

# Impacts of Protectionism to International Trade: Evidence from the Sugar Industry in Vietnam

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This study uses a quantitative model of protectionist policies for fledgling industries proposed by Melitz (2005) and Irwin (1990) to investigate the impacts of the protectionism policies on the sugar industry in Vietnam from 2015 to 2019. To assess the impact of these tariff quota policies on sugar, the paper uses primary data from 36 Vietnamese sugarcane enterprises as well as using secondary data from the statistical yearbooks and the industry reports. The findings revealed that there are some negative impacts on consumer surplus and total welfare and the competitiveness of the sugar enterprises. Therefore, the paper proposes some solutions to improve the competitiveness of the sugar industry in Vietnam.

**Keywords:** *Irwin model, Melitz model, trade policy, total welfare, protectionism.*

## Introduction

The infant industry argument was first introduced by Hamilton in 1970 and has been questionable as a policy recommendation. Hamilton aimed to use of tariffs to protect the infant industries until their economies of scale were reached and encouraged government subsidies for these industries. Nicita et al (2013) stated that protectionism infers that the government has used some measurement to promote the domestic industry in the international integration stage. A few studies have been conducted to investigate the impact of these policies on international trade.

Campi and Dueñas (2019) analysed the impact of trade agreements (TAs) on bilateral trade flows. In general, in the integration process, some enterprises are still not strong enough to compete in the international trade process. Tariffs will make these enterprises' products to be able to compete with foreign goods (Krugman, 2003). The protection policy will be

considered illegal because it distorts the nature of trade. However, to protect the fledgling domestic industry, the policies are necessary for the integration period. Some developed countries have gained success in their industrialisation processes, such as the United States and Britain. Moreover, some developing countries have benefitted from this policy as well, namely South Korea and Taiwan (Chang, 2008).

A tariff is "a tax that a government charges on goods that enter or leave their country" (Macmillan Dictionary, 2020). This includes two sorts of taxes: import tax and export tax. Import tax is a duty imposed on imported goods, while export tax is a duty imposed on exported goods. Tariffs barriers are much more transparent, stable, and predictable than non-tariff barriers. As a WTO member, Vietnam has committed to the tariff quotas for agricultural products regulated in Schedule CLX - Part I - List of concessions and commitments on goods - Tariff quotas - Instrument of Accession WTO of Vietnam. Under WTO commitment, Vietnam is allowed to apply TRQ with 4 groups (28 types of taxes on HS codes with 21 types of agricultural products and 7 types of non-agricultural products). Sugar is one of the products permitted to apply TRQ. Additionally, Vietnam has also implemented the ATIGA commitment to support the development of the sugar industry. The tax rate on sugar products in ASEAN countries is 5% and that of non-ASEAN countries is 20%. The ATIGA commitment was supposed to be effective on 1st January 2018, however, it has been extended to 2020. On 1st January 2020, this commitment is effective and there is no protectionism for Vietnam's sugar industry while domestic sugar enterprises have not been strong enough. This policy is causing strong arguments that require to have an in-depth study on how protective policies impact on effective production of sugarcane enterprises in Vietnam.

## **Literature review and Methodology**

### ***Literature review***

This literature review will discuss infant industry protection regarding research methods. In terms of the qualitative approach, since 1791 there have been different studies on infant industry protection initiated by Friedrich List, John Stuart Mill, and Mihail Manoilescu. The modern trend to protectionism is developed and strengthen in the United States. Beers và van den Bergh (1997) studied the regulatory environment. Lincoln và McCallum (2016) conducted a study on import duty while Gonzalez (2012) discussed free trade agreements.

List (2018) consider protectionism as a necessary measure for a country is developing from free trade and facing obstacles from the competition of imported goods. His view was based on the theory of trade-off between the current benefit and future income. However, List (2018) affirmed that the protectionism should be limited because when the import tax is set a too high level, it will eliminate the competitive spirit of domestic producers. Therefore, the infant industry won't have the motivation to develop.

Similarly, Nguyen (2015) argued that in the context of globalisation and the open market, investment and commerce are more favourable. If all commercial tariffs are lifted, the income of developing countries can increase. Therefore, protectionism negatively influences not only to the country which imposed this policy, but also global growth. Nguyen Thang (2018) echoed this sentiment by stating that in the country supported by protectionism, consumers have no options to choose high-quality products and competitive prices as in the countries which follow the free trade. Therefore, the producers have low motivation to apply high technology in production, increase competitive capacity. The measurement to limit importation can harm the economy and consumers, especially the low incomes (Nguyen Thanh, 2016).

Relating to non-tariff barriers (NTBs), there are few studies have been conducted. Carrère and De Melo (2011) discussed the impact of non-tariff barriers. Carrère and De Melo (2011) propose a method to calculate how non-tariff measures influence trade flows. By introducing a method of four-step evaluation on the effectiveness of trade policy instruments toward the improvement of labour productivity, Ghodsi and Stehrer (2016) have investigated the relationship between trade policy and the global economy. Moreover, Deardorff and Stern (1997) appraise the existing quantifying measures for NTBs, i.e., recurrence type, price matching, quantity effect, comparable formal degrees of support.

Genç and Law (2014) emphasise the accelerating influence of non-policy barrier to the trade. When referring to the policy on tariff for Vietnamese agricultural products, Trinh (2006) claims that the tariff although has been imposable; nevertheless, the complicated uncertainty of international economic, political condition, as well as the introduction of a wide range of non-tariff at the exporting market currently, these policies, remain inadequate. Kozluk and Timiliotis (2016) determined that environmental policies are not an important operator of international trade models. Ngo et al. (2016) presented an investigation of the relationship between environmental regulation strictness and the desire for goods and services and noticed that higher fees lead to a decline in the number of new companies.

Regarding the quantitative approach, there are some studies have been conducted on infant industries. Melitz (2005) has developed the quantitative model to estimate the impact of tariffs and subsidies on the infant industries that need to be protected. in this study, the author has built an equation and illustrated the learning curve (FLC) to inform the development process of an industry from infant to mature is quick or slow. Van Beers and van den Bergh (1997) used a gravity model to analyse the impact of relatively stringent environmental regulations on exports and imports activities. When trade flows of intensive goods considered as an independent variable, no impact of environmental policy on the export activity of intensive goods was proved. The study also adds to the international trade literature

investigating the experimental correlation between entry fee and international trade in the Hummels 2005 and Arkolakis 2010. The cost of entry of goods and services considerably reshapes trade flows. When this cost is high, it can substantially reduce trade.

Khouilid và Echaoui (2017) have used the elasticity of imported demand and a predicted gravitational equation for a surveyed data from 28 countries which are developed at a different level to analyse the Moroccan export methods. Lee and Swagel (1997) examine the data from 41 countries in 1998 about trade flow, production, and trade barriers to test how political, economic factors, non-tariff barriers, and how the protection (tariff and non-tariff) affect trade flow.

Douglas A. Irwin (2002) has developed a model of price equation, domestic products yield, and measures the welfare earned in the steel industry of the protection policy from the British competition. From his research findings, he found the answers for two question "when the industry can develop without the protection" and "does tariff promote domestic production?". Irwin has found that the harmless from protection policy caused the increase of input materials, i.e., price of iron and steel had risen. However, finally, he concluded that the development of steel industry in America was thanks to the success of protection policy. After a period, the steel industry has gained some achievement in lowering production cost, conducted effectively technology transfer, and most importantly, the domestic production has developed.

Related to the trade protectionism, Yang và Martínez-Zarzoso (2014) applied gravity model to examine the influence of the determinants on the export value in the free trade area of ASEAN-China (ACFTA) from 1995-2010. Apart from the familiar variables such as GDP, population, and language, there are two newly added variables, i.e., the shared border and Free Trade Agreement AFTA including protectionism. The authors have evaluated some groups of products including agricultural products. Their findings confirm not only the suitability of new variables but also the impact of protectionism on the export value of a country.

In contrast, Tu (2008) has used a gravity model to analyse the trade statistic data from General Department of Vietnam Customs from 1998-2005 to assess the determinant factors to the level of trade protection in Vietnam under the commitment with other countries in ASEAN+3. The research findings indicated that due to the insufficient participation and implementation from Vietnam on commitments with ASEAN+3, there was limited impact on Vietnamese trade from ASEAN+3.

Generally, there are some studies on the impacts of protectionism on the infant industries, however, most of them concentrate on the policies in the protection period of the infant

industry. There is limited research on the impact of these policies in the extension period. The paper will focus on the protection policy on the sugarcane industry in the 2-year extension period (post-protection of 2018-2019) in Vietnam. This will provide some opinions on the decision of stop trade protection for this industry in early 2020.

### **Methodology**

This study uses a quantitative model of protectionist policies for fledgling industries of Melitz (2005) and Irwin (1990) to investigate the impacts of the protectionism policies on the sugar industry in Vietnam from 2015 to 2019. To assess the impact of these tariff quota policies on sugar, the paper uses primary data from 36 Vietnamese sugarcane enterprises (Vietnam has only 36 enterprises in the sugarcane industry) as well as using secondary data from the statistical yearbooks and the sugar industry reports.

#### **a. The effective Rate of Protection (ERP)**

In economics, the effective rate of protection (ERP) is a measure of the total effect of the entire tariff structure on the value-added per unit of output in each industry, when both intermediate and final goods are imported. This statistic is used by economists to measure the real amount of protection afforded to a particular industry by import duties, tariffs, or other trade restrictions.

Formula:  $ERP_i = \frac{Vi' - Vi}{Vi}$

$Vi'$ : added value in  $i$  industry when tariffs are applied;

$Vi$ : added value in  $i$  industry when the trade is free (before tax)

ERP can also be calculated by the following formula:

$$ERP_i = \frac{Vi' - Vi}{Vi} = \frac{ti - \sum a_{ij} t_j}{1 - \sqrt{a_{ii}}}$$

$t_i$  is the tax rate for finished goods;

$t_j$  is the tariff on intermediate goods;

$a_{ij}$  is the ratio expressing  $j$ 's participation in the production of  $i$  product.

The formula shows that the effective rate of protection is determined by the tariffs and the value-added in the total output.

If the tariff is the same on both inputs and outputs, ERP is equal to the nominal rate of tariff. If the output tariff is higher than the input tariff, the bigger the tax gap is, the bigger the ERP is. If the ERP is negative, it means that the tariff on raw materials is considered to be higher than the tariff on finished goods. In this case, tariffs are considered to play a role in adjusting

the factors of production that are outside of the industry rather than they are used to adjust resources. However, the tariff structure is pyramid-shaped. It is lower or equal to 0 for raw materials, higher for intermediate goods, the highest for finished goods. EPR is usually higher than the nominal tariff. However, the nominal rate of protection may be lower than the nominal tariff if domestic producers have to buy inputs higher than prices in the world.

### ***b. A Quantitative Model of Protective Policies for Fledgling Industries***

To assess the effectiveness of protective policies for manufacturing industries, this paper uses the Milert curve theory with two assumptions:

- Domestic goods and imported goods are interchangeable. Import tax is the only measure used by the government to protect the fledgling industry. In other words, this is a model to assess the impact of protectionism on domestic production. Tariffs are not stable. They will be reduced later.

- Technology is constant over time.

*The "study" function*

$q_t$ : quantity of domestic goods at time  $t$ ,

$q'_t$ : quantity of imported goods

Both are assumed to be nonnegative. The relationship between domestic cumulative quantity and  $Q_t$  is written as follows:

$$q_t = Q_t - Q_{t-1} \quad (1)$$

The domestic industry is assumed to be a fledgling industry, so the marginal cost at time  $t$  is  $c_t$

The marginal cost function is:

$$c(Q_t) = \exp(b-aQ_t), a > 0 \quad (2)$$

Domestic production, which is protected, and "maturity" will lead to the accumulation of a certain output ( $Q$ ), and the marginal cost will remain constant with this fixed output ( $Q$ ).

Meanwhile, the foreign manufacturing industry is assumed to have reached the "maturity" stage and has constant marginal costs at all times ( $\bar{p}_t$ ).

Therefore, the prices of domestic goods ( $p_t$ ) and prices of imported goods ( $\bar{p}_t$ ) are determined as follows:

$$p_t = c(Q_t) = \exp(b-aQ_t) \quad (3)$$

$$\bar{p}_t = c + \pi_1$$

As mentioned, earlier tariffs will decrease after a certain period in which the rate of the import tax rate is reduced or removed completely ( $T$ ). Before this period, the government could protect the fledgling industry at suitable tariffs however, after this time, tariffs must be reduced under the signed commitments in the trade agreements.

Therefore, the price of imported goods:

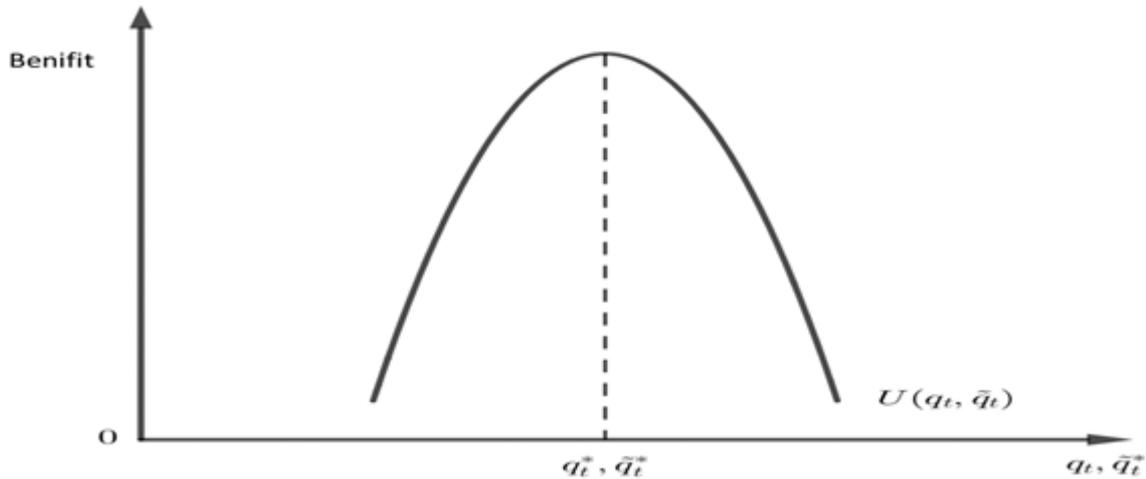
$$\begin{cases} \bar{p}_t = \tilde{c} + \tau_1 & t < T \\ \bar{p}_t = \tilde{c} + \tilde{\tau} & t \geq T \end{cases} \quad (4)$$

*Domestic demand and benefit function*

Domestic demand is created by representative consumers who have the welfare function achieved through consumption of domestic goods ( $q$ ) and spelling goods ( $\tilde{q}$ ), is a concave curve function  $U(q_t, \bar{q}_t)$

$$U(q_t, \bar{q}_t) = \beta(q_t^2 + \tilde{q}_t^2) + \gamma q_t \bar{q}_t + \alpha_1 q_t + \alpha_2 \bar{q}_t, \quad (\beta, \mu < 0; \alpha_1, \alpha_2 > 0) \quad (5)$$

**Figure 1:** Benefit function graph (Melitz, 2005)



Looking at the graph, we see when  $q_t, \bar{q}_t \geq q_t^*, \bar{q}_t^*$  benefit function reduces depending on the rise of  $q_t, \bar{q}_t$ .

So that if it does not happen, we need a condition  $q_t, \bar{q}_t < q_t^*, \bar{q}_t^*$ .

So

$$q_t < U_{q_t}(q_t, \bar{q}_t) \quad \text{or} \quad q_t < \frac{-\gamma \bar{q}_t - \alpha_1}{2\beta}$$

$$\text{And } \bar{q}_t < U_{\bar{q}_t}(q_t, \bar{q}_t) \quad \text{or} \quad \bar{q}_t < \frac{-\gamma q_t - \alpha_2}{2\beta}$$

With  $\rho_t$  and  $\bar{\rho}_t \geq 0$ , the problem of representative consumers is maximising their benefits. Also, consumer surplus is measured by the total benefits achieved minus the cost of purchasing domestic and imported goods.

$$CS_t = U(q_t, \bar{q}_t) - p_t q_t - \bar{p}_t \bar{q}_t \quad (6)$$

The condition for maximising benefits is:

$$\frac{\partial CB_t}{\partial q_t} = \frac{\partial CB_t}{\partial \bar{q}_t} = 0$$

$$\begin{cases} p_t = Q_q(q_t, \bar{q}_t) = 2\beta q_t + \gamma \bar{q}_t + \alpha_1 \\ \text{Or } \bar{p}_t = Q_{\bar{q}}(q_t, \bar{q}_t) = 2\beta \bar{q}_t + \gamma q_t + \alpha_2 \end{cases} \quad (7)$$

With  $2\beta$  is the slope of the demand curve ( $2\beta < 0$ );  $\gamma / 2\beta$ , denotes the possibility of substitution between domestic and foreign goods ( $\gamma \in [2\beta, 0]$ ).

#### *Welfare state and policy*

Welfare state ( $TW_t$ ) is the sum of consumer benefits and tax revenues:

$$TW_t = CS_t + \tau_t \bar{q}_t$$

Replacing the consumer surplus function and the price determination function above, we can rewrite the Welfare state function as follows:

$$TW_t = U(q_t, \bar{q}_t) - c_t q_t - \tilde{c} \bar{q}_t \quad (8)$$

The problem for policymakers is to maximise the value of gross welfare state (discounted over time).

So the problem of policymakers can rewrite is:

$$\text{Max } TW = \sum_{t=0}^{\infty} \left( \frac{1}{1+r} \right)^t \left[ U(q_t, \bar{q}_t) - c(Q_t) q_t - \tilde{c} \bar{q}_t \right] \quad (9)$$

With  $1/(1+r)$  is the discount rate and exogenous variable.

#### *Calculate and analyse*

Solve equation (9), we get

$$\tau_t = \frac{\gamma^2 - 4\beta^2}{\gamma} q_t + \frac{2\beta}{\gamma} e^{b-aQ_t} - \frac{2\beta}{\gamma} \alpha_1 + \alpha_2 - e \quad (10)$$

Looking at equation (10), we have the conclusions:

The optimal tariff rate depends on the first two components. With  $\gamma \in [2\beta, 0]$ , we have

$$\frac{\gamma^2 - 4\beta^2}{\gamma} > 0$$

, so, the relationship between  $\tau_t$  and  $q_t$  is the same direction. Additionally, the relation between  $\tau_t$  and  $Q_t$  is inverse proportion. The trend of the optimal tariff depends on  $q_t$  and  $Q_t$ .

The 3 exogenous factors affect the optimal tariff curve are the substitution between domestic goods ( $\gamma / 2\beta$ ) and foreign goods ( $2\beta$ ), the slope of the demand curve and the "learning" level ( $a$ ).

If the factors  $\gamma$  and  $a$  are constant and the greater the slope of the demand curve is, the greater the optimal tariff curve is. In theory, the steeper the demand curve is, the less the quantity demanded responding to the price is. Therefore, the welfare is not affected as much as the light demand curve. In this case, policymakers are even more motivated to increase import tariffs.

If other factors are constant, the higher the level of substitution between foreign and domestic goods ( $\gamma / 2\beta$ ) is, the higher the optimal tariff is. It is obvious that if there is an import bias, an increase in tariff will not affect the demand for imported goods significantly, thus the social welfare will not be affected negatively.

An important factor influencing the optimal tariff trend curve is the level of learning of the manufacturing industry ( $a$ ). In general, the use of tariff will lead to a distortion of welfare by increasing product prices. If the "learning" process takes place slowly, it takes a long time for the industry to balance while the economy is in a state of "distortion", the loss of welfare is greater.

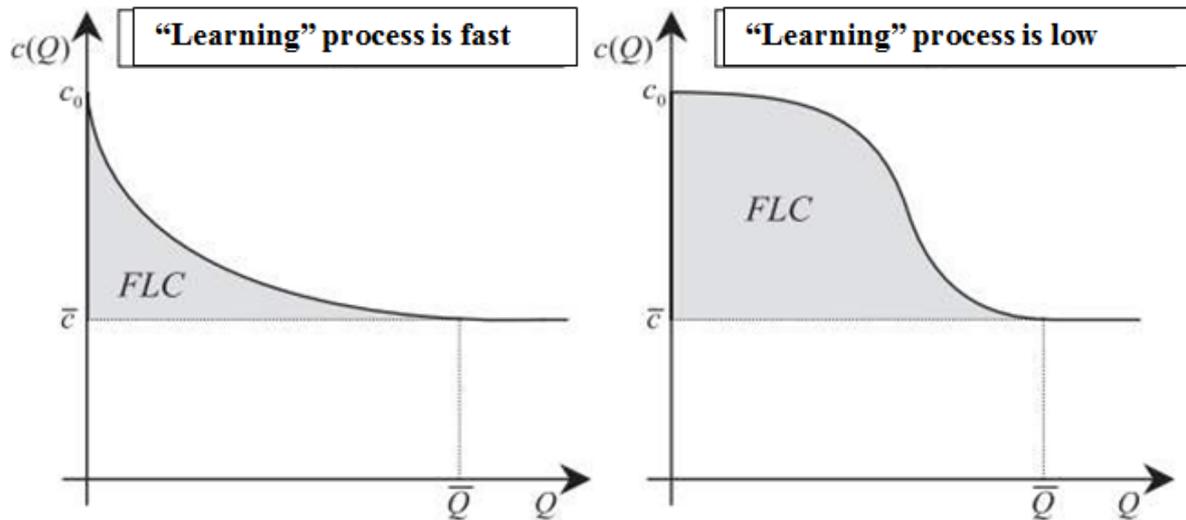
However, if the "learning" of the manufacturing sector is fast enough, the marginal cost decreases rapidly with the development of the industry, the price will drop, the negative effects of the tariff on with welfare state will be reduced gradually. Thus, if the learning level is slower, the optimal tariff curve tends to increase

### ***Evaluate the Policy***

- The first method: Using curves modelled by Melitz.  
To evaluate the effectiveness of policies, we can determine by the total welfare:

$$TW = \int_0^T W(qt)dt - FLC$$

**Figure 2:** Simulation of “learning” curve (Melitz, 2005)



Drawing FLC curves from the indicators shows the speed of the “learning” process of the fledgling industry and then can evaluate whether the policy is effective or not.

*The second method: calculate Total Welfare (Total Welfare) in the period*

Irwin (1990) introduced the total welfare model when a country implemented protectionism through tariffs as follows:

$$TW_i = CS_i + PS_i + GS_i$$

With,

$TW_i$ : total welfare

$CS_i$ : consumer surplus

$PS_i$ : producer surplus

$GS_i$ : Government surplus

And,

$$CS_i = - (P_{TN} * Q_{TN} + P_{NK} * Q_{NK}) + (Q_{TN} + Q_{NK}) * P_{\text{without tariff}}$$

With,

$P_{TN}$ ,  $Q_{TN}$ : price and consumption of domestic goods

$P_{NK}$ ,  $Q_{NK}$ : price and consumption of import goods

$P_{\text{without tariff}}$ : is the price product without a tariff.

Therefore, the total welfare includes producer surplus, consumer surplus, State surplus. Consumer surplus is calculated by the difference between the amount of money consumers pay for real goods and the amount they can purchase at a lower price without tariffs.

When the government implements protectionism with tariffs, the price of domestic and import goods are higher than those without tariff, so consumer surpluses are often negative (the loss of consumer).

## Results and Discussion

### *The sugar industry and protectionism policies in Vietnam*

#### *a. Sugar industry in Vietnam*

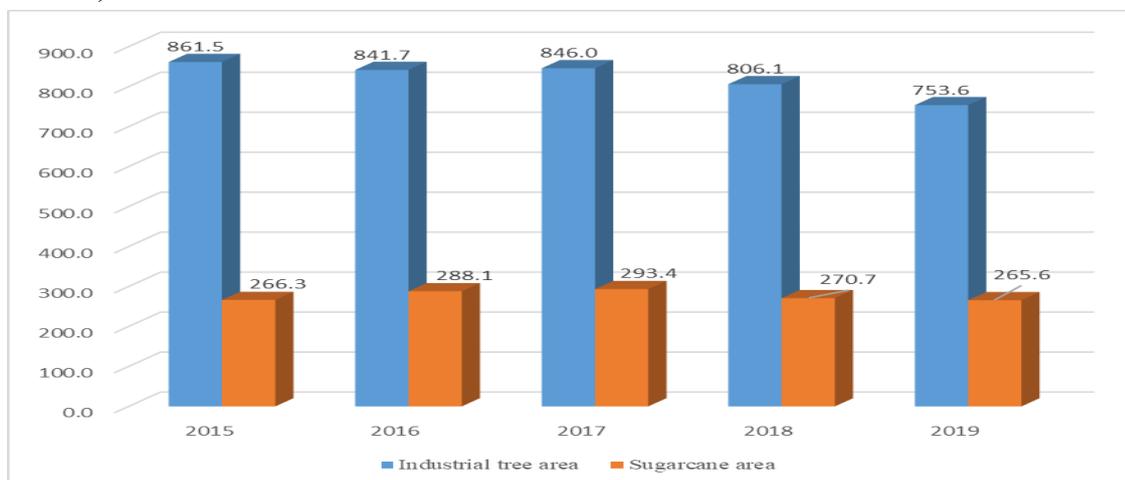
The sugar industry is one of the oldest agricultural processing industries in the world with more than 100 countries and territories participating in the value chain.

Global sugar production is about 174.8 million tons in 2018 and reaches an average growth of about 2% a year (VSSA, 2018). Sugar can be produced from two main materials: sugar (75-80% of global supply) and sugar beets (25-30% of global supply).

The sugar industry has been developing since the 1990s in Vietnam. In the ASEAN region, Vietnam is close to the world's second-largest sugar exporter, Thailand, and cope with to 300-500 thousand tons of smuggled sugar from the southwest border with cheaper production costs. Vietnam is also located near the world's largest sugar importers such as Indonesia (about 7% of global import turnover) and China (about 5.3% of global import turnover). Vietnam also participates in different trade agreements which brings more export markets for the sugar industry as well as opportunities to improve product quality and diversify products.

**Figure 3:** Statistics of sugarcane growing area in the period of 2015-2019

*Unit: 1,000ha*



**Source:** Ministry of Agriculture reports

In recent years, sugarcane enterprises have applied different methods to improve management capacity, competitiveness capacity and management costs. There is a strong trend of merging between sugar enterprises or value chain enterprises to improve production efficiency.

However, besides the opportunities, at present, the sugar market is facing many opportunities. Many sugarcane enterprises are operating under full capacity with the rate at 35.9% in 2017 and 44.3% in 2018. The current serious shortage of raw material and the competition of

smuggled sugarcane enterprises are continued in the next crops. Sugar prices tend to decrease slightly, and consumption is low. According to VSSA report, sugarcane area is 157,800 hectares in 2019, down 18% compared to 2018. The output is 1.18 million tons, reduced by 17.5% compared to 2018.

***b. Protective policies the sugar industry***

Although the sugar industry is still relatively fledgling, it is likely to develop in the future in Vietnam. Therefore, the Vietnamese government has taken protectionism methods with tariff policies to enable the industry can compete with the foreign sugar industry. When joining the WTO, Vietnam has made some commitments to protect some agricultural products, including sugar. Accordingly, under WTO's commitments, the sugar industry was to implement the following tariffs:

**Table 1:** Summary of Vietnam's sugar industry tariff commitments

No.	Product	Level of quota	Level of tariff (%)		Note
			In level of quota	Out of level of quota	
1	White sugar				Quota increase is 5% / year
2	Raw sugar	55.000T	25	85	Reduce from 30% in 2005 to 25% in 2009
3	Refined sugar	55.000T	60	50	

**Source:** VCCI, 2015

On the other hand, under the WTO commitment, in 2015, Vietnam applied a tariff quota of about 81,000 tons of sugar with a preferential tariff for WTO members of 25% for refined sugar and 40% for white sugar. While the normal tariff outside the quota is 80% for raw sugar and 85% for white sugar.

Additionally, Vietnam has signed ATIGA commitments with ASEAN countries. In this commitment, Vietnam offers ASEAN members preferential rates of 5% in quotas for both white sugar and raw sugar. In 2018, Vietnam proceeded to liberalise the import of sugar from ASEAN countries. Under the agreement with Laos, Vietnam offers it a preferential rate with an import tax of 2.5% for Laos' sugar products when the import is within the general quota amount as committed by the WTO commitments across the border between two countries.

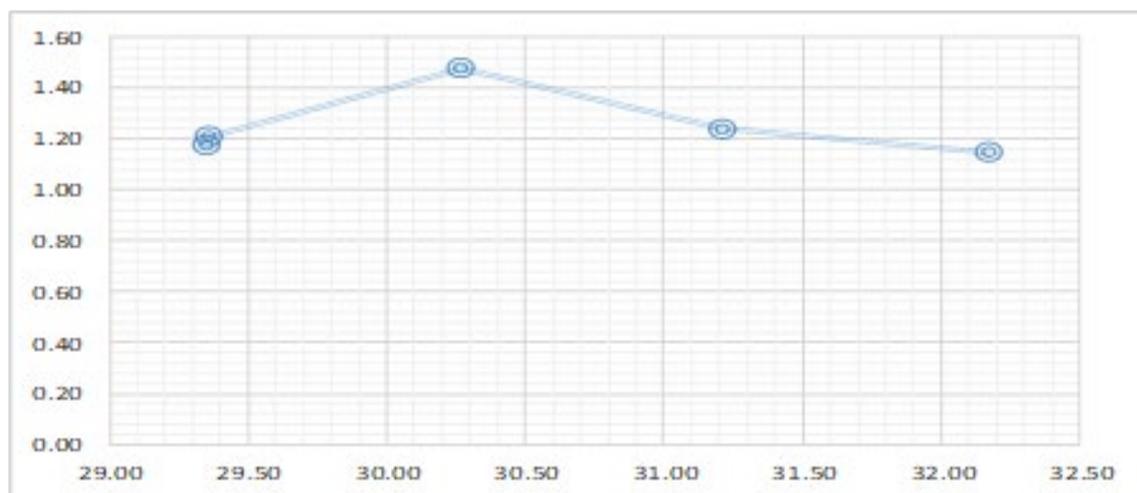
In general, it can be affirmed that the domestic sugar industry is still highly protected by the government, and this protection level is much higher than other important production industries such as textiles, leather shoes, rice, and coffee. According to ATIGA's commitment, Vietnam should have removed the import quota of sugar in 2018. However, to give enterprises and farmers more time to prepare to adapt to ATIGA integration, the Prime Minister agreed to postpone the implementation of the commitment for 2 years.

### ***C. Assess the Impact of the Policy on the Sugarcane Enterprises in Vietnam through Miler's Model***

To assess the impact of tariff quota policy on sugar industry from 2015 to 2019, the paper uses data investigating 36 sugarcane enterprises. By using these statistics, the paper calculates the sugar production cost and quantity from 2015 to 2019 in Vietnam. Compared with FLC in the theoretical content, it can claim that the "learning" process of the sugar industry is slow and unstable despite protectionism policies. From 2015 to 2018, production has increased but has not been stable. Sugar quantity increased rapidly in 2016 and 2017. However, this quantity decreased in 2019, the increase compared with quantity in 2015 is only 0.97%. Besides, production costs have decreased but the reduction is not significant, only about 20%.

**Figure 4:** "Learning curve" of the sugar industry from 2015 to 2019.

*Unit: million ton*



**Source:** Author's survey results.

Figure 4 shows that the "learning" process of sugar enterprises and the ability to reduce costs is weak as well as technology transfer remains limited. Therefore, the effect of protective policies on the development of the industry is ineffective from 2015 to 2019. The protective policies of the sugar industry in Vietnam still have many limitations, the high level and long-time frame of protection makes sugar price high and producers unmotivated. From this, the

researchers can conclude that the impact of protective policies, which have been implemented in Vietnam in the recent period (2018 – 2019) is also unstable and ineffective.

#### ***d. Calculating Total Welfare in Vietnam***

From the theoretical content of total welfare over time, the total welfare in the sugar industry in Vietnam is calculated by the following formula (Irwin, 1900):

$$TW_i = CS_i + PS_i + GS_i$$

$$CS_i = - (P_{TN} * Q_{TN} + P_{NK} * Q_{NK}) + (Q_{TN} + Q_{NK}) * P_{\text{without tariff}}$$

With,

$TW_i$ ,  $CS_i$ ,  $PS_i$ ,  $GS_i$  are total welfare, consumer surplus, producer surplus, government surplus in Vietnam respectively.

$P_{TN}$  and  $Q_{TN}$  are price and consumption of domestic goods in Vietnam

$P_{NK}$ ,  $Q_{NK}$ : price and consumption of import goods in Vietnam

$P_{\text{without tariff}}$ : is the price product without a tariff.

To calculate  $Twi$ ,  $CSi$ ,  $PSi$ ,  $GSi$  in the sugar industry from 2015 to 2019, the paper uses data investigating 36 sugarcane enterprises, secondary data collected from the General Statistics Office, sugar industry reports, project reports on the sugar industry to calculate the after-tax profit (producer surplus), and amount of tax that enterprises pay into the state budget each year.

For calculating consumer surplus, the authors collected domestic price data through the IO inter-industry balance sheet and investigating 36 sugarcane enterprise as well as using the statistical yearbooks and the sugar industry reports.

For calculating the price without tariff, the authors collected prices of imported sugar and multiplied it by the proportion of total consumption over the years to calculate the average import price. Then, the researchers used the average import price to subtract the number of tariffs and value-added tax paid under state regulations to calculate sugar prices when there is no tax.

**Table 2:** Results of total welfare in the sugar industry from 2015 to 2019

*Unit: VND billion*

Year	Consumer surplus (CS)	Producer surplus (PS)	Government surplus (GS)	Total welfare (TW)
2015	-2,650.8	840.8	425.0	-1,385.0
2016	-2,157.6	821.5	412.3	-923.8
2017	-1,440.2	883.3	437.2	-119.7
2018	-2,293.1	779.2	417.4	-591.6
2019	-1,376.7	707.3	340.2	-329.2

**Source:** Author's calculation

According to the results of Table 2, a consumer surplus is always a negative number from 2015 to 2019 (-2650.8 billion VND in 2015; -2293.1 billion VND in 2018 and -1376.7 billion VND in 2019). Although producer surpluses and government revenues resulting from increasing taxes and sugar prices have reduced consumer surpluses, total welfare is always a negative number from 2015 to 2019 (-1385.0 billion VND in 2015, -591.6 billion VND in 2018 and -329.2 billion VND in 2019). It can be concluded that tariff policies in the period of 2015-2019 are ineffective ( $TW \leq 0$ ), the benefit is not enough to offset the cost. The extension of protectionism of the sugar industry in Vietnam from 2018 to 2020 is inefficient. Therefore, the removal of tariff policies for the sugar industry in 2020 is necessary to improve the autonomy and competitiveness of sugar enterprises.

### Policy implications

In general, when Vietnam started to join international trade organisations and the sugar industry was infant, the protectionism policies were needed. These policies created the conditions for sugar enterprises to have time to research and apply science and technology, increased quality and output, and created competitiveness on the market. At the same time, these protective policies attracted foreign investors to set up joint ventures, bringing development to the industry. However, these protectionism policies should not last too long and the level of protectionism should not be too high because these policies do not improve the autonomy and competitiveness of sugar enterprises. Therefore, the removal of tariff policies for the sugar industry in 2020 is necessary.

To improve the development of the sugar industry, we need to focus on some solutions:

- Restructure sugar enterprises, form sugar enterprises with the value chain, incorporate production with consumption, and incorporate the sugar processing industry with the food and beverage industries.



- Restructure commercial system, consumption and retail system. Improve the Government's management role to stabilise production, price and share the benefits between production and consumption.
- Restructure the ways of producing sugarcane materials, diversify products, form product value chains to reduce production costs, prices and increase the competitiveness of sugar enterprises.
- Implement the methods to combat smuggling and trade frauds in the sugar field to protect sugar production, enterprises, and sugarcane growers.

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