THE WELFARE EFFECT OF VAT REFUND CANCELLATION TO SOYBEAN EXPORTERS IN UKRAINE

by

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A thesis submitted in partial fulfillment of
the requirements for the degree of

MA in Economic Analysis

Kyiv School of Economics

2019

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Date _____

Kyiv School of Economics

Abstract

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In December 2017 amendments to the Tax Code of Ukraine were adopted and exporters of soybeans were exempt from VAT for the period 1.09.2018 to 31.12.2021. The exemption from VAT means that exporters will no longer receive a VAT refund. Hence, the VAT non-refund policy works as an export tax. From the economic knowledge, we expect that the producers will suffer losses and consumers and the government will gain from such policy.

In this work, we conduct partial equilibrium analysis for the empirical evaluation of the effect of VAT non-refund and partial VAT refund policies. For this purpose, the paper provides an estimation of domestic demand, supply and import demand elasticities, using 3SLS and ARIMA respectively. The calculated change in consumer, producer surplus and change in government revenue showed that the imposed policy results in losses for the economic welfare.

TABLE OF CONTENTS

LIST OF FIGURES

Number *Page*

LIST OF TABLES

Number *Page*

ACKNOWLEDGMENTS

The author wishes to express the deepest appreciation to her Thesis Supervisor Prof. Dr. Oleg Nivievskyi, for the comments and ideas, without which this work would not exist. The support on the topic selection, data mining and all other steps helped a lot to conduct this research.

I am also grateful to all KSE professors for the openness for discussion and the willingness to help and make the studying process easier. Many thanks go to KSE Honorary President Tymofiy Mylovanov and Academic Director Olesia Verchenko. Thanks to my groupmate Maria Kondratiuk, with whom we overcame all the challenges and deadlines side by side.

I would like to express the highest gratitude to my English teacher Oksana Kachurets for making this paper more interesting and readable for everyone.

Last but not least, I am immensely thankful to my parents and my husband for patience, support and faith in my success.

GLOSSARY

VAT – Value Added Tax. A consumption tax placed on a product whenever value is added at each stage of the supply chain, from production to the point of sale.

SSSU- State Statistics Service of Ukraine. The government agency responsible for collection and dissemination of statistics in Ukraine.

CPT - Carriage Paid To price. Denoting that the seller incurs the risks and costs associated with delivering goods to a carrier to an agreed-upon destination.

FOB - Free on Board. Means the purchaser pays the shipping cost from the factory or warehouse and gains ownership of the goods as soon as it leaves its point of origin.

EXW – Ex Works price. Describes when a seller makes a product available at a designated location, and the buyer of the product must cover the transport costs.

WTO – World Trading Organization. Global international organization dealing with the rules of trade between nations

MY- Marketing Year. A period of one year, designated for reporting and analysis of production, marketing and disposition of a commodity.

Chapter 1

INTRODUCTION

World soybean production has increased by over 500 percent in the recent 40 years, and it will continue growing because of several reasons. The first reason is strong demand for animal feed (especially in China, where the rapidly increasing standard of living allows the average consumer to eat more meat than ever before). The second reason is significant demand growth for biodiesel feedstock[1]. The last one is the trend of healthy food, which will lead to growth of soybean demand.

Ukraine is the world leader of the sunflower production and has a big chance of being the top producer of soy beans. Based on the data from United States Department of Agriculture the production of soybeans in Ukraine increased at 6.7 times, from 723 thsd. tons in 2008 to 4831 thsd. tons in 2018. At the same time, the soybean export increased at 13.7 times and soybean oil export increased at 41.8 times and in 2018 it were 2531 thsd. tons and 334 thsd. tons respectively[2].

In order to stimulate increasing domestic processing of soybeans amendments to the Tax Code of Ukraine were adopted in 2017 as a result of this, the exports of soybeans were exempt from VAT. Soybean exporters were exempt from VAT for the period from September 1, 2018 till December 31, 2021. However, on May 22, 2018 Verkhovna Rada of Ukraine decided to soften a bit a restriction and canceled the VAT exemption for exporters - agricultural enterprises producing soybeans and

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[1] U.S. Energy Information Administration https://www.eia.gov/energyexplained/biofuels/use-of-biodiesel.php

[2] United States Department of Agriculture https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery

the rapeseeds operating on agricultural lands owned or used by such agricultural producers[3]. The VAT exemption implies that the exporters do not receive a refund of the credited VAT when purchased soybeans from farmers. In this case VAT non-refund is an export restriction measure.

Theoretically, the cancellation of VAT refund leads to decreasing domestic prices of beans. As a result, firms could buy cheaper raw materials for processing their products. As a result of the price decrease on the domestic market and VAT refund cancellation, farmers forgone their revenues. However, big corporations are better off. They have the opportunity to buy cheaper raw materials and the chance to choose whether they want to process or export seeds.

Consequently, the VAT non-refund becomes a tax on soybean exports. Non-refunding VAT to soybean exporters is introduced in order to stimulate soybean processing domestically. This is a widely used method of government support for an "infant industry" that has a growing potential. This idea has already been applied to the sunflower industry and its implementation is considered successful. In October 1999, Ukraine imposed a 23% export duty on sunflower seeds to stimulate domestic processing. Over the following years and consequently to the WTO negotiations, it was gradually reduced to 10%.[4]

After the imposing of the export tax on sunflower seeds in Ukraine processing capacity for seed processing increased. However, there are losses that are not obvious. First, according to «APK-Inform»[5], in 2013/14 MY the export revenues from the sale of 1 million tonnes of sunflower seeds was $ 25 million (or $ 25 / tonne) less than the sales of the products of that 1 million tonnes (oil and meal),

[3] Law of Ukraine https://zakon.rada.gov.ua/laws/show/2440-19

[4] Law of Ukraine https://zakon.rada.gov.ua/laws/show/1033-14

[5] APK – inform https://www.apk-inform.com/en/prices

but the data the calculations did not include the price of seed processing. Therefore, the processing cost should not exceed $ 25 / tonne, while in Ukraine it was $ 38 / tonne. Consequently, the value added generated from longer value chain (seed production, processing and exporting) is less than from shorter value added chain(seed production and export)[6].

The development of the processing industry implies a longer chain of added value, however, due to the lack of effective and modern production technologies in Ukraine, the cost of processed products can be extremely high, as a result of which the production can be unprofitable. In other words, the sale of processed products may be less profitable than the sale of raw materials. That is, an increase in the export of processed products due to a decrease in the export of soybeans will lead to the decrease in the government gain.

The main question of the research is to evaluate the welfare gain/loss of farmers, traders and Ukrainian government after the recent imposition of VAT non-refund policy for soybean exporters. The estimation of welfare effects from the introduction of the VAT non-refund policy on the Ukraine soybean market will be made using partial equilibrium analysis for a «small» country case.

The thesis is structured as follows. Chapter 2 describes the main findings related to effects of export restrictions to agriculture products and government interventions with a view to develop «infant» industry and it also provides literature review. Chapter 3 gives detailed methodology. The data description and analysis of variables are present in Chapter 4. The estimation results and policy implications are the part of Chapter 5. The summary of the thesis is described in Chapter 6.

[6] Vox Ukraine https://voxukraine.org/uk/nevidshkoduvannya-pdv-eksporteram-soyi-abo-pro-ekonomichni-naslidki-soyevih-pravok/

Chapter 2

LITERATURE REVIEW

2.1. Theoretical Studies

The analysis for this research should be started from the investigation of the VAT system. Generally, VAT is conceived to be a consumer tax and to be production-neutral. The VAT rate should be as low as possible, because it reduces consumer income. Due to the fact that the price is higher than the free trade price (when domestic price equals world price) the consumption decreases. In case of export, a consumer pays VAT to the government, who import products. Entrepreneurs collect VAT from sales and also they pay VAT for inputs. The tax balance transfers to fiscal authorities and requires VAT to be refunded. However there are several scenarios of VAT policy: no VAT refund, a VAT rate reduction and VAT exemption or ignorance of small farmers. In this research we will observe the last case.

The VAT exemption means that entrepreneurs don`t have to make a declaration of tax balance for fiscal authorities. So, they can`t collect VAT for sales and have to bear VAT payments for inputs. Kirschke (2019) describes the implications of VAT non-refund policy as compared to full VAT refund:

- Domestic, consumer and producer prices decrease;
- Consumption goes up and production goes down;
- Consumer taxation goes down to zero and producer taxetion increases;
- Government`s budget goes up because of increasing taxation base;

- Consumers' gain and producers lose from the policy.

The export restrictions are a popular form of supporting potential successful industries. However, many studies emphasize that the government intervention can lead to inefficient allocation of resources. Robert E. Baldwin (1969) believes that protection of "infant" industry may lead to the drop of social welfare or even worse to fail to achieve the socially optimal allocation of resources.

Also, Marrewijk and Berden (2006) argue that an increase in trade restrictions leads to a slow-down of economic growth, while a decrease may lead to a rapid catch-up process. Their analysis is focused on small developing countries and they show that the increase in trade restriction launch stagnation processes, which result in slow down of a catch-up process.

2.2. Empirical Research

We come to the discussion of trade restrictions and its impact on economic welfare. Iryna Kulyk and Thomas Herzfeld describe the impediments to wheat export from Ukraine. In their paper they analyze how the change of Ukrainian agricultural policy influences national grain trade. The main idea is that any export restriction brings large welfare losses compared to a free trade situation. They analyze different export policies applied by Ukrainian government and their effects on the export. The results show the restoration of VAT refund causes higher farm prices and income, gives an incentive to farmers to increase grain production or invest in more efficient technology. Moreover, as the domestic consumption is relatively stable, the production growth leads to export increase.

The estimation of elasticity coefficients for domestic demand, domestic supply and import demand using partial equilibrium analysis was done by Ganna Kuznetsova (2007) for evaluation of sunflower seed export tax. Ganna analyzed the welfare effect of export restrictions for wheat in Ukraine. Ganna showed empirically that the export taxation for wheat brought fewer losses than tax quota in Ukraine.

In case the government introduces an export tax, or as in our case, it cancels the VAT refund in export situations, in order to protect and develop the "infant" industry, this can lead to dramatic losses. In "infant" industries, it is necessary to do R&D in order to optimize costs and profits. It should be also considered that while choosing one industry to support, the state creates unequal conditions for possible potential industries. Moreover, identifying state sectors for government support there appears a high risk of corruption, which creates significant policy distortions and leads to market failures.

In order to estimate price elasticity for the soybean sector we follow Roberts and Schlenker (2013) who present a framework for identifying demand and supply elasticities of agricultural commodities using 3SLS and included shocks into regressions for denying endogeneity.

The latest work that has been done for the Ukrainian soybeans market is Nivievskyi (2019). In the paper, the author discusses the sector of soybeans and its processed products like meal and oil. Furthermore, he describes the main problems of canceling VAT and estimates the welfare effect of such policy. This thesis extends the previous research by estimating the coefficients of elasticity, which have not been previously evaluated, and re-estimates the welfare effect for the soybean sector in Ukraine.

Chapter 3

METHODOLOGY

3.1 The Model of Supply and Demand

Since the effect of the policy is likely to be restricted to soybean market only, we can use partial equilibrium analysis. Thus, the basic model will be used to evaluate effect of VAT non-refund policy, ignoring the fact that it makes changes on other markets.

The purpose of this thesis is to estimate welfare effect of cancelling VAT refund policy for soybean exporters. The policy become an export tax for those exporters, operating on agricultural lands owned or used by such agricultural producers. Thus, we can identify in the market two prices – free trade price and price with tax. In order to find change in consumer, producer and government surpluses, we need to estimate demand and supply elasticities. The model will be specified in the following way:

Domestic demand: $Q^D(P) = a * P^{\varepsilon_d}$

Domestic supply: $Q^s(P) = b * P^{\varepsilon_s}$

Thus, Export supply equation: $E^s(P) = b * P^{\varepsilon_s} - b * P^{\varepsilon_s}$

Import demand: $Id(P) = c * P^{\varepsilon_{Id}}$

In order to estimate price elasticity we are going to follow Roberts and Schlenker (2013) who in their article present a framework for identifying demand and supply elasticities of agricultural commodities. The idea is to use past shocks as exogenous price shifters. Authors say that the past shocks as weather could change inventory and future price. Also, consumption is smoother than production and storage allows to transfer commodities from periods to periods. Consumption is a differences between production and the amounted stored. To sum up, the empirical model evaluated as follows.

Supply:

$$q_{st} = \alpha_s + \beta_s * p_{st} + \gamma_s * \omega_t + u_t$$

$$p_{st} = \delta_s + \mu_{s0} * \omega_t + \mu_{s1} * \omega_{t-1} + \epsilon_t \quad (1)$$

Demand:

$$q_{dt} = \alpha_d + \beta_d * p_{dt} + v_t$$

$$p_{dt} = \delta_d + \mu_{d0} * \omega_t + \eta_t \quad (2)$$

Where q_{st} – log of domestic supply for soybean;

p_{st} - the domestic (ex-works) log price of soybean faced by processors

ω_t , ω_{t-1}– annual shock as a weighted average of all shocks: yields, growing area, caloric content of one production unit of crop.

q_{dt} - log of domestic demand for soybean, new production minus the change in inventories

p_{dt} – log of the domestic prices

Price is the key endogenous variable on the right-hand side of both supply and demand equations. We should correct for the endogeneity of prices, because it would create negative bias of supply elasticity, since unobserved positive supply shifts would tend to reduce the price. Additionally, it would create positive bias of demand elasticity, since unobserved positive demand shifts would tend to reduce the price.

The yield also could be endogenous, in order to deal with endogenity we are going to add annual shock ω_t to equations. Hence, if production increases because of an increasing in the area, but not yield, it will not come into shocks. The annual shocks are estimates as a weighted average of all shocks. The weights depend on yields y_{cit}, growing area a_{cit}.

$$y_{cit} = g_{ci}(t) + \xi_{cit} \tag{3}$$

Where y_{cit} is log yields,

$g_{ci}(t)$ – specific time trends

$$w_t = \xi_{cit} * \hat{y}_{cit} * a_{cit} \quad (4)$$

The system of equations of demand and supply will be estimated by 3SLS. Roberts and Schlenker (2013) tried to use IV, 3SLS for identifying demand and supply elasticities of agricultural commodities and came to the conclusion that 3SLS is more efficient in dealing with autocorrelation.

The import demand shows what the demand for Ukrainian exports of soybean is.

$$\ln(Id)_t = \gamma_0 + \gamma_1 * \ln(FOBs)_t + \gamma_2 * \ln(FOBb)_t + \gamma_3 * \ln(FOBc)_t + \gamma_4 * AR(i) + v_t \quad (5)$$

Where Id –exports of soybean;

FOBs – world (free on board) price for soybean;

FOBb – the world price for sunflower seeds.

FOBc – the world price for rapeseed

The estimated coefficients are price elasticities, which are the key value for the partial equilibrium analysis. The supply and demand elasticity coefficients allow us to estimate welfare effects.

3.2 The Price Policy Formulation

The next step is to estimate the free trade price, the price that would have prevailed in Ukraine if there had been VAT refund for exporters.

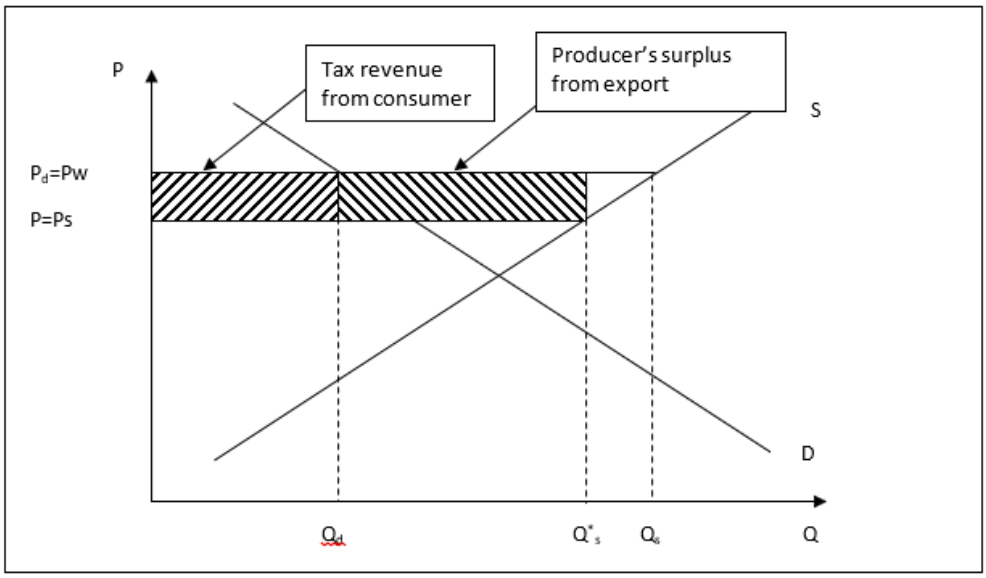

Figure 1. Market with no export VAT refund policy
Source: Jechlitschka, Kirschke and Schwarz, 2007

Figure 1 shows how the prices behave under no government regulations for import of the product with no refund of exported goods and VAT for domestic consumption.

The main fundamental for setting a price by producers is the pW – world price because this is exactly the price of export in order to be competitive on the world market. On the other hand, producers are constrained by the VAT at the domestic market, setting their price as

$$p^d = (1 + v)p \quad (6)$$

Being net exporter, country does not usually impose the protection rate on import and with no subsidies from government, in this case

.

$$p = p^W - vp * (1 - a) \quad (7)$$

$$p = \frac{p^W}{1+v(1-a)} \quad (8)$$

Where p – domestic market price

p^W-world price

v - rate of VAT

a - Export VAT refund rate

Thus, domestic price equals world price and price of producers equals to the price of supply. It means that domestic consumers pay VAT on the good while having the best possible price, government gets revenue and firms, which were lucky to export, have a production surplus on price difference at the world and domestic markets.

The second case shows how prices will react with a response to a refund of the VAT to exporters, which is alternative to the current policy of the soybean market. Starting again from Pw accounting for no import regulations we obtain P = Pw. There is no regulation at the producers' side, consequently, a producer will provide Qs for both domestic and export markets. At the same time, a consumer will demand Q*d, since the consumer must pay VAT and the price is Pd. The main difference to the previous case is that consumer price appeared to be higher than the price on the world market, which makes the consumer worse off comparing to the previous case. Meanwhile, we can see that this situation benefits the producer only since the have an opportunity to supply more to both markets at higher prices. The government benefit with VAT export refund also shrink to the size of consumer tax only and depicted as a shaded area on the graph. (Figure 2)

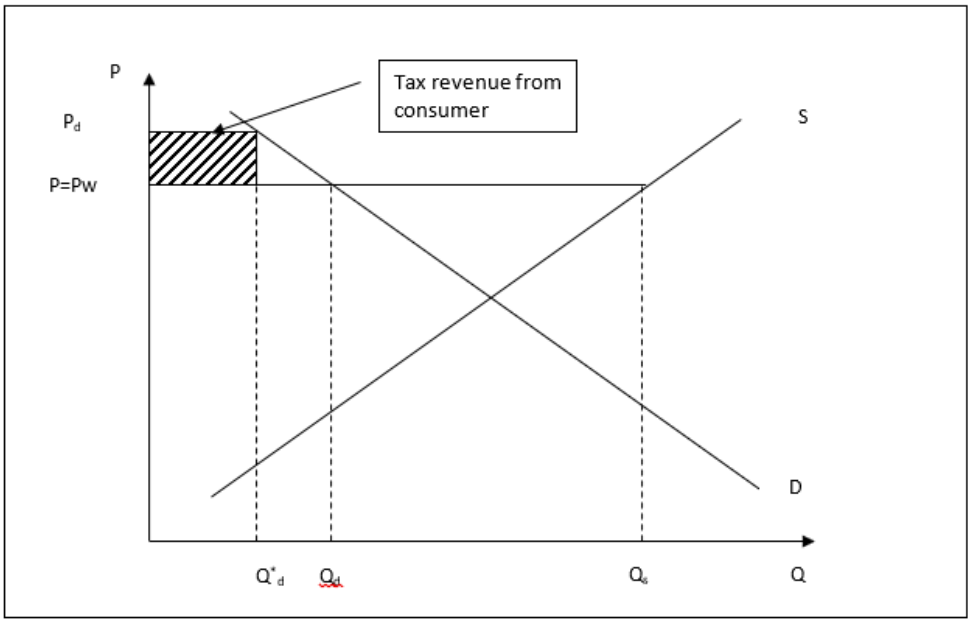

Figure 2. Market with export VAT refund policy

Source: Jechlitschka, Kirschke and Schwarz, 2007

The VAT refund case indicates that consumers and government are going to be better off since the consumer receives soybeans at lower prices compared to VAT non-refund policy. While the case two benefits government with a VAT from consumer only and making the consumer worse off by such high prices. At the same time, this situation is very profitable for the producer having VAT refund and supplying for both domestic and world markets at higher prices.

The final step is to calculate change in consumer, producer surplus and government revenue and change in the welfare after cancelling VAT refund policy.

Chapter 4

DATA DESCRIPTION

4.1 Data Source and Preparation

The research uses data from State Statistics Service of Ukraine and UkrAgroportal. The initial data base for estimating supply and demand equations is monthly data for 25 oblasts for the period of 2011-2019. The form №29 contains the data about production, area harvested, yields (ratio of total production divided by area harvested), and form №21 demonstrates realization and prices for soybean. The State Statistics Service of Ukraine releases a cumulated form of data each year. Thus, production and areas harvested were estimated as differences between the current value and the previous one for each oblast respectively. It should be mentioned that the values for January were as given. The soybean seeding season is August, September and November, as a result data set consisted only of the mentioned months for 8 years. Prices of soybean were given as average for one, two, three and till twelve months. In order to calculate average prices for each month the weighted average formula was used.

$$p_t = (\overline{cum\ p_t} * cum\ q_t - \overline{cum\ p_{t-1}} * cum\ q_{t-1})/q_t \qquad (9)$$

The State Statistics Service of Ukraine provides information about realization, which consists of export, and doesn't give data on monthly consumption for each

oblast. Due to this, we calculated monthly fractions of export in realization of soybeans in Ukraine, got the fraction of consumption and multiplied it on realization.

After estimating the current values of needed variables, two forms were merged using oblast, year and month. However, the number of observations was reduced due to the fact that the data about some oblasts are not published in order to ensure compliance with the requirements of the Law of Ukraine "On the State Statistics" regarding confidentiality of statistical information.

The next step in data set preparation was to delete zero consumption or production observations, because our model is based on logarithms and logarithm of zero is undefined. The final dataset for estimating supply and demand equations consists of 536 observation of monthly data for soybeans in Ukraine within 2011-2019 years.

To estimate import demand equation we used weekly data of 2012-2019 for Ukraine from UkrAgroConsult and aggregated it into monthly form. The data includes Carriage Paid To (CTP) prices for soybean, sunflower, barley, rapeseed and EXW price of soybean. The data for dependent variable - export of soybean was collected from the State Statistics Service of Ukraine. The number of observations in dataset for estimation of import demand equation is 96.

4.2 Descriptive Statistics and Data Analysis

The analysis of data set gives us a picture of current market situation. In Ukraine in 2018 the 69% of enterprises that produced soybeans had up to 100 ha. However,

this group had only 12.3% of total production. While, the greatest part of production belonged to the group with 200-500 ha (Figure 3.).

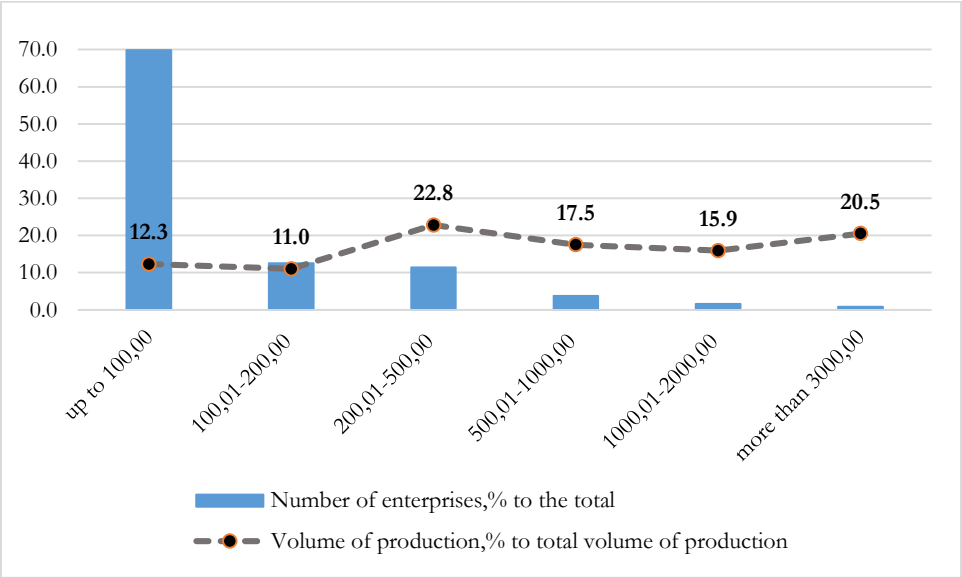

Figure 3. The distribution of soybean producers by size and yield in 2018 in Ukraine
Source: based on data from the State Statistics Service of Ukraine

Generally, the 89.9 % of production was made by enterprises and only 10.1% by households in Ukraine in 2019. Nevertheless, there are oblasts, which have about 50% household production Mykolaiv, Chernivtsi and Kirovohrad. From figure 4, we can see that the level of production in 2019 is lower than in 2018. There are two leaders of soybean production in Ukraine - Khmelnytska, Poltavska oblasts. However, Kherson has higher yield.

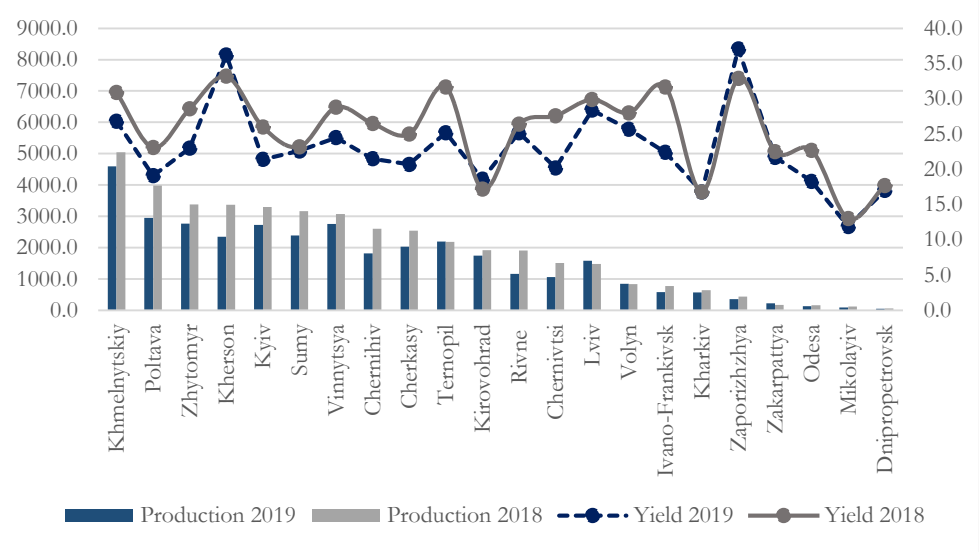

Figure 4. The production of soybean and its yield in 2018-2019 in Ukraine

Source: based on data from the State Statistics Service of Ukraine

The graphical analysis of soybean prices has shown the evidence of effect from imposing non VAT-refund policy (Figure 5). Before introducing the policy the prices had upward trend, while immediately after introduction of the policy, the prices decreased. The CPT price has fallen less, than the price on the domestic market since May 2018. The margin, which was calculated as a difference between CPT and EXW price, proves this fact. It means that the profit of producers has decreased, and the profit of exporters has increased.

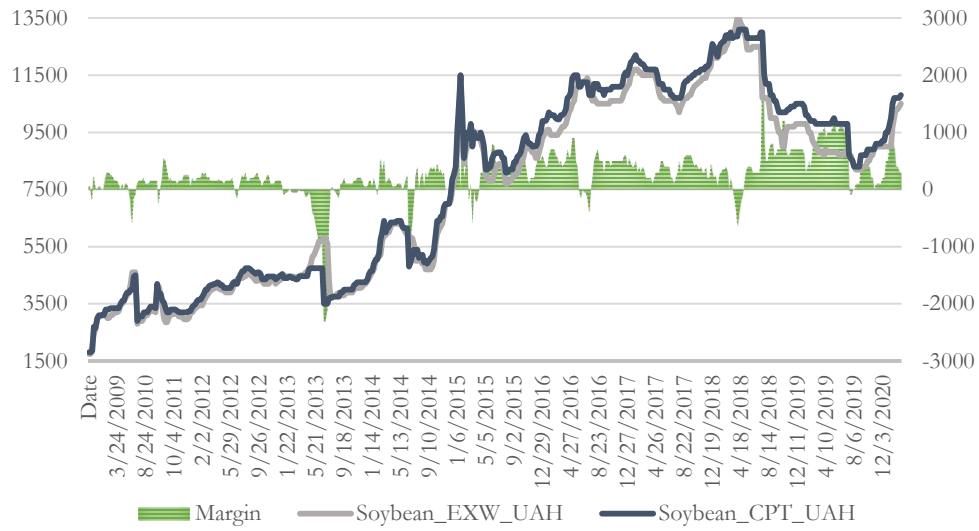

Figure 5. The EXW and CPT prices for soybeans in Ukraine in 2009-2020
Source: based on data from UkrAgroConsult

The table 1. below demonstrates the average prices of soybeans in each oblasts within 2016-2019. As we can see from the table 1on average prices in 2019 were decreased by 14.9% compared with 2018. The estimation of losses and gains for each side will be shown in Chapter 5.

Table 1. The average prices on the domestic market of soybeans in Ukraine

Oblast	2016	2017	2018	2019	Growth rate 2018/19,%
Vinnytsya	8789.4	9466.2	9766.5	8291.8	84.90
Volyn	8777.8	9383.5	9876.1	8009.5	81.10
Dnipropetrovsk	8215.5	9456.0	9628.7	7558.5	78.50
Donetsk	к	к	9268.0	7673.9	82.80
Zhytomyr	8802.2	9427.2	9359.8	8189.8	87.50
Zakarpattya	8668.4	10332.7	9215.2	9150.7	99.30
Zaporizhya	9013.8	9311.3	9391.5	7860.7	83.70
Ivano-Frankivsk	8451.1	9144.1	8332.2	7815.6	93.80
Kyiv	8845.8	9473.8	9451.3	7882.4	83.40
Kirovohrad	8780.5	9482.9	9876.1	7920.6	80.20
Luhansk	к	к	к	к	к
Lviv	8939.8	9538.8	9682.7	8056.0	83.20
Mykolayiv	8587.6	9867.1	9792.8	7579.6	77.40
Odesa	8485.1	9163.9	9482.1	7054.7	74.40
Poltava	8909.4	9622.1	9766.7	8174.7	83.70
Rivne	9149.0	9313.7	9388.6	8665.7	92.30
Sumy	8860.5	9542.8	9716.6	8230.0	84.70
Ternopil	8671.5	9061.7	9716.6	8132.8	83.70
Kharkiv	8490.4	9008.3	9494.4	7605.0	80.10
Kherson	9135.6	9336.6	9904.0	8131.2	82.10
Khmelnytskiy	9063.9	9499.0	9843.0	8150.0	82.80
Cherkasy	8861.2	9286.5	9291.9	7926.0	85.30
Chernivtsi	8446.7	8353.8	8543.6	7509.8	87.90
Chernihiv	9060.9	9586.4	9860.1	8617.7	87.40
city of Kyiv	8928.1	10213.8	8681.8	8186.9	94.30
Ukraine	**8893.1**	**9488.9**	**9574.5**	**8147.9**	**85.10**

Notes: к - data are not published in order to ensure compliance with the requirements of the Law of Ukraine on the State Statistics regarding confidentiality of statistical information.

The exploratory data analysis showed that prices of crops are highly correlated, that creates multicollinearity (Figure 6.). It means that we cannot add all the variables into regression.

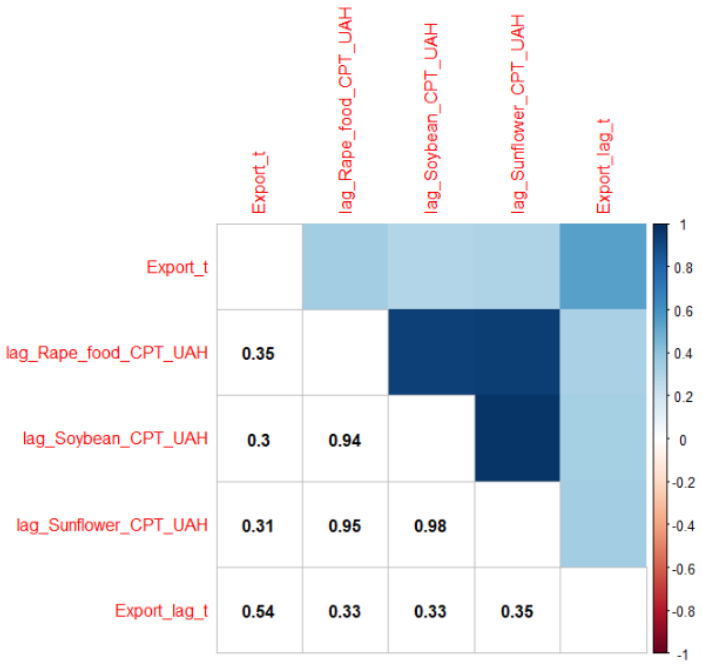

Figure 6. The correlation plot of variables in import demand equation.
Source: based on data from UkrAgroConsult

In order to understand whether we should expect elastic or inelastic price elasticity of import demand, we have to analyze the world market of soybeans. In 2019 the biggest leader of soybeans export in the world Brazil (51.8%), United States (31.9%) and Argentina (5.4%). Ukraine ranks sixth with 1.6% of world exports. Figure 7 demonstrates the structure of Ukrainian soybeans export by countries.

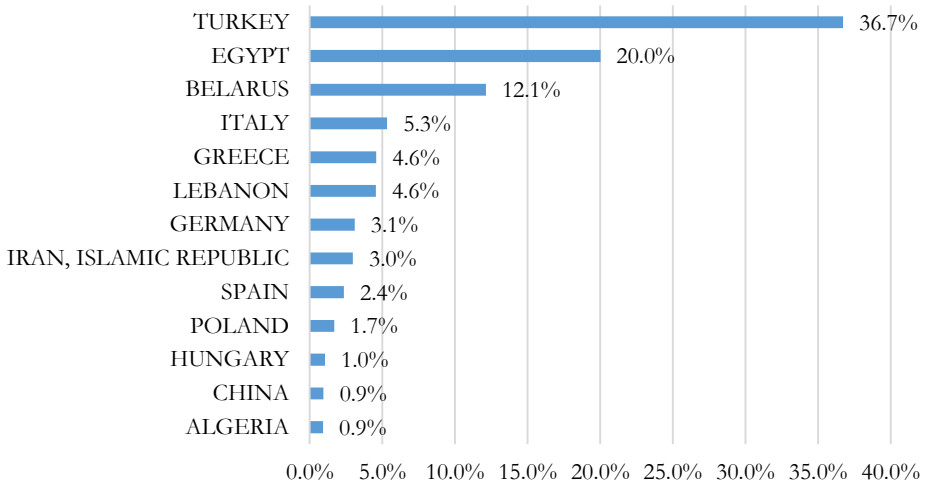

Figure 7. The geographical structure of Ukrainian soybean export in 2019
Source: based on data from the State Statistics Service of Ukraine

On the other hand, the biggest importer of soybeans in the world is China, 58.9% of world export goes to them. However, Egypt occupies the 4th position (2,4%), Turkey has 1.9% of world imports and Iran has 1.5%. European counties import 10% of the world amount of soybean import. To summarize, changes in prices of Ukrainian soybean potentially can make an effect on the world import demand, because Ukraine is the biggest exporter in Europe and Middle East.

From Figure 8 we can see the dynamics of soybean export (left axis) and oil and meal export (right axis) and we should note that the sector has developed greatly in recent years. From the figure, we can note that since 2000, the export of soy products has had a positive trend. Namely, in 2014 there was a sharp increase in the export of soybeans. We also see that the export of oil and meal increased

significantly in 2017/2018 compared to the previous year, which could be caused by a change in policy.

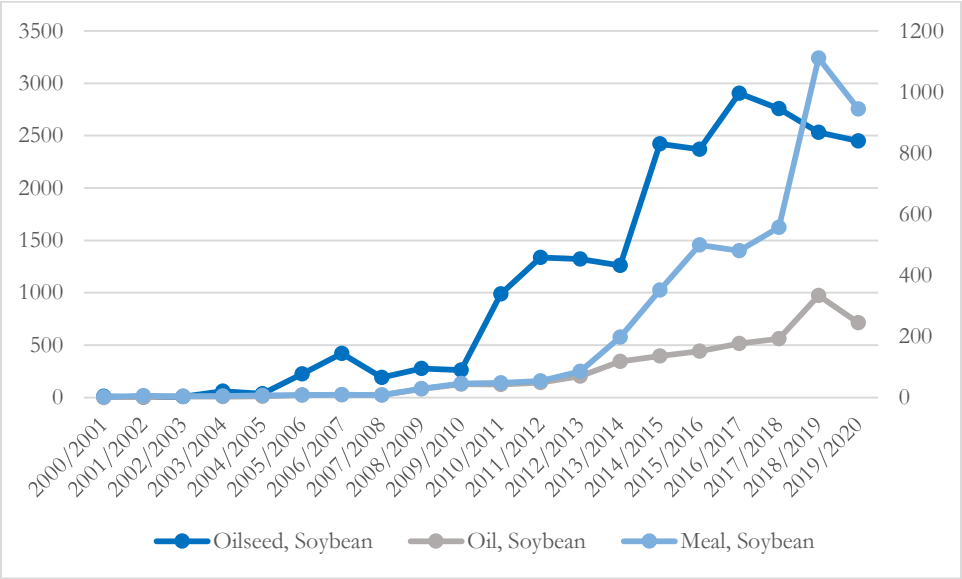

Figure 8. Export of soybean, oil and meal in Ukraine in 2000-2020

For a better understanding of the reasons for increasing export, we should look at production. Figure 9 shows that the production of soybean products also has had upward sloping. The production of soybean increased by 40% in 2015 compared to the previous year, at the same time the export increased by 1.9 times. This fact indicates that the rise in export was caused by increasing production and increasing import demand.

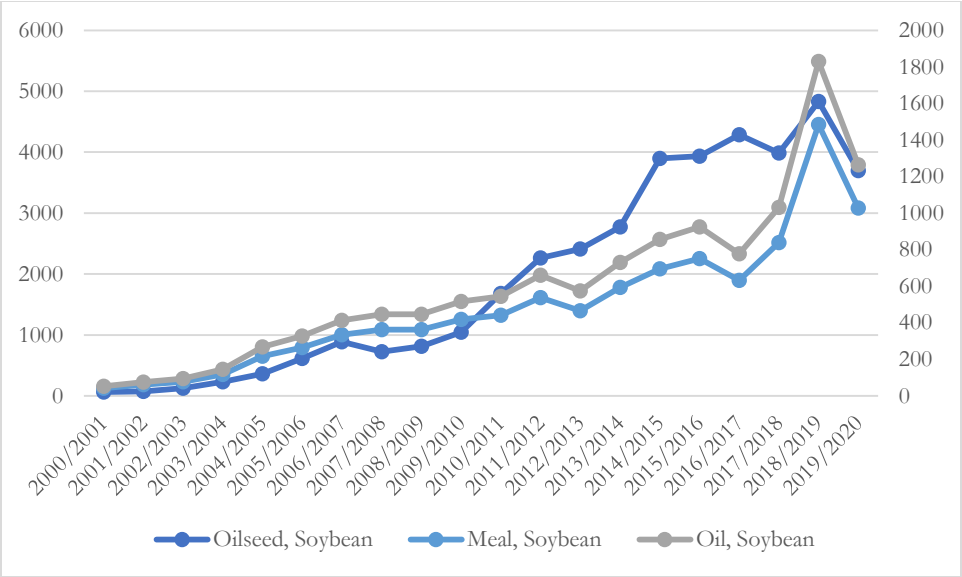

Figure 9. Production of soybean, oil and meal in Ukraine in 2000-2020

As was mentioned in previous chapter, the idea of cancelling VAT refund is to increase the production of soybean oil and meal. The spike in production was in 2018/2019. While the production of soybean increased by 21%, the rise in oil and meal production was 77%.

Chapter 5

ESTIMATION RESULTS

The following section is structured in the following way: the first subsection presents an overview of the estimation results of the primary model, the second subsection is demonstrates welfare effect of VAT non-refund policy.

5.1 Estimation of Elasticity Coefficients for Domestic Demand, Domestic Supply and Import Demand

As was discussed in the previous chapter, a welfare analysis of canceling VAT refund policy will be conducted using three equations: demand, supply and import demand. The estimations of the first two equations are made by following specifications from Chapter 3 using 3SLS. While the growing area is endogenous, it enters only as a weighting factor of the exogenous shocks. The first stage issues shock that covers weather conditions for each oblast within year and month. As the data set includes only three months from August to October, we expect that its coefficient will be significant.

Table 2. The first stage model results

Variables	**Estimate**	**Pr(>|t|)**
(Intercept)	-63.412	0.000 ***
Year	0.033	0.000 ***
Month	0.069	0.002 **

Notes: p-values in parentheses . p < 0.1,* p < 0.05, ** p < 0.01, *** p < 0.001
Residual standard error: 0.4041 on 533 degrees of freedom, Multiple R-squared: 0.06008

From Table 2 we can that coefficients of year and month are significant at 0% significance level. Holding all other variables constant, on the average yield is increased by 3.3% each year. Moreover, from the beginning till the end of the harvest period , on average yield is increased by 6.9% every month. The regression yield on year and month allows us to catch residuals and estimate shocks (3). The distribution of shocks is shown in Figure 9.

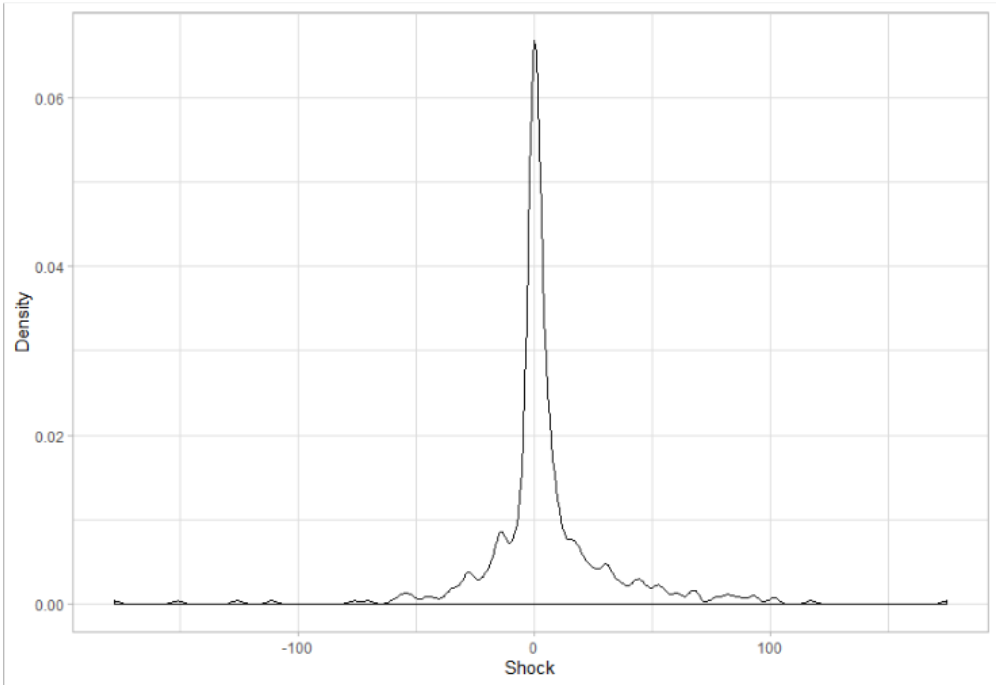

Figure 10. The distribution of estimated shocks of yield in Ukraine

The shock in the current period affects supply and as a result induces future prices. Consequently, we should add not only current shocks but also shocks of the previous period. In the case of oblast level panel data and as we can`t observe shocks in July, it reduces the number of observations to 331. The result of the second stage estimation can be found in Table 3 below.

Table 3. The second stage of model

Variables	**Estimate**	**Pr(>|t|)**
(Intercept)	-287.9000	0.0000 ***
Shocks	-0.0001	0.9090
Shocks lag	-0.0001	0.8710
Year	0.1473	0.0000 ***
Month	-0.0408	0.1750
N	331	

Notes: p-values in parentheses . p < 0.1,* p < 0.05, ** p < 0.01, *** p < 0.001
Residual standard error: 0.2681 on 326 degrees of freedom, Multiple R-squared: 0.6597

In fact, neither current, nor lagged shocks don`t influence prices. In contrast, the coefficient of year is significant at all significance levels. Holding all other variables fixed, prices increase by 14.7% on average each year. While the coefficient on month is insignificant.

Finally, we estimated demand and supply equations. Table 4 presents the regression results of the demand side.

Table 4. Estimation of demand elasticity

Variables	**Estimate**	**Pr(>|t|)**
(Intercept)	1.9995	0.406
Coef. El of demand	-0.4085	0.0713 .
Shocks lag	-0.0032	0.2480
Consumption lag	0.0001	0.0000 ***
Month	0.8895	0.0000 ***
N	326	

Notes: p-values in parentheses . p < 0.1,* p < 0.05, ** p < 0.01, *** p < 0.001
Residual standard error: 1.518 on 326 degrees of freedom, Multiple R-squared: 0.3696

As the results reveal the domestic demand is rather inelastic: its own price elasticity is (-0.408). It means that ceteris paribus, on the average increase in price by 1 % will lead to a 0.41% decrease in domestic consumption of soybeans in Ukraine. Also, the impact of the shocks that have occurred in the previous period was insignificant. The effect of the previous level of soybean consumption is small but significant at all levels of significance.

Table 5. Estimation of supply elasticity

Variables	**Estimate**	**Pr(>|t|)**
(Intercept)	-14.0451	0.0000 ***
Coef. El of supply	0.3572	0.0538 .
Shocks	0.0009	0.7481
Shocks_lag	-0.0075	0.0011 **
Storage	-0.00006	0.0000 ***
Month	2.2453	0.0000 ***
Production lag	0.0078	0.0000 ***
N	326	

Notes: p-values in parentheses . $p < 0.1$,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Residual standard error: 1.19 on 324 degrees of freedom, Multiple R-squared: 0.6269

The domestic supply is very sensitive to prices: the elasticity of supply with respect to price is 0.357. Thus, holding other variables fixed, on the average increase in price by 1 % will lead to 0.36% increase in soybean production in Ukraine. As was expected the shocks of previous periods are significant. Also, storage which was calculated as a difference between production and realization of the previous period was added to the regression. The coefficient of storage has negative sing and significant at all significance levels.

Table 6. Estimation of import demand model

Import Demand	**Estimate**	**Pr(>|t|)**
(Intercept)	10.8642	0.0040 **
log(lag_Soybean_CPT_UAH)	-0.584396	0.6556
log(lag_Rape_food_CPT_UAH)	0.0304	0.9739
log(lag_Sunflower_CPT_UAH	1.4413	0.1953
AR(1)	0.6004	0.0000 ***

Notes: p-values in parentheses . p < 0.1,* p < 0.05, ** p < 0.01, *** p < 0.001

The coefficient of world price of soybeans on import demand is -0.58, but it is insignificant. Thus, we can`t conclude about its elasticity.

Using estimated elasticities, we can construct the demand and supply equations. From the real data we can find parameter a in equation dividing annual domestic demand by annual price in Ukraine. The same mechanism is used to find parameters b and c in supply and import demand equations respectively. Thus, corresponding equations are presented below.

Domestic demand: $Q^D(P) = 56465.31 * P^{-0.409}$

Domestic supply: $Q^s(P) = 159.69 * P^{0.357}$

Export supply equation: $E^s(P) = 159.69 * P^{0.357} - 56465.31 * P^{-0.409}$

Import demand: $Id(P) = 2 * 10^9 * P^{-0.58}$

5.2 Calculating Welfare Effects

Having coefficients of elasticity and parameters of equations we can evaluate the welfare effects of VAT non-refund policy with a partial VAT refund. Each policy will be compared with free trade conditions - a full VAT refund, thus price on the domestic market equals world price.

Prices for each policy were estimated using formulas from Chapter 3. In order to estimate demand and supply quantities, we plugged calculated prices into domestic demand and supply equations.

Then, we compute producer revenue by multiplying supply price on supply quantity, consumer expenditures by multiplying demand price on demand quantity and foreign exchange by multiplying world price on export quantity.

A consumer pays 20% of VAT and a producer pays the tax in case of non-refund or partial refund policy. The total government budget was evaluated as a difference between VAT revenue (sum of consumer taxation and producer taxation) and export VAT refund.

In order to estimate the total benefit that a consumer gains from the lower price, we need to calculate the area under the demand curve. For calculations we need a closed interval that is why we make the assumption that the highest price is 15000 UAH. Hence, the integral of demand equation was taken within the interval from the demand price to the maximum price, after that added to consumer expenditures. Also, cost describes the (variable) production cost and evaluated as

the area under the supply curve. In other words, we took the integral of the supply equation within the interval from zero to supply price and subtract from producers' revenue.

Consequently, the consumer surplus equals the difference of total benefit and consumer expenditures whereas producer surplus - the difference of producers revenue and cost. Finally, the sum of consumer, producer surplus shows the total welfare. The result of calculations are shown in Table 7.

Table 7. The estimation of government revenue, producer and consumer surpluses for different VAT refund policies

Parameter	Export VAT refund rate		
	100%	**40%**	**0%**
Supply price, UAH per t	9521.2	8501.0	7934.3
Demand price, UAH per t	11425.4	10201.3	9521.2
Domestic market price, UAH per t	9521.2	8501.0	7934.3
World market price, UAH per t	9521.2	9521.2	9521.2
Supply quantity, 1000 MT	4213.0	4045.9	3947.4
Demand quantity, 1000 MT	1242.1	1300.9	1338.1
Export quantity, 1000 MT	2971.0	2745.0	2609.3
Producer revenue, mln UAH	40113.1	34394.3	31319.8
Consumer expenditure, mln UAH	14191.0	13270.9	12740.2
Foreign exchange, mln UAH	28287.3	26135.4	24843.5
Government budget:			
VAT revenue, mln UAH	8022.6	6878.9	6264.0
Export VAT refund, mln UAH	5657.5	1866.8	0.0
Total , mil UAH	2365.2	5012.0	6264.0
Consumer taxation, mln UAH	2365.2	884.7	0.0
Producer taxation, mln UAH	0.0	4127.3	6264.0
Total benefit, mln UAH	18382.3	19017.7	19384.2
Cost, mil UAH	10558.0	9052.7	8243.5
Producer surplus, mln UAH	29555.1	25341.5	23076.3
Consumer surplus, mln UAH	4191.3	5746.8	6644.0
Welfare, mln UAH	36111.6	36100.4	35984.2

Source: Own calculations based on Jechlitschka, Kirschke and Schwarz, 2007

Due to the change in VAT refund rate the distribution of taxes between consumers and producers also changes. While the government pays a full VAT refund, he whole taxation burdens the consumers. In the case of partial equilibrium, the tax allocates between a consumer and producer. Also, it should be mentioned that the amount of export decreases, it means that producers will receive less foreign currency

The final step is to compare welfare effect policies with different export VAT refund rate with free trade policy with 20% of VAT rate and 100% VAT refund rate (Table 8.).

Table 8. Evaluated effect of policy

Parameter	Export VAT refund rate	
	40%	0%
Change in Government Revenue, mln UAH	2646.9	3898.8
Change in Producer surplus, mln UAH	-4213.6	-6478.9
Change in Consumer surplus, mln UAH	1555.5	2452.7
Change in Welfare, mln UAH	-11.2	-127.4

Source: Own calculations based on Jechlitschka, Kirschke and Schwarz, 2007

The analysis showed that complete cancelation of VAT refund brings the budget up to 3898.8 mln UAH, but at the same time, it causes the loss of producers revenue -6478.9 mln UAH. Total welfare effect for economy was negative and equal to -127.4 mln UAH.

To summarize, the VAT non-refund policy decreases the producer surplus a lot and increases consumer surplus and government revenue. However the net effect of the policy is negative. Compared to the policy of partial VAT refund with a 40% refund rate it shows that the second one makes smaller losses for social welfare.

Chapter 5

CONCLUSIONS

Amendments to the Tax Code of Ukraine were adopted, exporters of soybeans were exempt from VAT for the period 1.09.2018 to 31.12.2021. However, later the exemption was canceled for soybeans producers-exporters. The main consequence of imposing VAT non-refund policy is consumer price reduction and this is exactly what happened on the soybean market in 2018.

Generally, 70% of producers have less than 100 ha for soybean production, but they produce only 12.3% of total amount. The soybean and its processing products sector have been developing rapidly for the past 20 years, both production and export have grown in several times. What is important that Ukrainian production of soybeans fully satisfy domestic consumption and about 50% of total amount is exported. The main importers are Turkey, Egypt and EU countries. Although the leader of soybean consumption is China, we occupy an advantageous position in trading with neighboring countries.

However, canceling the VAT refund policy can lead to switching producers to cultivating grains with higher profitability and we can lose our position. In order to evaluate the effects of policy, the welfare analysis was done.

Using 3SLS model we estimated that both domestic supply and demand are rather inelastic. The increase in price by 1% on the average leads to an increase in supply by 0.38% and a decrease in demand by 0.41%. The coefficient of elasticity of import demand is insignificant.

The partial equilibrium analysis showed that with non-refund policy and as a consequence price reduction and taxation, producers loss 6478.9 mln and 4213.6 mln UAH in case of a partial non-refund policy. The gain of consumers from price decreasing is 2452.7 mln UAH with complete non-refund policy and 1555.5 mln UAH for partial non-refund policy. Despite the fact that government revenue from VAT decreased, the export VAT refund decreased as well. Thus, the government gains 3898.8 mln UAH and 2646.9 mln UAH from complete and partial VAT non-refund policies respectively.

Some important policy implications can be derived from the results above. The comparing two policies: VAT non-refund (100% VAT non-refund rate) and partially VAT refund (40% of VAT refund rates) with a 20% VAT rate shows the government's intervention leads to welfare losses. Moreover, the VAT exemption brings more losses than partial tax refunds. Thus, VAT non-refund policy decreases total welfare by 127.4 mln UAH and partial VAT refund policy decreases by 11.2 mln UAH. Thus, the policy implication is straightforward. The government should restore policy with partial VAT refund policy or conduct a complete VAT refund policy, which could bring 36111.6 mln UAH to social welfare. In order to comprehensively evaluate the effect of adopted laws and current tax rates the analysis for the effect of policy will be done in the processed foods sector: oil and meal in further research.

WORKS CITED

Baldwin, Robert E. 1984. "The Inefficacy of Trade Policy." *Journal of International Economics* 16, no. 1-2: 198–203.

Betliy O, R. Giucci, and R. Kirchner. 2013. "VAT in Ukraine: Would other indirect taxes perform better?" Policy Paper PP/02/2013*,* Institute for Economic Research and Policy Consulting and the German Advisory Group https:// ies.princeton.edu/pdf/E150.pdf

Götz Linde Johanna, Ivan Djuric, and Oleg Nivievskyi. 2016. "Regional Wheat Price Effects of Extreme Weather Events and Wheat Export Controls in Russia and Ukraine." Halle (Saale): IAMO, Leibniz Institute of Agricultural Development in Transition Economies

Götz, Linde, Thomas Glauben, and Bernhard Brümmer. 2013. "Wheat Export Restrictions and Domestic Market Effects in Russia and Ukraine during the Food Crisis." *Food Policy* 38: 214–26.

Hamilton, Jonathan H., Robert S. Pindyck, and Valerie Yvonne Suslow. 2018. *Study Guide for Microeconomics, Ninth Edition*. Upper Saddle River, NJ: Pearson Education

James N. Barnes and Dennis A. Shields. 1999. The Growth in U.S. Wheat Food Demand; *USDA ERS Wheat Yearbook*/WHS-1998/March https://pdfs.semanticscholar.org/bcf2/3a3590f2e330ec9a391619af79fd50dd3fca.pdf

Jechlitschka, Kurt, Dieter Kirschke, and Gerald Schwarz. 2007. "Microeconomics Using Excel: Integrating Economic Theory, Policy Analysis and Spreadsheet Modelling". London: Routledge

Kuhn A. and O.Nivievskyi 2003. "The Struggle over VAT Refunds for Grain Exports". Policy Paper T32, Institute for Economic Research and Policy Consulting and the German Advisory Group

Kulyk, I., T. Herzfeld and O. Nivievskyi 2014. "Comparative assessment of Ukrainian grain export policies." *Agriculture Policy Report.* APD/APR/01/2014 https://apd-ukraine.de/images/APD_APR_01-20134_Getreidehandelspolitik_eng.pdf

Kuznetsova A. 2007. "The Welfare Effects of Export Restrictions: The case of Ukrainian Market for Wheat." KSE Master Thesis

Marrewijk, Charles Van, and Koen G. Berden. 2007. "On the Static and Dynamic Costs of Trade Restrictions for Small Developing Countries." *Journal of Development Economics* 84, no. 1: 46–60. https://www.sciencedirect.com/science/article/abs/pii/S0304387806001416

Mohanty, Samarendu; Peterson, E. Wesley F.; and Smith, Darnell B. 1997. "Estimation of Demand for Wheat by Classes for the United States and the European Union" *CARD Working Papers*. Paper 173. http://lib.dr.iastate.edu/card_workingpapers/173

Roberts, Michael J., and Wolfram Schlenker. 2010. "Identifying Supply and Demand Elasticities of Agricultural Commodities: Implications for the US Ethanol Mandate". Cambridge, MA: National Bureau of Economic Research.