PUB}} \prod_i \left[\frac{PC_{i,t}}{\gamma_i^{INVPUB}} \right]^{\gamma_i^{INVPUB}} \tag{21}$$

$$PK_t^{PRIV} = \frac{1}{A^{K-PRIV}} \prod_i \left[\frac{PC_{i,t}}{\gamma_i^{INVPRIV}} \right]^{\gamma_i^{INVPRIV}} \tag{22}$$

The sectoral accumulation rate of private capital $\left(\frac{IND_{k,bus,t}}{KD_{k,bus,t}} \right)$in period t is an increasing function of the cost-benefit ratio of capital $\left(\frac{R}{U} \right)$in the same period, but the rate of increase of the accumulation rate, under the effect of this ratio, is decreasing.

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$$\frac{IND_{k,bus,t}}{KD_{k,bus,t}} = \varphi_{k,bus}\left[\frac{R_{k,bus,t}}{U_{k,bus,t}}\right]^{\sigma^{INV}_{k,bus}} \quad (23)$$

The user cost of capital in an industry is equal to the average price of capital (PK) multiplied by the sum of the interest rate (IR) and the depreciation rate $(\delta_{k,.})$:

$$U_{k,pub,t} = PK_t^{PUB}\left(\delta_{k,pub} + IR_t\right) \text{ and } U_{k,bus,t} = PK_t^{PRIV}\left(\delta_{k,bus} + IR_t\right) \quad (24)$$

- ***The parameters of the functional forms***

The specification of the production, household consumption and import and export demand functions requires parameters including income elasticity of product demand, Frisch parameter, elasticity of substitution between capital and labour, elasticity of substitution between imported and domestic products, elasticity of transformation between foreign and domestic sales, and elasticity of foreign demand.

In the absence of long series, these parameters have not been estimated on Senegalese data. They were borrowed from the CGE literature, and from empirical studies in other developing economies. All other parameters of the model were calibrated using SAM data, in order to ensure consistency with base year data.

- ***Balance and closure of the model***

The balancing procedure involves balancing several variables in the model.

The supply of the composite product (Q) is the sum of household final consumption (C), government expenditure, intermediate demand (DIT), private investment (INV), changes in inventories (STK) and margins (MRGN):

$$Q_{i,t} = \sum_h C_{i,h,t} + CG_{i,t} + INV_{i,t} + VSTK_{i,t} + DIT_{i,t} + MRGN_{i,t} \quad (25)$$

Labour supply equals labour demand

$$LS_{l,t} = \sum_j LD_{l,j,t} \quad (26)$$

The supply of and demand for capital also equalize:

$$KS_{k,t} = \sum_j KD_{k,j,t} \quad (27)$$

The sum of total investment and stocks by value is equal to the sum of household (HS), firm
(FS), government (GS), and rest of the world (ROW) savings, valued in local currency:

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$$IT_t = \sum_h SH_{h,t} + \sum_f SF_{f,t} + SG_t + SROW_t \quad (28)$$

$$IT_t^{PRIV} = IT_t - IT_t^{PUB} - \sum_i PC_{i,t} VSTK_{i,t} \quad (39)$$

The supply and demand of local products for the domestic market are equalized:

$$DD_{i,t} = \sum_j DS_{j,i,t} \quad (30)$$

The supply and demand for export products also equalize:

$$EXD_{i,t} = \sum_j EX_{j,i,t} \quad (31)$$

In the model's closure procedure, public spending is fixed. On the labour market, labour supply is assumed to be exogenous and capital demand is assumed to be fixed. Moreover, the current account balance is assumed to be fixed, which isolates the situation where an inflow of capital would allow the financing of domestic policies.

2.2. Accounting framework of the model: The Social Accounting Matrix (SAM)

The accounting framework of the model is provided by the social accounting matrix (SAM). The latter is constructed using data from the Input-Output Table the Balance of Resources-Employment Table by Commodity, and the Government Financial Transactions Table, the balance of payments and survey data for household information. We use the SAM constructed by the ANSD[2] for the year 2017.

The model thus specified with the SAM incorporates two types of capital factors (capital and land) and two types of labour factors (from the segmentation of the labour market into skilled and unskilled labour). The standard institutional units are maintained. However, for the specific needs of the study and insofar as farmers, more specifically cashew farmers, are more localized among rural households, the household institutional unit is disaggregated into urban and rural households. The model also integrates 8 branches and product accounts with a highlighting of the cashew nut branch and product resulting from the disaggregation of the agricultural branch and the agricultural product, this for the specific needs of the study.

[2] National Agency for Statistics and Demography (ANSD)

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3. Simulation and discussion of results

3.1. Simulation and justification

The aim of this simulation is to evaluate the medium- and long-term impact of a trade policy on the cashew nut sector in order to measure its sectoral effects and its impact on household and state income in Senegal. Thus, our simulation focuses on the introduction of a 10% tax on the country's raw cashew nut exports. This policy was inspired by the one applied by the government of Ivory Coast in February 2017 to benefit more from this activity in the country because, most of the production is exported in its raw state. Indeed, in Senegal it is estimated that between 75 to 95% of cashew production is exported in the raw state and the country's government would consider applying a similar policy. This policy is envisaged to promote job creation and increase government revenues. The reference situation concerns the cashew nut sector, which is a sub-sector of the agricultural sector where there is no taxation on exports.

3.2. Results and discussion

3.2.1. Impact on external trade

A ten percept (10%) tax on raw cashew exports would negatively affect Senegal's foreign trade. Indeed, during the period from 2017 to 2022, the country would record a continuous decline in raw cashew nut exports. Thus, Senegal, which does not have a monopoly on the world market for the product, would be less competitive due to the additional cost of applying such a tax. This trade policy would benefit Senegal's direct competitors such as Guinea Bissau, but also leading countries in West Africa such as Nigeria, Ivory Coast and Benin. Such a situation would increase the smuggling of the product which is a common practice between the southern part of Senegal (Kolda, Sédhiou and Ziguinchor) and Guinea Bissau. Indeed, despite drastic measures taken by the authorities of both countries to curb the illegal trade of cashew nuts at their common border, Senegalese producers in search of a better price for the product would be tempted to sell their production in the markets of neighboring countries, which would offer a better price. Senegal would then lose most of the added value of this activity, which would be a huge loss of income for the country.

The loss of income that Senegalese producers would suffer as a result of the introduction of this tax on cashew exports would lead them to switch to other cash crops such as groundnuts or cotton, which were once the country's main cash crops and are largely destined for export. On the other hand, local processors of the product should benefit from a drop in exports, as this would allow them to obtain better supplies of raw materials at good prices.

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Table 1: Change in exports (% compared to bau scenario)

	2017	2018	2019	2020	2021	2022
Agriculture	0.000	-6.111	-5.873	-5.653	-5.450	-5.261
Cashew	0.000	-6.230	-6.355	-6.457	-6.545	-6.622
Livestock	0.000	-6.165	-5.993	-5.835	-5.689	-5.554
Fishing	0.000	-7.639	-7.505	-7.377	-7.255	-7.138
Leather industries	0.000	-4.319	-4.272	-4.206	-4.122	-4.023
Other industries	0.000	-4.760	-4.754	-4.726	-4.679	-4.616
Market services	0.000	-6.425	-5.951	-5.513	-5.107	-4.732

Source: authors' simulation, September, 2021

3.2.2. Impact on the value added of the sectors of activity

The introduction of a 10% tax on raw cashew nut exports would have a negative impact on the value added of the cashew nut, fishing and industrial sectors. Indeed, the value added of the cashew sector would fall by about 6% per year during the period 2017 to 2022. On the other hand, the effects on the other sectors would be positive, particularly for the agriculture and livestock sectors. Thus, the value added of agriculture would increase by 0.68% in 2018, against approximately 1.40% in 2022, while that of livestock would increase by 0.65% in 2018, against 1.03% in 2022. The drop in the value added of the cashew sector would be a direct consequence of the decline in demand for cashew exports from Senegal due to the additional costs borne by importers as a result of the new export tax. This decline would lead to a drop in revenue for Senegalese producers. Such a situation would negatively affect the well-being of producers, as revenue from cashew plantations is the main source of income for many farming households in Senegal, particularly in the southern part of the country. Indeed, farmers have progressively abandoned groundnut and cotton crops, which were once the main cash crops in Senegal, in favour of cashew plantations, which require less physical effort and almost no inputs. Moreover, there is a strong fluctuation in the producer price due to the presence of several intermediaries between producers and importers, so producers do not fully benefit from the fruits of their activity.

Table 2: Change in value added (in % compared to the bau scenario)

	2017	2018	2019	2020	2021	2022
Agriculture	0.000	0.680	0.875	1.059	1.232	1.396
Cashew	0.000	-6.068	-6.181	-6.281	-6.367	-6.367
Livestock	0.000	0.647	0.745	0.841	0.936	1,029
Fishing	0.000	-3.278	-3.155	-3.032	-2.911	-2.792
Leather industries	0.000	-0.161	-0.087	0.006	0.115	0.239
Other industries	0.000	-0.391	-0.370	-0.327	-0.264	-0.016
Market services	0.000	-0.016	0.359	0.708	1.034	1.338
Non-market services	0.000	0.501	0.510	0.517	0.524	0.530

Source: authors' simulation, September, 2021

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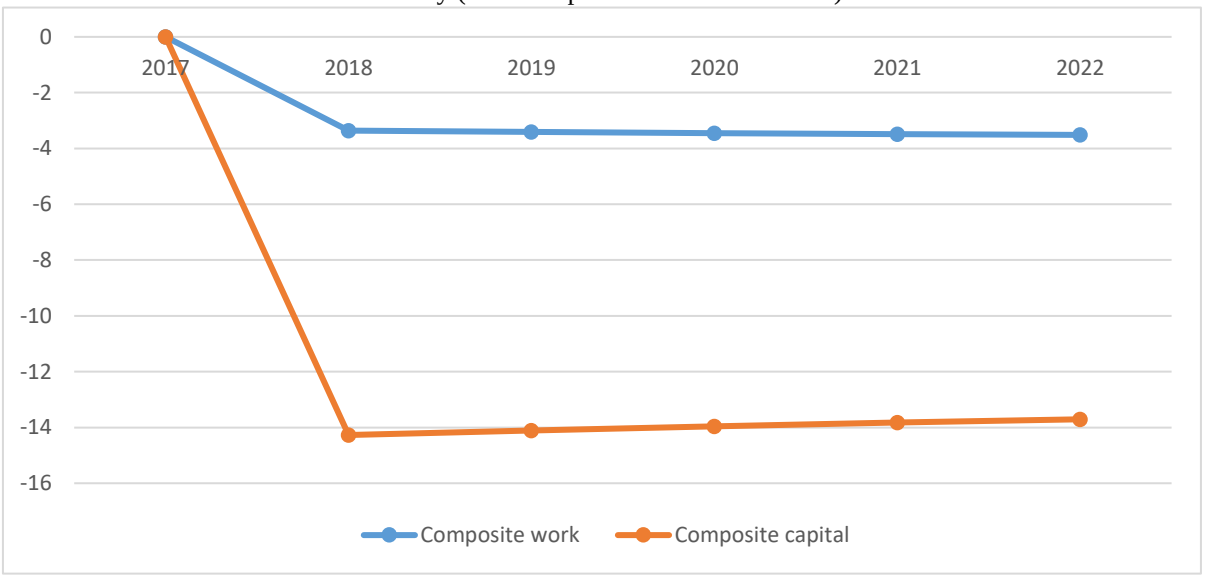
3.2.3. Impact on the remuneration of factors of production

A decrease in the value added of the cashew sector would have negative effects on the demand for production factors. Indeed, there would be an oversupply of labour and a surplus of capital in relation to the needs in this activity. This would lead to a decline in the remuneration of labour and capital factors during the period 2017 to 2022. Faced with such a situation, many farmers will be tempted to migrate to large urban centres in search of paid jobs, which would accentuate the phenomenon of rural exodus in the country, particularly in Dakar, which according to estimates concentrates more than 80% of Senegal's economic activities. Thus, there would be an increase in the overpopulation of Dakar, which covers less than 5% of the national territory but concentrates about a quarter of the Senegalese population.

Moreover, the sector is also very much affected by climate change phenomena. Indeed, the value added in the sector depends on the yield which is linked to climate change. In other words, good rainfall generally leads to a better yield, i.e., an improvement in the sector's added value, whereas poor rainfall often results in a drop in yield.

Graph 1: Variation in the rate of remuneration of factors of production in the cashew nut industry (in % compared to the bau scenario)



Source: authors' simulation, September, 2021

3.2..4. Impact on household and government revenues

A 10% tax on raw cashew exports would have differential impacts on agents' income. Indeed, the government would benefit from this policy, since its income and savings would increase over the period 2017 to 2022. On the other hand, households would be negatively affected by this trade policy, since the incomes of rural households (Mrurals) and urban households (Murbans)

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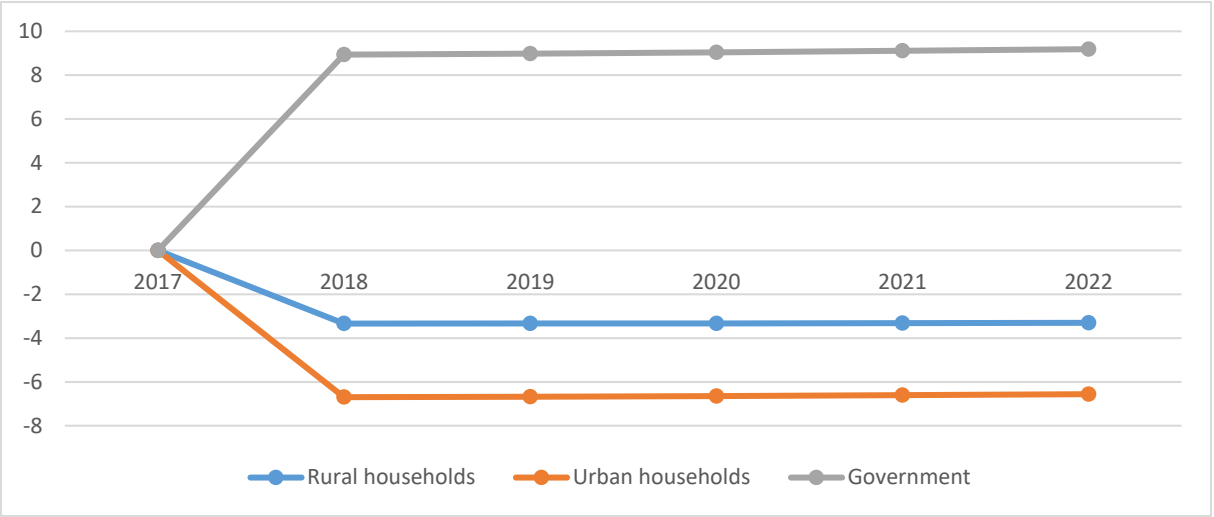
would fall during the period. These results corroborate the work of Liefert and Westcott (2016), Bouet and Debucquet (2010) and Josling et al. (2009) who found that the export tax increases government revenue but decreases the income of local producers. The decline in household income would be a direct consequence of the decline in the remuneration of the factors of labour and capital and therefore of value added. This situation would constitute a danger for the food security of rural households in Senegal, particularly those in the southern zone who derive a large part of their income from the sale of cashew nuts. Indeed, there is a strong tendency to abandon other crops such as groundnuts and cereals in favour of cashew plantations since the advent of Indian importers who offer a relatively high price per kg of cashew nuts.

Graph 2: Change in agents' disposable income (in % compared to the bau scenario)



Source: authors' simulation, September, 2021

3.2.5. Impact on household savings and consumption budgets

The drop in household income would result in a decline in their consumption budget but also in their savings (graph 3). This situation would negatively affect the well-being of households.

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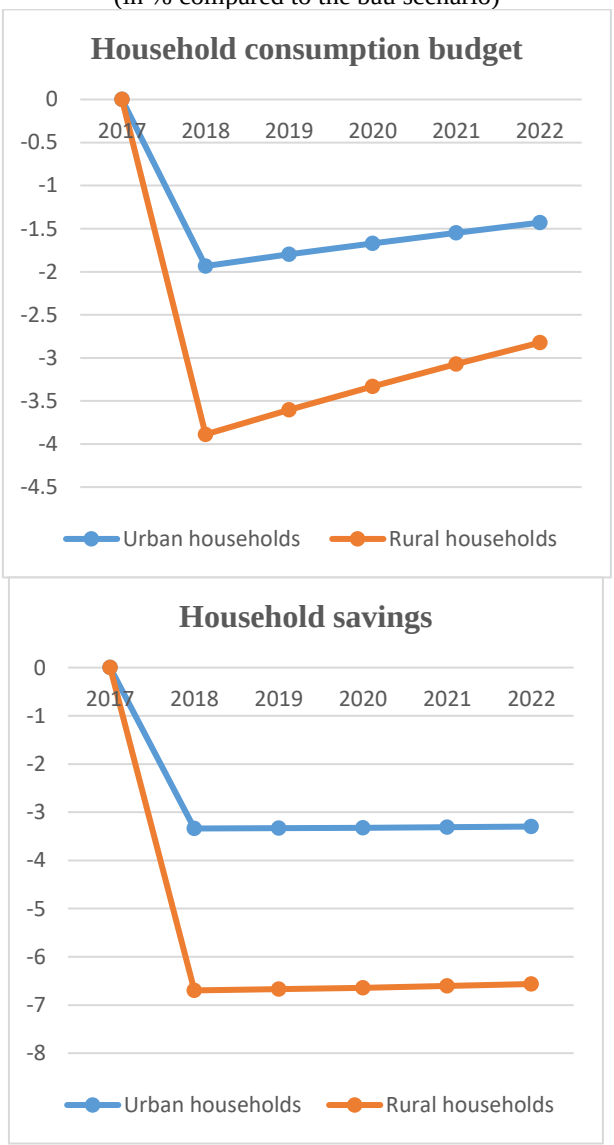
Graph 3: Change in real household consumption budget (in % compared to the bau scenario)



Source: authors' simulation, September, 2021

3.2.6. Impact on economic growth

Agriculture is the driving force of the primary sector in Senegal and is an important source of income for the country's rural households. It occupies a privileged place in the PSE, which is a reference framework for public policies over the 2014-2035 period. According to the ANSD (2020), the agricultural sector contributes 62.8% of the value added of the primary sector and 9.4% of national GDP. The application of a 10% tax on raw cashew nut

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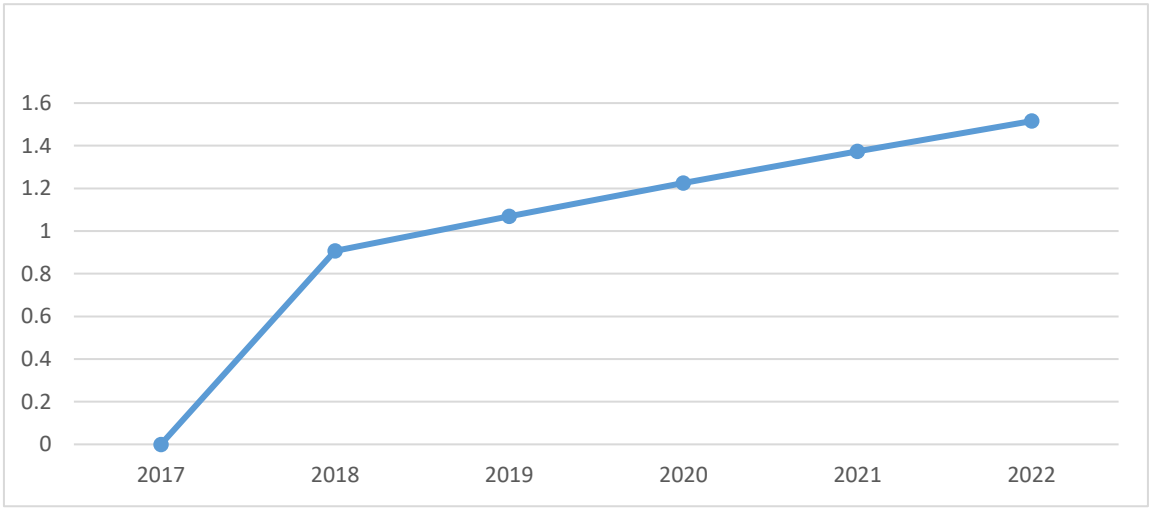
exports would have a positive impact on Senegal's real GDP over the period 2017 to 2022. In other words, the decline in cashew sector value added following the application of a trade policy on the sector would not affect the country's wealth creation. Thus, the increase in value added in the other sectors following the reallocation of resources to them would result in an increase in real GDP during the period 2017 to 2022 as shown in the graph below.

Graph 4: Change in real GDP at market prices (% relative to the bau scenario)



Source: authors' simulation, September, 2021

Conclusion

The objective of this paper is to evaluate the medium- and long-term sectoral impacts of a trade policy on the cashew sector in Senegal. We simulated the impact of a 10% tax on raw cashew nut exports on the various sectors of activity and on household and state income. For the choice of 10%, we were inspired by the policy applied by the Ivory Coast government in 2017 to benefit more from this activity because most of the country's production is exported in its raw state. Senegal is in the same situation as Ivory Coast, since it is estimated that between 75 and 95% of the country's cashew production is exported in the raw state and the country's government would consider applying a similar policy. For the simulation, we used the dynamic computable general equilibrium model which was based on the dynamic PEP model (PEP-1-t) developed by Decaluwé et al. (2010). The accounting framework of the model is the 2017 Senegal Social Accounting Matrix (SAM), from which we disaggregated the agricultural branch to isolate the cashew sector.

The results of the simulation show that a policy of taxing raw cashew nut exports from Senegal at a rate of 10% would have a negative impact in the medium and long term on the value added of the cashew nut sector, as it would decrease over the period 2017 to 2022. This decline would be explained by a

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drop in export demand for the product, which is linked to the sector's loss of competitiveness. On the other hand, this policy would benefit the other sectors, particularly the agricultural sector for which the value added would increase during the period. This policy would also negatively affect the income and savings of urban and rural households. However, the government would benefit from the measure since its income would increase over the period.

These different results found confirm the controversies on the relevance of a taxation policy on raw products in developing countries. Indeed, taxes on primary products can promote industrialization and job creation. Industrial development, in turn, is conducive to economic growth, which helps to eradicate poverty. But the absence of an enabling environment for industrial development is detrimental to economic growth and increases dependence on export earnings.

Policy recommendations

Several policy lessons can be drawn from this study.

i. The first lesson is that the government should apply this tax on raw cashew exports, since it would benefit from it through increased income.
ii. The government will then have to use the revenues generated to expand its policy of subsidies to producers to compensate for the losses suffered by the latter.
iii. Most of Senegal's raw cashew production is exported in its raw state, and the country loses a large part of the added value of this activity. There is a need to create more processing units so that the country can better benefit from this activity.
iv. Also, the government should apply a minimum price policy for the cashew trade, as it often does for groundnuts, which would increase the income of local producers.
v. In addition, in the cashew trade, intermediaries between producers and lessors benefit from a large part of the income derived from the activity. Thus, the government needs to reduce the number of intermediaries so that producers can better benefit from their activity.

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