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IMPACT OF SPECIAL SAFAGUARD TARIFFS IN SUGAR MARKET FOR BRAZILIAN ECONOMY

Cinthia Cabral da Costa
Embrapa. Email: cinthia.cabral.da.costa@gmail.com
Heloisa Lee Burnquist
USP/ESALQ. Email: hlburnqu@usp.br
Joaquim José Martins Guilhoto
USP/FEA. Email: guilhoto@usp.br

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Resumo
Este trabalho apresentou uma análise crítica em relação as salvaguardas especiais para os produtos agrícolas, denominada SSG, e realizou uma simulação dos seus efeitos sobre as exportações brasileiras de açúcar para os países que mais a aplicaram: Estados Unidos e União Européia. Inicialmente as linhas tarifarias (LT) sobre as quais as SSG incidiram foram identificadas em todo período em que foram aplicadas: de 1995 (início das regras atuais do comércio internacional, definidas na Rodada Uruguais) a 2013 (dados mais recentes das notificações). Para os anos que o SSG baseada nos preços foram aplicadas, o valor desta tarifa adicional foi calculado para cada uma das LTs relevantes. Esta informação foi utilizada, com elasticidades-preço, para obter a mudança correspondente nas importações. Finalmente, o efeito de um aumento das exportações brasileiras de açúcar na ausência das tarifas SSG foi calculada e também o impacto global sobre a economia brasileira usando sua matriz de insumo-produto. Os resultados indicaram que o impacto do valor do açúcar que não foi exportado para os mercados da União Europeia e dos Estados Unidos devido à SSG no período 1995-2013 foi equivalente a R$ 42 bilhões no valor da produção para toda economia (a preços de 2013) e quase R$ 22 bilhões no PIB para este país. Considerando-se que nas SSG, o mecanismo baseado no preço é particularmente importante quando os preços do mercado internacional são baixos, estes resultados sugerem que esta intervenção política pode ser altamente perversa, uma vez que se traduz em diminuição da produção doméstica e deprime o preço mundial do produto.
Palavras-chave: Açúcar, tarifa SSG, matriz insumo produto.

Abstract
This paper presents a critical analysis of the SSG and a simulation of its effects for Brazilian sugar exports to countries such as the United States (US) and the European Union (EU) bloc. A first stage involved the identification of tariff lines (TL) for the EU and the US sugar imports from Brazil during the period of 1995 to 2013. Next, WTO notifications about SSGs were examined to identify when the measure was applied for sugar by these countries at each

year, since 1995. For the years that the price-based SSG applied, the value of this additional tariff was calculated for each of the relevant TLs. This information was used, with price elasticities, to obtain the corresponding change in imports. Finally, the effect of an increase in Brazilian sugar exports in the absence of SSG tariffs was calculated and also the overall impact on Brazilian economy using its input-output matrix. The results indicated that the impact of the value of sugar that was not exported to the EU and US markets due to SSG tariffs in period 1995-2013 was equivalent to BRL 42 billion in the production value for all economy at 2013 prices (or US$ 20 billion) and almost BRL 22 billion in GDP for this country. Considering that the SSG price-based mechanism is particularly important when international market prices are low, these results suggest that this policy intervention can be highly perverse as it translates into decreased domestic production in both, exporting and importing countries, and dampened world prices as the excess demand is restricted.
***Key words**:* Sugar, SSG Tariff, Brazil, input-output matrix.

1. Introduction

The SSG is a set of WTO provisions through which a WTO Member country can temporarily insulate its domestic market from short-term fluctuations of the international prices by imposing a tariff rate that is higher than the bound tariff rate on the import of a particular commodity. Hence, the SSG mechanism is also temporary and short-term and not meant to insulate countries from long run price signals (Pal and Wadhwa, 2006).

When the multilateral trade agreement was interrupted by the second time in July 2008 - after the 2006 interruption –, advocates of trade liberalization considered that this was not a disaster, since the postponement of a "final" agreement did not mean that the actual degree of liberalization of global trade would be far less than would have been the case if a consensus had been settled at that time. It has been argued that the negotiations were not expected to reduce the actual protection in global trade, since they should establishing limits and the form of protection that a country could resort to in different areas. The point to note, however, is that an expressive asymmetry of the world trading system remains. This is reflected, on the one hand, by the tariff and non-tariff barriers to which various countries - including the United States (U.S.) and the European Union bloc (EU) - can resort to protect their agricultural sectors, whenever their competitiveness is under challenge. On the other hand, it is seen in the pressure maintained upon developing countries to expose their agricultural sector to competition from imports, even though agriculture is a far more important source of livelihood for these countries than is the protected agricultural sector for the developed economies.

This paper evaluates the consequences of the asymmetry related to the form taken by the special safeguard (SSG) as introduced by the Uruguay Round Agreement on Agriculture (URAA) in 1994, and the potential problems due to the lack of modifications in its basic rules although that there have been important changes in the international trade relations since its introduction and a forecast for coming years.

The trade relations selected to illustrate this problem are those involving major players in the international sugar market, such as Brazil, United States (U.S.) and the European Union bloc (EU). This market was selected because it is appropriate to explore the SSG mechanism under the argument to be developed in this research. Brazil is the major exporting country in

this market, responsible for about 50 percent of the world exports. At the importing side, the United States (U.S.) and European Union (EU) are important players that reserved the right to apply SSG tariffs to sugar (WTO, 2014).

Safeguards are temporary restrictions on imports adopted under special circumstances such as a sudden expansion of imports (WTO, 2002). This instrument was primarily introduced under the WTO Safeguards Agreement, but the URAA adopted special provisions on safeguards (Article 5) that apply only to agricultural products subject to tariffication. The safeguards duties for agriculture can be triggered automatically when the import volume of agricultural products rises above a certain level (volume trigger), or if prices fall markedly below historical prices (price trigger). In addition, it does not require demonstration that serious injury is being caused to domestic firms (WTO, 2002).

Although the SSG mechanism was created to deal with problems that liberalization of agriculture could create, the provision to 'remain in force for the duration of the reform process' indicates that the agreement provides no end date for its use. In legal terms, the SSG mechanism is in place until Members, by formal agreement, decide to end it. A major issue is that this leads countries to impose a tariff in excess of the maximum (bound) rate of tariff permitted under its under the Uruguay Round commitments. It is also important to note that the SSG was available only for countries that went through the tariffication/Tariff-Rate Quota (TRQ) route in the market access negotiations of the Uruguay Round. Currently, 39 out of all the 160 WTO Members have access to SSG (Pal and Wadhwa, 2006).

The next section describes the method and data used in this analysis, section 3 presents the results and finally conclusions are discussed in section 4.

2. Methods and data

Although in general, the SSG can be applied based on price or quantity, the sugar market has been subject only to price triggers.

The identification of the incidence of SSG additional tariffs requires a search of the notifications presented by the importing countries to the WTO. These notifications are to inform if the measure was applied or not by the importing countries on a yearly basis. However, there are several shortcomings in the content of the notifications of the SSG to the WTO. In general, importing countries are not obliged to specify the magnitude of the additional tariff applied, nor is the exporting country that will be subject to the mechanism. Therefore, to identify the impact of the SSG, this study considered an average additional tariff, calculated as the value that could be applied on the Brazilian exports. This average value has also been used to identify the impact on Brazilian sugar exports if this additional tariff had not been applied.

The item that follows describes the method used for these calculations. Section 2.1 presents the method to calculate the volume of sugar that Brazil could be exporting since 1995 if the SSG had not been applied and finally, the total impact on Brazilian economy is estimated, as described in Section 2.2.

2.1 Calculation of the impact of SSGs on Brazilian sugar exports

A first stage of this research involved the identification of tariff lines (TL) for the European Union (EU) and the United States (U.S.) of sugar imports from Brazil during the

period of the analysis (1995-2013). These data were obtained from Eurostat (2014) and USITC (2014).

Next, the WTO notifications were examined to verify if the SSG measure was applied for those TLs and countries at each year since 1995 (WTO, 2014b), when the SSG was implemented. For the years when the price-based special safeguard was applied, the value of additional tariff for each of the relevant TLs was calculated. This calculation required the identification of the price that was subject to SSG. This price could be obtained as the unit value of the Brazilian import for each tariff line on a yearly basis as the ration between the trade flow value and its volume. However, whenever the SSG was added to an over quota sugar tariff by the EU and U.S. and also depending on the quota management, the price paid to exporters within the quota could be higher than the international price, due to rents in imports in-quota. Therefore, if the importing country traded over-quota and paid SSG as notified, the CIF price paid by the importer should be equal to the export price plus freight (this means that the price does not have the in-quota rent). Then, the CIF price (P) in each year was obtained adding to Brazilian FOB unit values (obtained in Brazil, 2015), the average freight between Brazil and each market analyzed. The freight in each year was obtained in OECD (2015) and IGC (2015).

Using the trigger price and the SSG mechanism explained in the URAA (WTO, 2014a), the additional tariff in ad valorem value was calculated for each TL, year and importer. The average additional tariff calculated for the TLs was applied to the Brazilian export unit value for each year that imports were subject to SSG. Whenever the SSG is applied, the import demand curve for this product/country can be represented as ID in Figure 1(a). The domestic price for this product is, at least, this total amount paid by importer. Consequently, as described in the graphic that represents the domestic market of the importer country (Figure 1, b), the quantity imported equals 0-Q1. However, if the SSG was eliminated, the domestic price, which is defined by the CIF import price (P) plus taxes (T_{out} to out-quota tariff and T_{SSG} to SSG additional tariff), changes from P_{dom} to P'_{dom} and the import volume would be 0-Q1 to 0-Q2.

To estimate the impact caused by the use of this additional tariff (T_{SSG}) on production and consumption in the importing country (ΔM), additional information is needed, such as the volumes produced (S) and consumed (D) on yearly basis, as well as the estimated price elasticity of supply (ε) and of demand (η). These volumes were obtained in FAO (2014) and the elasticities used in this study are those estimated and presented by FAPRI (2014). The sugar volume that would not be imported due to the SSG was calculated using Equation 1.

$$\Delta M = [(P_{dom} - P'_{dom})/P_{dom}] * \eta * D - [(P_{dom} - P'_{dom})/P_{dom}] * \varepsilon * S \quad (1)$$

The quantity of the product that could not be actually exported (ΔM_{BR}) is obtained by multiplying the change in total import volume (ΔM) by the share of the Brazilian exports for each of the corresponding years. When this volume is multiplied by the Brazilian FOB price, the value of exports that could not be traded is obtained. For the prediction of impact in the coming years we used the supply and demand quantities, as well the Brazilian share, observed in 2013.

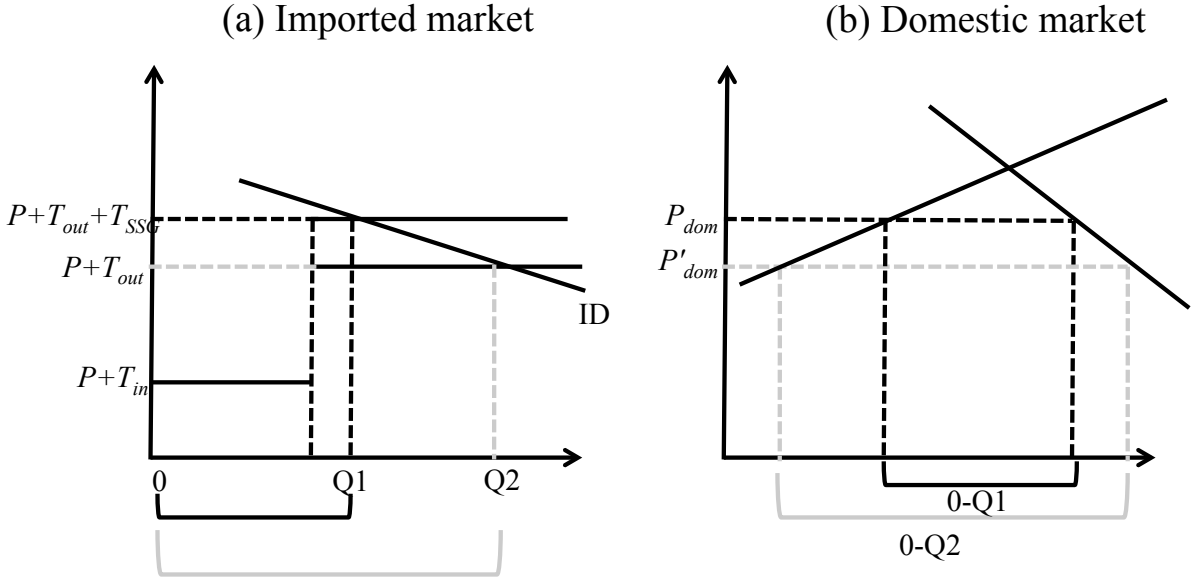

Figure 1. Importer market that applied over quota tariff and SSG for a product and impact of the SSG on its imports
Source: Elaborated by authors.

This quantity (ΔM_{BR}) multiplied by the price paid to producers provides a value to be used in the estimation of the impact on the Brazilian economy, using an input-output matrix for this economy. The next section describes the method applied in this analysis.

2.2 Calculating the impact of the SSGs on Brazilian economy

This study sought to analyze the impact of the expected lost in its sugar exports considering the use the SSG mechanism by importer countries on the Brazilian economy. The approach adopted to evaluate the magnitude of these effects involved the relationships among all the Brazilian sectors with the sugar sector, which would be directly affected. The analysis is based on a matrix of technical coefficients derived from the input-output matrix (IOM) of the Brazilian economy, for 2009 – which was the most recent data available.

This matrix (A) represents the relationships of intermediate demand. The production value of the economy (matrix X) can be described as:

$$AX + Y = X \quad (2)$$

where Y is the matrix of final demand. This can be rearranged and expressed as:

$$X = (I - A)^{-1} Y \quad (3)$$

where X represents the output of the economy and $(I - A)^{-1}$ can be used to calculate the direct and indirect impacts of the changes in the Brazilian demand (Y) and is described as the Leontief inverse matrix (Miller & Blair, 2009). These are the type I impacts.

We can also obtain the income effects corresponding to an increase in household demand resulting from the direct and indirect effects of a change in economic activity, identified as the type II multipliers. This last impact is obtained assuming closure for households activities. In this case, the Leontief inverse matrix is derived from a matrix A^* of

technical coefficients, where household consumption is treated as endogenous, hence the sector multipliers are calculated from the matrix $(I-\overline{A})^{-1}$. Thus, the total output of the economy that is driven to meet the change in final demand is obtained as follows:

$$\overline{X} = (I-\overline{A})^{-1} * Y \quad (4)$$

where $(I-\overline{A})^{-1}$ is the new Leontief inverse matrix.

The impact multipliers, i.e. matrices $(I - A)^{-1}$ and $(I-\overline{A})^{-1}$ were used to calculate the impact on the Brazilian economy from the changes in Brazilian sugar exports (Y). This change in exports represents the shock applied on the Brazilian economy and is.

The shock on the Brazilian sugar exports was calculated as the volume of sugar that the country did not export due to the SSG applied (ΔM_{BR}), since 1995, multiplied by the producer price in Brazil for the same year of the employed input-output matrix (IOM). The IOM used in this calculation considered the structure of the economy in 2009. It was obtained by Guilhoto (2014), where the sugar sector is distinguished from the whole economy and, consequently, can be used to verify what happens if a shock occurs only in that sector.

The impacts on the Brazilian economy were measured not only in the form of the value of production (X), as described by equation (3). Other impacts, such as the value of remuneration (Z_R), the import value (Z_M), the Gross Domestic Product – GDP (Z_{GDP}) and the value of tax (Z_T) were also calculated. For that, the production value (X) is multiplied by the coefficient for each of these variables, as described in equation (4):

$$Z_{(nx1),k} = [diagonalized(C_{(nx1),k})]_{(nxn),k} * X_{nx1} \quad (5)$$

where $k = R$ (remuneration value), M (imports value), GDP (value of the Gross Domestic Product), or T (value of the government tax collection).

The coefficients C_k were obtained using the input-output matrix and dividing the value of the each variable: C_R, C_M, C_{GDP} e C_T for each of the n economic sectors by its production value (X).

3. Results

A first step of this research was the identification of the tariff lines (TL) that were relevant in EU and U.S. for sugar imports from Brazil since the year that SSG started to be applied until the last notifications of SSG to the WTO through the 1995 to 2013. Three TLs were identified for each market. In the EU these were identified at an 8-digit tariff line as: 17011110, 17011190 and 17019910. For the U.S., the relevant tariff lines were identified as: 17011150, 17019158 and 17019950. It must be noted, however, that a change was introduced in the Harmonized System (HS) for sugar in 2012, when the HS6 170110 was changed to HS6 170114. The important TLs identified for the U.S. market are those that represent the out quota import for the main TLs corresponding to the U.S. sugar imports from Brazil. This occurs because the TLs for in and out of quota are not the same in the U.S.

In both markets (U.S. and EU), these three TLs represented 98% of the total sugar imports from Brazil in the period of the analysis. Additionally, these importers (EU and U.S.) reserved the right to apply SSG to these three TLs.

Following, the results are presented in three steps. First, in subsection 3.1, we analyzed the impact of the use of SSG since it was implemented in 1995, until the last notifications

about it. Second, we analyzed the possible impacts in the coming years, taking into account the different levels that sugar price is recently reaching and forecasted in world market. Finally, in order to make a sensitive analyze for the results obtained, we explored the possible changes in this estimation for different price elasticities for EU and U.S. markets.

3.1 Impact of SSG during the period 1995-2013

An evaluation of the WTO notifications for sugar in the EU shows that SSG measures were applied every year since 1995 for all sugar tariff lines (WTO, 2014b). The U.S. market did not apply SSGs in 1995, 2001, 2007, 2008 and 2012 to raw sugar and only in 2008 for the HS 17019950. We observed that the import volume in the HS 17019158 (for U.S.) was relatively lower compared to the other two sugar tariff lines

Table 1 shows the additional tariffs, in ad valorem, regard to CIF price (which was estimated as Brazilian FOB unit value plus freight) for the EU and the U.S. market in the three TLs selected along the 1995 to 2013 period. We can see in this table that the additional tariff presented similar behavior among TLs and markets that is highest additional tariff in beginning of 2000s and non-importance of SSG in the last four years analyzed (2010-2013)[1]. This is expected since the price behavior of the raw and white sugar should be the same. In lasts years, the use of SSG measure was inhibited since the international sugar price was close to the trigger price.

As described in section 2.1, to examine the impact of the elimination of this additional tariff for production and consumption in the European Union and also for the U.S. sugar market, the average of those three additional tariffs was considered.

Taking into account the equation (1) described in section 2, the volume of sugar that EU and U.S. did not import due the use of SSG measure was estimated. The domestic price cogitating the SSG (P_{dom}) or not (P'_{dom}) was estimated for each sugar, market and year analyzed. For this, we also need include the out of quota import tariff that are a specific tariff for all TL analyzed. In European Union they are: 418 Euros/ton for TL 17011110; 552 Euros/ton for TL 17011190 and 531 Euros/ton for TL 17019910. In U.S., the specifics values for the out of quota tariffs are: U$330/ton for TL 17011150; U$480/ton for TL 17019158 and U$500/ton for TL 17019950.

The results, which represent the volumes of sugar that would not be imported by EU and U.S., is described in Figures 2 and 3, respectively, in each year, since 1995. These figures also illustrated the portion of these volumes that were due to a decrease in production and the portion due to increase in demand, which depend on the price elasticities used. For the EU sugar market, the price demand elasticity used was -0.1 and price supply elasticity 0.6 (Fapri, 2014). Since price elasticities for the U.S. market was not available from this same source, the EU price elasticity as also used for the U.S.

[1] The last notification in the U.S. was for 2012 (WTO, 2014b).

Table 1. Estimated SSG additional tariff considering the annual average of unit value of EU and U.S. sugar imports from Brazil; period 1995-2013[2]

	EU			U.S.		
	17011110	17011190	17019910	17011150	17019158	17019950
1995	4.9%	16.6%	6.4%	-	-	-
1996	7.1%	20.7%	12.4%	-	-	-
1997	10.3%	27.0%	16.0%	0.8%	2.0%	9.3%
1998	22.2%	45.3%	29.1%	7.8%	24.9%	16.9%
1999	53.1%	92.6%	52.6%	25.9%	-	33.5%
2000	41.4%	75.4%	39.1%	18.3%	-	24.3%
2001	25.8%	50.6%	34.7%	0.0%	-	21.0%
2002	52.3%	91.5%	56.0%	25.4%	-	35.5%
2003	41.6%	75.7%	53.8%	22.3%	-	38.0%
2004	44.0%	79.5%	48.6%	20.1%	-	24.9%
2005	23.5%	47.0%	29.3%	8.4%	-	14.8%
2006	3.6%	14.3%	6.0%	-	-	1.5%
2007	10.9%	28.1%	14.0%	0.1%	-	7.9%
2008	3.0%	13.6%	7.1%	-	1.7%	-
2009	0.5%	10.3%	4.5%	-	-	-
2010	-	0.6%	-	-	-	-
2011	-	-	-	-	-	-
2012	-	-	-	-	-	-
2013	-	3.3%	-	-	-	-

[2] The additional tariff estimated in this study and, consequently, the other results that follow it, are different those obtained in the previous study once the CIF price paid by the importer (*P*) were different. While in previous we consider the unit value import from Brazil, here we use the export price plus freight.

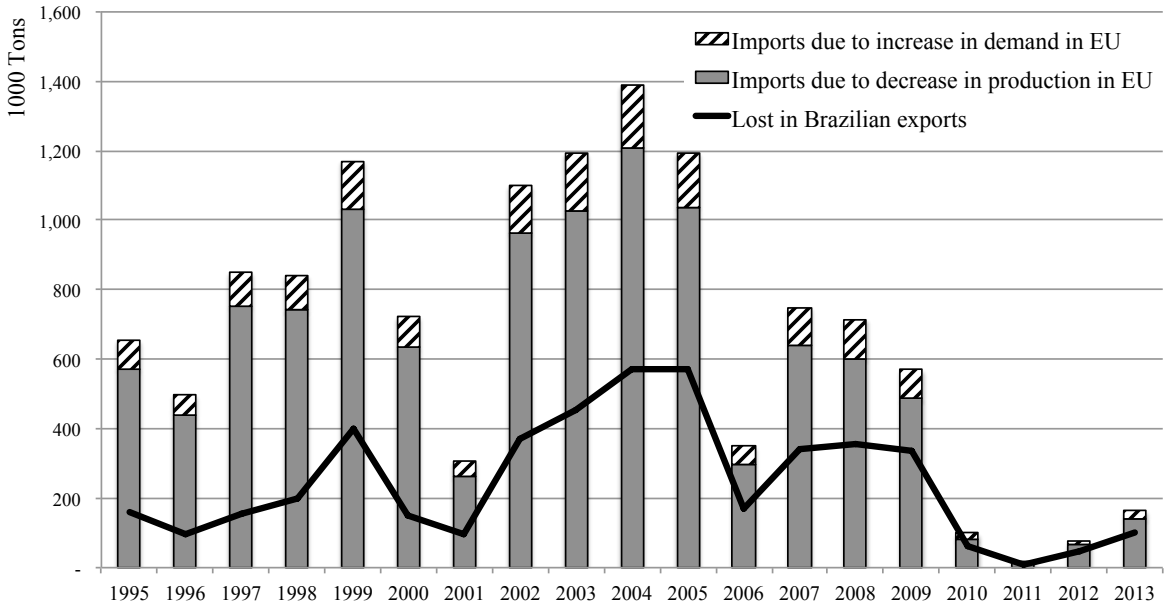

Figure 2. Estimated sugar volume that EU left importing, from the world and from Brazil, due the use of SSG measure in period 1995-2013

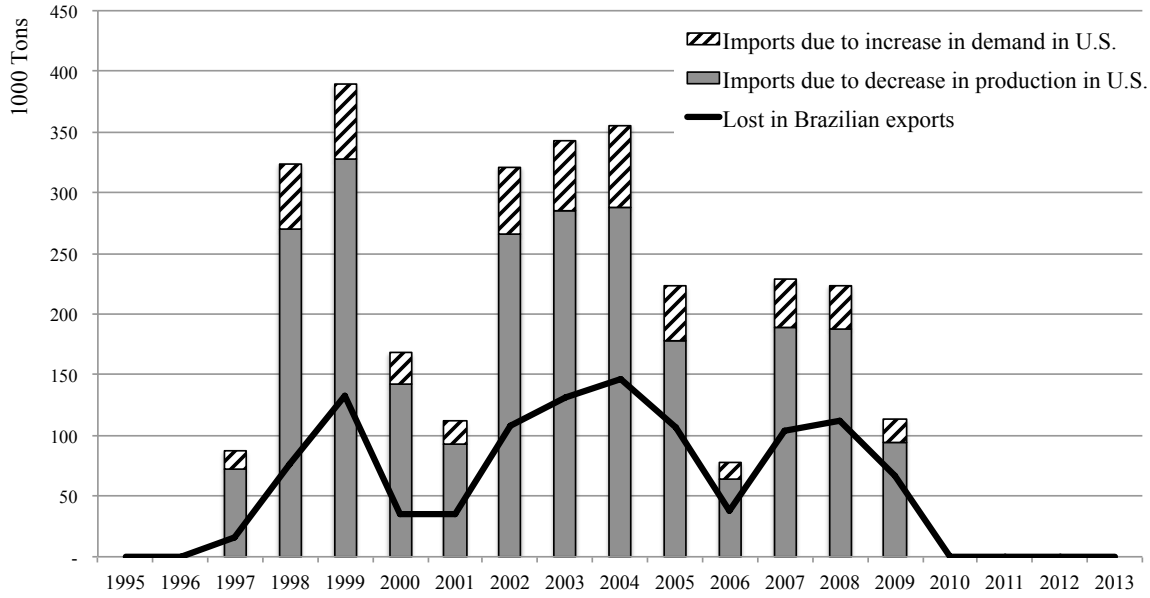

Figure 3. Estimated sugar volume that U.S. left importing, from the world and from Brazil, due the use of SSG measure in period 1995-2013

Figures 2 and 3 also show the amount of impact in import volume due to increase in demand, once the domestic price reduce and due to reduce in domestic production, once the producer price in importer country decrease as well. The import volume due to decrease in production, for both markets, responds to majority impact once the supply elasticity used (0.6) is more elastic than the demand elasticity (-0.1). As described in subsection 3.3, if these

elasticities change, become more or less elastic, the impact in import volume in these markets also varies. The magnitude of these variations is analyzed in that subsection.

As described in section 3.1, weighting this result by the market-share of Brazilian exports in the world, the volume of sugar that Brazil did not export to the EU in each year is described in the black line in Figures 2 and 3.

The results described in Table 1 and Figures 2 and 3 occurs due the performance of sugar CIF import price. The functioning is: how much the sugar import price decrease, higher is the additional tariff that importer country should apply and, consequently, greater is the volume of sugar that these countries do not import and Brazil do not export subsequently. Figure 4 shows this behavior, illustrating the main import sugar price and the volume of sugar that Brazil probably left export due to SSG applied in both importer analyzed.

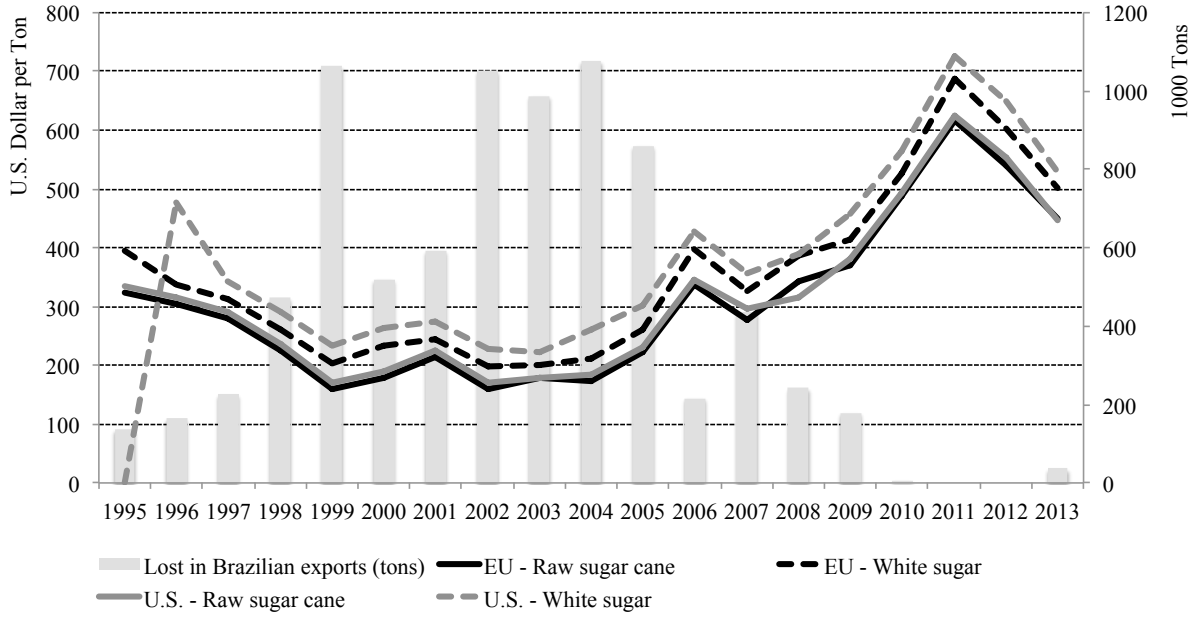

Figure 4. Sugar CIF import price for EU and U.S. and estimated sugar volume that Brazil could not export due the use of SSG; period 1995-2013

Finally, the sum of all the estimated volume of sugar that Brazil did not export to both, the EU and U.S. markets, due to SSG in period 1995-2013 results in 7,107 thousand tons in the case of EU and 1,157 thousand tons for the U.S. Figure 5 shows the impact on the overall Brazilian economy due to increase of this demand for sugar sector (8,264 thousands tons). In this figure, we represent the direct and indirect impacts in Brazilian economy (that is the impact type I) and also add the impact due to income effect related to this first impact (that is the impact type II).

Considering the overall Brazilian economy, the increase of this demand for sugar sector (8,264 thousands tons) results in a total (direct, indirect and income effects) impact in this period of 42 billion in Brazilian Reals in production value to 2013 prices (Figure 5), half of which is the direct and indirect effects. This represents almost US$ 20 billion in 2013 prices. This impact was obtained using the equations (3) and (4) described in section 2.2, respectively, for impact type I and II.

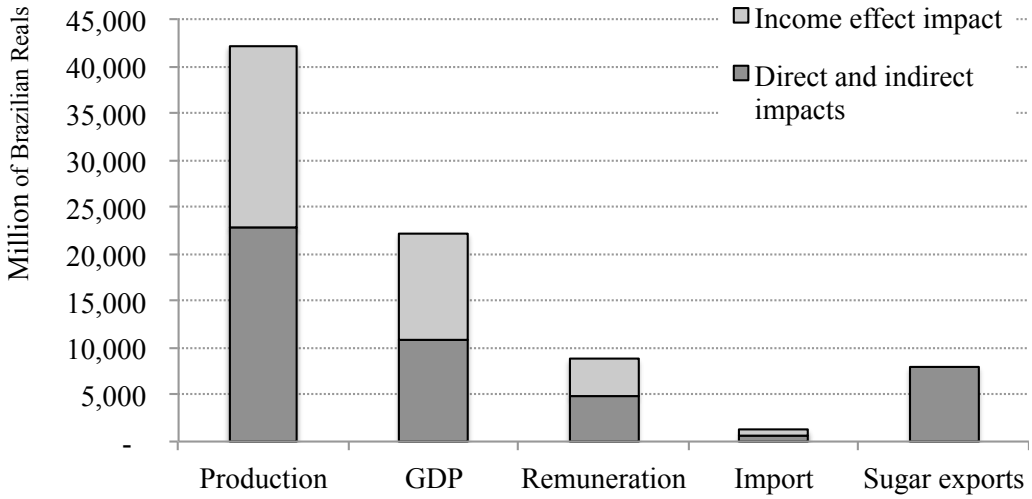

Figure 5. Estimated impact on the Brazilian economy due to sugar volume that EU and U.S. left importing from Brazil in period 1995-2013

Using the equation (5), we can also identify the impact on the other variable, as GDP, remuneration and Brazilian imports (Figure 5). Figure 5 also includes the value of the shock in the sugar demand due to increase in exports to the EU (6,873 million Brazilian Reals – BRL) and to the U.S. (1,119 million Brazilian Reals – BRL), in revenue for producers. The total impact in GDP in all this years was 22 billion in Brazilian Reals, which, nearly half represents increases in remuneration. In order to have a magnitude of this impact, the total impact in production value and in GDP for the period analyzed represents 0.8% of those values for all Brazilian economy in 2009. Unlike the other variables, the increase in imports could be a negative impact on Brazilian economy if it was higher than exports. However, we can see in Figure 5 that the initial shock that represents sugar exports (BRL 7.9 billion) is much higher than its impact in increase the imports (BRL 1.3 billion).

The results for Brazilian economy described in Figure 5 reflect the impact for the nineteen years analyzed. However, as we can see in Figures 2 and 3, the additional tariff due to SSG had almost none impact after 2010. Thus, the annual impact on Brazilian economy, disregarding the last three years, was: BRL 2.8 billion for the value of total production and BRL 1.4 billion for the GDP.

This investigation is important to Brazilian government once show how much was the damage done by this policy and consequently, the importance of negotiations in WTO to its reform. However, because in the last years this mechanism was not much important, the analysis done next shows how much the SSG could became significant in the coming years, strengthening the conclusion that the country negotiate the performance of this mechanism multilaterally or bilaterally.

3.2 What we can expect to coming years?

In 2014, the sugar price in world market decreased, reaching the levels observed in 2009. In this subsection we analyzed the impact of the two possibilities that the price level for

sugar in world market could achieve in the coming years and evaluated the annual impact on sugar trade and Brazilian economy.

Table 1 shows the two potential prices to sugar and its impact. The forecast of free market sugar price made by the International Monetary Fund (IMF, 2015) shows that, in 2015, the average price will be 14% lower than the average price observed in 2014. Thus, we considered two possible price behavior for the coming years: one more optimistic, where the prices are 10% lower and other pessimistic, where the prices are 20% lower than the average import prices observed for EU and U.S. in 2014.

Table 1. Forecast to world sugar prices (U$/ton) and expected annual sugar volume that EU and U.S. left to import, and their annual impacts on Brazilian economy, due the use of SSG

		Unit	Optimistic (less 10% of the 2014 prices)		Pessimistic (less 20% of the 2014 prices)	
			EU	U.S.	EU	U.S.
In importer countries	SSG additional tariff*	%	3%; 13% and 4%	0%; 0% and 4%	7%; 20% and 6%	0%; 0% and 5%
	Volume left to import	1,000 tons	536.6	98.7	791.7	149.7
	Value left to export	1,000 US$	123,054	22,639	161,376	30,526
Total impact (direct, indirect and income effect) on Brazilian economy	Increase in Brazilian production value	BRL million	1,937		2,871	
	Increase in Brazilian GDP		1,023		1,516	
	Increase in employment	Number	28,530		42,276	
	Increase in remuneration	BRL million	407		604	
	Increase in Brazilian imports		61		90	

Note: *the additional tariff described are, respectively for: 17011110; 17011190 and 17019910 for EU and; 17011150; 17019158 and 17019950 for U.S.

We observed that, the annual average impact described previously (discounting the period 2010-13), is between the annual effects on Brazilian economy found for the optimistic and pessimistic scenario for sugar price: while the annual average impact on Brazilian production was BRL 2.80 billion for period 1995-2009, in the optimistic and pessimistic scenarios it were, respectively, BRA 1.9 - 2.87 billions. However, we can also observe that the additional tariff due the SSG mechanism for this forecast prices were lower than the majority of tariffs paid by EU and U.S. While the average of additional tariff paid by EU and U.S. in period 1995-2009, in the three TLs analyzed, were 32% and 14%, the average tariff

estimated for the forecasted price were 6.7% and 1.3%, respectively. These mean that, if the past sugar price repeated, we can observe a higher annual impact on Brazilian economy, even that showed in the pessimistic scenario analyzed. This pessimistic scenario shows that, if the CIF sugar import price falls 20% in relation to that observed in 2014, EU and U.S. would reduce their sugar imports in 791 and 149 thousands tons, respectively. Consequently, the reduction in Brazilian sugar export would cause the following annual reduction on Brazilian economy: BRL 2.87 billions for the total production value; BRL 1.5 billion for GDP; BRL 0.6 billion in remuneration and 42 thousands jobs.

For the optimistic scenario, which the sugar import price reduce 10%, the persistence of the SSG, could cause an annual damage in Brazilian economy in amount of BRL 1.9 billion for production value and BRL 1.02 billion for GDP. Per year, 28 thousands jobs may be lost. These reduction in some Brazilian economic variables, represent, in percentage of the Brazilian economy in 2009, to almost 0.03% and 0.05% for the optimistic and pessimistic scenarios, respectively.

It is important take into account that, the magnitude of the impacts on Brazilian economy analyzed depends on the producer and consumer behavior in the importer markets. This behavior is represented by the price elasticities in this study. Thus, in next we identify the impact for period 1995-2013 in Brazilian economy, but cogitating different values of price elasticities.

3.3 Sensitive analysis

The price elasticities used for EU and U.S. in this study has an important role in the results. For this, in this subsection we simulate the same results described for period 1995-2013 but using different elasticities. In the first two scenarios (A and B), the price demand elasticity for both markets (EU and U.S.) changes: in Scenario A increases from -0.1 to -0.5 and in Scenario B decreases from -0.1 to -0.03. For scenarios C and D, the price supply elasticity varies from 0.6 to 1.2 and 0.3, respectively. Table 2 describes these scenarios and the new results obtain from each of them.

In one hand, we can see in the shaded columns at Table 2 that, when price demand and supply elasticities become more elastic (scenarios A and C, respectively), the volume that those markets left importing during the period 1995-2013 increases, from 24.5 millions tons to: 37.6 millions tons when price demand elasticity rise and; 45.8 millions tons when price supply elasticity changes. Considering the Brazilian share in the sugar world market, the impact on the Brazilian GDP increased, from BRL 22.2 billions to: BRL 34.2 billions when price demand elasticity rise and; BRL 41.4 billions when price supply elasticity changes. As GDP, the values in others variables considered in Brazilian economy also increase. This means that, when consumers and, or, producers of sugar answer more due to change in prices, the reduction in economy of the exporter markets due to use of SSG became bigger. In this case, almost double the amount of losses in Brazilian economy when price supply elasticity double (Scenario C), which was the condition where the Brazilian economy suffered major losses due to application of SSG.

On the other hand, when price demand and supply elasticities become less elastic, as described in Scenarios B and D, respectively, the volume that those markets left importing during the period 1995-2013 decrease. When EU and U.S. price demand elasticity fall, the

sugar volume that these markets left importing down from 24.5 millions tons to: 22.2 millions tons when price demand elasticity fall (Scenario B) and; 13.9 millions tons when price supply elasticity become more inelastic (Scenario D). The consequent impact on the Brazilian GDP due to reduction in Brazilian export were from BRL 22.2 billions to: BRL 20.1 billions when price demand elasticity decreased and; BRL 12.6 billions when price supply elasticity declined. Thus, the price elasticities described in Scenario D were those that produce the lower impact on trade and, consequently, in the economy of the export country.

Table 2. Price elasticities values used in each scenario described for sensitive analysis and estimated sugar volume that EU and U.S. left importing, and their impacts on Brazilian economy, due the use of SSG in all period 1995-2013 measured in this study and shown in Figure 2 and 3

	Unit	Used	Scenarios analyzed in sensitive analysis			
			A	B	C	D
η, for EU and U.S.	%	0.1	-0.5	-0.03	-0.1	-0.1
ε, for EU and U.S.	%	0.6	0.6	0.6	1.2	0.3
Volume that EU left importing	1,000 tons	21,120	31,885	19,236	39,549	11,906
Volume that U.S. left importing		3,437	5,782	3,027	6,288	2,012
Value left to export	1,000 US$	209,739	354,466	184,411	383,296	122,960
Production value	BRL million	42,102	64,917	38,110	78,501	23,903
GDP		22,234	34,283	20,126	41,457	12,623
Remuneration		8,854	13,652	8,014	16,508	5,027
Imports		1,316	2,029	1,191	2,453	747

Therefore, we observed that, even for different price elasticities, due the higher level of additional import tariff applied on sugar imports since 1995 owed to SSG, the impacts on international sugar trade and Brazilian economy are still considerable.

Take into account the future impacts in Brazilian economy, the worse scenario that we could consider is that with price elasticities described in Scenario D and with the same level of sugar import prices that occurs in period 1999-2003. In this case, if SSG still to be applied, the annual losses in Brazilian economy could be more than five times those impacts described in pessimistic scenario in the previous section.

4. Discussion of the Results

The purpose of this study is to illustrate some consequences of the interruption of the multilateral negotiations under the Doha Round of the World Trade Organization (WTO) concerning the access of competitive developing countries exports to commodity markets such as the sugar market in developed countries. This issue is relevant for the global sugar market, given its characteristic of being one of the most distorted by protectionism that has been left out of most multilateral and preferential trade agreements, and where price volatility is high both in the short and long-run due to its global market structure, as will be explained in this paper.

This research identified that additional tariffs associated to the SSG mechanism applied by the EU resulted in a relatively strong restriction on its sugar imports through the period from 1995 to 2013. Considering that Brazil is the largest sugar exporter in the global market, the restriction on Brazilian sugar exports was also large and became even greater when the impacts to the rest of Brazilian economy was considered. For all this period, the Brazilian GDP could have grown the equivalent value of the sugar industry GDP in 2009. In addition some assumptions made in this study possibly underestimated the results, such that the actual impact of a phase out of the SSG mechanism could be greater for the Brazilian economy. This occurs due to two important reasons. First, once there is no information about the value of additional tariff applied, the notifications presented to the WTO only describes if the SSG was applied or not, and the sugar import price should be very competitive (very low) to be imported in those circumstances. About this assumption, mainly for U.S., the importer notified the use of SSG in a lot of years that we did not found the additional tariff based on the assumptions made (they were: 1996, 1997, 1998, 2006, 2009, 2010 and 2011 to raw sugar, 1995, 1996, 2010, 2011 and 2012 to white sugar). Second, the share of the Brazilian export used to allocate the volume that Brazil could increase its exports is also undervalued due to the highest export subsidy from EU and the all barriers applied to sugar imports.

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