Nataša Stanojević[1]
Slobodan Kotlica[2]

JEL: F62, F 17
DOI: 10.5937/industrija46-15888
UDC: 339.56
339.97/.98
Original Scientific Paper

Globalisation and Methodology of Researches in International Trade[3]

Article history:
Received: 3 December 2018
Sent for revision: 15 January 2017
Received in revised form: 25 May 2018
Accepted: 25 May 2018
Available online: 29 June 2018

Abstract**:** *The intensive globalization of production at the end of the 20th and the beginning of the 21st century led to a significant distortion of statistical data of the volume of international trade. The usage of these data in quantitative research does not provide reliable information regarding the development potential of a particular export route (orientation) or products. The specific methodological procedure has been proposed in order to correct these data, prior to their application in known econometric models. It includes standard procedures for separation of inter-industry from intra-industry trade, and then the differentiation of horizontal and vertical form of intra-industry exchange. In the last step, the disputed value of exports is identified by marking unusual situation of higher export price of undeveloped economies to the developed ones. This is a result of the multiple crossing of the border of the same products. The obtained corrected value of statistical data can be successfully applied in existing econometric models. The methodological procedure was applied to the selected Serbian export groups of products and several of its key export partner countries. The results show that the statistical value of export is 10% to 40% higher than the real one.*

Key words**:** *international trade, econometrics, statistic data, methodology.*

[1] Dositej Faculty of Economics and Informatics, Belgrade, natasa1171@gmail.com
[2] Dositej Faculty of Economics and Informatics, Belgrade
[3] The paper is a part of research on the Ministry of Education, Science and Technological Development, no. III47004.

Globalizacija i metodologija istraživanja međunarodne trgovine

Apstrakt**:** *Intenzivna globalizacija proizvodnje krajem XX i početkom XXI veka dovela je do značajne distorzije statističkih podataka o obimu međunarodne trgovine. Primena ovih podataka u kvantitativnim istraživanjima ne daje pouzdane informacije u pogledu razvojnog potencijala određenog izvoznog pravca (orijentacije) ili proizvoda. Radi korekcije ovih podataka, pre njihove primene u poznatim ekonometrijskim modelima, predložen je specifičan metodološki postupak On uključuje standardne postupke za razgraničavanje inter-industrijske i intra-industrijske trgovine, a potom razdvajanje horizontalne i vertikalne u okviru intra-industrijske razmene. U poslednjem koraku, na osnovu utvrđivanja nelogičnosti između izvozne cene i smera trgovine između razvijenih i nerazvijenih privreda, izdvaja se sporna vrednost izvoza, koja je rezultat višestrukog prelaska granice istih proizvoda. Tako dobijena korigovana vrednost statističkih podataka može se dalje uspešno primenjivati u postojećim ekonometrijskim modelima. Metodološki postupak je primenjen na odabrane izvozne grupe proizvoda Srbije i nekoliko njenih ključnih izvoznih zemalja partnera. Rezultati pokazuju da je statistička vrednost izvoza 10% do 40% veća od realne za analizirane proizvode.*

Ključne reči**:** *međunarodna trgovina, ekonometrija, statistički podaci, metodologija.*

1. Introduction

The expansion of the number and activities of national and international organizations dealing with international trade issues has led to the formation of extensive, updated datasets of diverse statistics on this area. Modern information technology development has made it possible for any interested researcher to access and use these data simply and easily.

Data about the scope, trends and representation of product groups in the export and import of all countries of the world are available on the websites of national statistical agencies, key international institutions such as the United Nations, the most important economic international organizations (the World Bank and the International Monetary Fund) and a number of agencies specialized in certain types of economic activities.

Without considering the veracity of the available data, we evaluate their validity from the perspective of the objectives of economic research in which they are applied. Our basic assumption is that there is a significant distortion

of data on the volume of foreign trade, mostly due to the impact of globalization on production characteristics and hypothesis is that if the export data is being corrected to approximate to real (economic useful) value, they will provide more relevant basis for research in international trade, and consequently more appropriate economic policy based on them.

So, the main research task is to determine the method of correction of data on international trade, which would allow their higher functionality in quantitative research.

After Introduction, second chapter describes the basic aims of scientific research of international trade, because the statistical data would be valued from the point of research objectives. Also, the most used methods and models of research of international trade, is described in this chapter.

Third chapter explain makes distinction between inter-industry, intra-industry (horizontal and vertical) trade and newer phenomenon of fragmentation of production, as a segment of vertical intra-industry trade. Fragmentation of production is analysed as the main cause of limited applicability of international trade statistics.

The key fourth chapter suggest new methodology of modification statistical data of international trade. This statistical procedures contain three steps: determining trade flow as an inter-industry or intra-industry, distinguishing between horizontal and vertical intra-industry trade and determining and separation of the questionable export value. The last one, questionable export value, we recommend to deduct from the total value of trade in future research.

In the fifth chapter, the proposed methodology is demonstrated on the example of key export products of Serbia. Serbian exports is selected because of the small number of export partners, it is a convenient example for demonstration.

Conclusion summarises the reasons and procedure for modification of international trade data.

2. Scientific research in the field of international trade

2.1. The aims of researches in international trade

International trade, especially exports, is one of the key drivers of economic growth and development. The basic theoretical argument in favour of this thesis is that the export orientation increases the openness of the economy,

which thus becomes more exposed to the penetration of foreign technologies and foreign competition, leading to the acceleration of technological progress.

Therefore, the most important goals of scientific research in the field of international trade are related to the analysis of existing export routes in order to find opportunities for improving export, whether it is to increase volume, product types or break into new export markets. The result of this kind of researches can be: a recommendation on changing export routes, increasing the production of certain types of goods, forming a strategy of joining some economic associations, counting on certain comparative advantages, etc.

Quantitative models of analysis and forecasting in the economy have become increasingly represented by the consolidation of liberalism as the dominant economic concept, but they would be equally massively used without political background, as they provided significant scientific explanations and predictions and provided a solid basis for creating a successful foreign trade policy. This does not exclude the importance of qualitative aspects of international trade researches, because without understanding the concrete country, economic system and conditions, quantitative analysis rarely provides correct predictions and estimates.

2.2. Methods of scientific researches in international trade

Thanks to the massive use of information technologies, the statistics on foreign trade are very precise and easily accessible, which has enabled the expansion of scientific research and published works in this field. Empirical research mainly refers to the application of existing theoretical models to individual countries or groups of countries, while most theoretical contributions to the study of international trade relate to insignificant modifications of existing models.

Regression analysis, gravity model, coefficient of coincidence, Balash and Grubel-Loyd index, are most often used models in international trade (Krugman, Obsttfeld, Melitz, 2014).

Regression analysis and gravity model are a standard framework for analysing trade patterns and, more specifically, the potential of trade flows. They are very similar in shape and are aimed at quantifying the impact of factors of international bilateral trade: GDP or GDP per capita, geographic distance (as a representative of transport costs), price level, common language, customs, colonial history, and others. Artificial variables give great freedom to introduce the specificity of the observed economies. An interesting example is the successful quantification of the economic impact of armed conflicts (Stanojević, 2010). The goal is to: anticipate the volume of trade in the short term, establish "free space" in targeted markets to increase exports or correct one of the factors that can affect economic policies in order to

increase export chances. This model was previously relatively often applied to Serbia's exports, while in the last decade it was used very rarely (Stanojević, 2015).

Coefficient of conformity analyses the degree of compatibility of exports of one country and imports of another of a particular group of product. Contrary to previous models, it does not provide an assessment of the total export potential of one country to another, but an assessment of potential export routes for a particular product group. UN Comtrade (https://comtrade.un.org) gives data on the quantity and price of exported goods by groups. This is actually the cosine angle between the export and import structure vector (Allen, 1963). Coefficient of conformity can have values from 0 (complete incompatibility) to 1 (completely identical structure of exports of one and imports of another country by sectors). Stanojević (2016) is one of the few examples of the application of this model to Serbian exports.

Balassa index (Balassa, 1965), i.e. RCA (Revealed Comparative Advantage) determines the acquired comparative advantage of a particular country in the production of a selected product group or sector. Basically, the index evaluates the intensity of trade and the specialization of the analysed economy.

The Grubel-Loyd index (1967; 1975), which will later be used in this paper, defines a specific trade direction as an inter-industry or intra-industry trade (IIT), which, by effects on the economy, stands out as a significantly different category in relation to export in general.

There is also the *Vona index* of intra-regional trade, then the *Finger-Krein index* of the similarity of trade distribution between the two countries, as well as several indexes of the export concentration of a particular product.

All of these models are based on data on the total volume of exports or the volume of exports of certain groups of products as a dependent variable (gravity model and regression analysis) according to which the influence of other factors or independent variables is the measured (Coefficient of conformity and all "Index" models) outcome of the research. Therefore, statistical data on existing exports are a key element of all quantitative models. Incorrect data leads to completely false results. Minor deviations from the actual volume of trade do not affect the main goal of the research. However, even the most precise modern statistical data on the border crossing of goods sometimes do not provide even indicative information about export as a way of improving the economy in any aspect. Incorporating these easily accessible data into mentioned quantitative methods often leads to totally wrong estimates, predictions, and expectations.

3. The fragmentation of production as a cause of limited applicability of international trade statistics

The available statistics on contemporary international trade are valid for quantitative research only if they are viewed as the monetary value of products crossing the borders of national economies. But these data by themselves can represent just a number that says nothing about the country's production and export capacities. In the most commonly used models, these data no longer give the correct answer to the most common research questions: where, what or how much an economy can potentially export in order to accelerate growth and development.

The main cause of the reduced validity of these data is the fragmentation of production, as one of the key elements of the globalization process. The fragmentation of production began as a result of extensive foreign direct investment (FDI), which is being invested by the developed countries into low-cost countries. In doing so, the host country retains a minimal part of the profits, and the main part goes to the investor. Export statistics show a reverse situation.

The term fragmentation of production used in this paper was originally proposed in Jones and Kierzkowski (1990). Arndt (1997), Venables (1999), Yi (2003), Jones and Kierzkowski (2001, 2005), and Deardorff (2001, 2005) made a significant contribution to the theory of international fragmentation of production and trade in semi-products. Other authors carried out significant empirical research to measure the extent of fragmentation and /or the impact of fragmentation of production on individual economies, such as Amador and Cabral (2008) for the Portuguese economy, Özenç and Altaylıgil (2013) for Turkey, etc.

The fragmentation of production, regardless of whether it is the result of FDI or a different kind of formation of international production chains, in most cases leads to statistical data showing a far greater volume of foreign trade than a real added value, under which we consider the value of output minus the value of intermediate consumption. Gross value added is a measure of real GDP.

As production fragmentation does not affect all segments of international trade in the same way, it is necessary to differentiate the inter-industry from the intra-industry exchange, and then the horizontal from the vertical intra-industry trade. Distortion of statistical data can occur in all these forms of trade, but their correction is not possible in all cases.

3.1. Inter-industry trade

Inter-industry exchange is a form of foreign trade based on comparative advantages. The subject of bilateral trade in this case refers to the products and services that are classified in different economic activities regardless of whether they are the products of higher or lower processing (the country imports food, exports cars or imports electronics, exports clothes, etc.). At the same time, for a particular bilateral flow to be called an inter-industry one, it is necessary that the economy should have a relatively small amount of import of the observed export product.

In relation to intra-industry trade, particularly the vertical one, these are isolated and generally known cases, which is why it is unlikely to mislead the researchers. Generally, inter-industry exports have the important role in economic growth and overall economic development.

3.2. Intra-industry trade

The phenomenon of intra-industry trade was first analysed in the works of Balassa (1966), Grubel and Loyd (1967; 1971; 1975). Intra-industry trade means that the country simultaneously imports and exports goods and services in the same sector. These models are elaborated by Dixit and Stiglitz (1977) and Helpman and Krugman (1985), including the model of intra-industry trade in monopoly competition and the horizontal product differentiation. Andersen (2003) gave a very detailed overview of extensive literature on intra-industry trade.

For the purposes of this research, horizontal and vertical intra-industry trade should be considered separately, as they have a very different impact on the economy.

3.2.1. Horizontal intra-industry trade

Horizontal intra-industry trade refers to the simultaneous export and import of goods classified in the same economic sector and in a similar processing phase (Grubel, Lloyd, 2007, p. 3). Sometimes it is about the exchange between the economy at a different level of development, and sometimes about equally developed countries. In the first case, the trade takes place on the basis of the difference in price (quality). In the second case, the exchange is based on different consumer preferences (for example, France imports German cars, while Germany imports French ones at the same time).

Intra-industry trade, especially its horizontal variation, has positive effects on economic growth and development, although it is not based on classical comparative advantages. The value achieved by these exports does not have

the incentive force of a high surplus in a particular industry, but it is important that it covers the value of imports in the same sector and engages internal production resources.

3.2.2. Vertical intra-industry trade

Vertical intra-industry exchange relates to the export and import of goods in the same sector, but at different stages of processing. This is the most typical consequence of the described fragmentation of production across different countries.

Vertical intra-industry trade occurs when foreign investments are placed in the production of goods not intended for the market in which they are produced, or at least not in the stage of production that is realized in this market. As mentioned above, intra-industry exchange also occurs without the presence of FDI, when exporting companies are a part of international production chains.

China is a typical example. In the OECD and WTO report (2012, p. 1), numerous studies are listed that explain this phenomenon. For example, the trade balance between the US and China is about 40% lower if the gross value added is calculated, than the one shown by statistical data, it is 50% lower in the trade between the EU and China, while the balance in the Japanese-Chinese trade, instead of the surplus, in terms of value added, shows a deficit.

4. Methodology of modification of data on international trade

4.1. Data

The term *product group* in this paper refers to two-digit and three-digit product groups according to Standard International Trade Classification (SITC). SITC has ten basic *sections* of products marked with single digit numbers 0-9 (food, raw materials, beverages and tobacco, plant and animal oils, chemical products, machines, finished products classified by material from which they were made, etc.). The sections are divided into two to over fifty groups.

The amount of trade at a high level of aggregation, by sections, would not be useful for the application in any quantitative research. Therefore, in the models for international trade research, data on the export of groups of products with three-digit classification should be used, and even more convenient, data on exports of *subgroups*, which are expressed by four-, five-, or even six- digit code within SITC. It is very important to choose an adequate level of aggregation of groups of export products in accordance with the

research objectives, because it is quite common for the economy to generate a surplus at the level of the product group, and a deficit according to the data of the observed sub-group and vice versa.

4.2. Determining trade flow as an inter-industry or intra-industry

The first step of the analysis is to determine the share of inter-industry or one-way trade within the analysed product group of the given country (j). Data on the export and import of the group of products on the three-digit level of the observed country are used in trade with the world as a whole.

The most widely used method for determining intra-industry trade was proposed by Grubel and Lloyd (1971, 1975). There are several other ways to establish inter-industry trade, but most of them are variations of the Grubel-Lloyd index. It is obtained in the following way:

$$GL_i = 1 - \frac{|Xi - Mi|}{Xi + Mi}; \quad 0 \leq GL_i \leq 1 \qquad (1)$$

Xi and Mi are the export values for the activity or product group, and the term in the ratio of the quotient is the absolute value of the trade balance.

The Grubel-Lloyd index therefore has a value ranging from 0 to 1. Zero signifies a completely inter-industry trade in a given product group. In this case, there is no need for adaptation of data before the application of the existing quantitative models.

When the value of the index is closer to 1, the specific trade direction is classified as an intra-industry trade and must be subjected to further analysis in order to determine whether it is a horizontal or vertical intra-industry exchange.

4.3. Distinguishing between horizontal and vertical intra-industry trade

As the key difference between horizontal and vertical intra-industry trade is a degree of processing of products, the simplest way of expressing this difference is by the range of unit prices of imported and exported products. When the difference between the export and the import price is outside of a certain range, this is not the exchange of products of the same degree of processing, but a vertical intra-industry trade. This range in researches varies from 15% (Fontagn'e et al., 1997) up to 25% (Ando, 2006). If, for example, an export product is more than 25% expensive or cheaper than an import product from the same group, this difference can be considered as a reliable indicator of vertical trade as a part of the production process.

Whatever the range taken as a basis for distinguishing horizontal and vertical intra-industry trade, the adjusted amount of bilateral trade will be substantially closer to the objective amount of foreign trade than the one shown by the available statistics.

The choice of a larger range leaves a greater chance of finding trade in a more favourable horizontal trade, while the smaller range narrows down this possibility.

For cases in which we will explain the methodological procedure of data correction, we will use an optimistic variant of 25%. The selection is based on the results of previous research in this field and aims to illustrate the methodological procedure. In this case, the intra-industry trade of products is horizontal if the difference in export and import prices is in the following range:

$$\frac{1}{1.25} \leq \frac{\mathrm{PX}kj}{\mathrm{PM}kj} \leq 1.25 \qquad (2)$$

Where:

PX*kj* is the value of a unit of goods *j* exported to the world by the country *k*,

PM*kj* is the value of a unit of goods *j* imported to the world by the country *k*.

If the difference between the export and the import price is below or above this range, trade is a vertical intra-industry one. The established vertical IIT comprises a number of different transaction bases within the same subgroup of the product. One of the basics of international trade is the export of products of lower processing, and the second is the export of cheaper products of the same level of processing from less developed economies.

In each product group there will be subgroups in which prices will be contrary to this logic, or subgroups in which the export of the less developed country is more expensive than import. These subgroups of products are the result of *multiple crossing of the boundaries of the same products*, in which they are only increased by the added value, as a result of production fragmentation.

4.4. Determining and separation of the questionable export value

The methods by which a particular trade route is defined as inter or intra-industry, and the method for distinguishing horizontal and vertical intra-industry trade have a common problem. None of them explains which direction the analysed trade flow takes, and it is exactly the direction that has the key effect on the success of an economy. Since vertical intra-industry trade also includes exports and imports in the same group, the above and

other formulas used to determine the IIT do not include differences in effects for different stakeholders in the production chain.

However, the focus of this research is a very common, and economically illogical reverse phenomenon, when the less developed country imports cheaper, and sells a more expensive product. Although it seems as a positive phenomenon for less developed economy, it is not a matter of development potential at all. It is about the fact that the goods before the finalization cross the border several times, with their value increasing each time for the amount of added value at a certain stage of production. Foreign trade statistics register each border crossing as the export of the total value of the product. The part of bilateral flow which referring to the multiple crossing of the border of the same product, exists only at the statistical level, while the mentioned positive effects of exports on economic growth are completely absent. The less developed country in this case only ensures a small number of (mostly minimum) wages for the workers.

If the participation of this kind of "export" (statistical rather than the real one) is large, this, apart from the problem for the economy, is an obstacle to all quantitative research, as it presents a very distorted picture of large exports.

In order to obtain real information about the export of a given country, the value of such exports should be excluded, or deducted from the value of exports of the analysed sector, product group, or product.

The thesis we advocate is that statistics on bilateral trade by a particular group of products, before being used in international trade research formulas, should be reduced by the amount of trade of that subgroup resulting from that multiple crossing of the border.

There is not much effort in the literature to establish a unique method to determine this value. Ando (2006) has made a significant contribution to this direction. He claims that the higher price per product unit of the less developed economy than a more developed one, in the same product subgroup, points to a multiplied export that he calls back-and-forth trade. Although this is an indicator of disputed exports, the argument seems insufficient to be adopted as a rule. Especially when it comes to very narrow product groups (five-digit and six-digit code of SITC - basic headings), a less developed country should be allowed the opportunity to achieve a higher price (higher processing level) than the more developed one.

The criterion which should be added in order to be absolutely sure that it is multiplied export is that the less developed country, which achieves higher export prices than the developed one, should at the same time have a trade deficit in the same goods with the same partner.

This last and crucial step for data correction does not require the application of any formula. It is easy to get the price per unit of product by dividing the value with the quantity from the UN COMTRADE data on the quantity and total value of exports and imports. The problem is that intra-industry trade qualifies as vertical by bringing in the price of products that are the subject of trade of a particular country with the world (equation 2), and in order to determine which export is the result of multiple crossing of the border, we assess the character of the bilateral trade route.

Depending on the objectives of quantitative research, we can distinguish *two methodological approaches in this third step*. The researcher should choose a particular option depending on whether the subject of the research is a specific bilateral trade route (possibly a trade with countries of a group) or a focus is on a particular product group, whose export potentials are analysed.

The first option is to apply again the equation 2 to the *k* country's trade in product *j*, but this time not with the world but with individual countries. Then we would not only classify the IIT of certain subgroups of products into vertical and horizontal, but in the same step, if it was vertical, simply assess whether it was an export that we consider questionable. The rule is the same - the questionable value of exports is amount of trade when the export price of a less developed country is higher than the import value by more than 25%. All subgroups of the selected product group should be included in the analysis.

The second option of the third step is to estimate to which countries the most of the vertical export of the product is directed. Sometimes almost all exports go to a group of several countries and then this option is not more demanding than the previous one in terms of number of observations. On the other hand, there are economies such as Chinese, which place their products in hundreds of countries, and the application of this other option can be very demanding. Although these observations are relatively simple in the intellectual sense, and the account is maximally facilitated by a number of tabular budgeting programs, their large numbers would require a lot of time.

A favourable circumstance for the researchers of Serbian foreign trade is that the key Serbian products are exported to only a few countries. That is why the example of Serbia is easy to explain in terms of the described methodological correction of statistical data in international trade surveys.

5. Correction of statistical data on selected examples of Serbia's exports

As an example of methodological procedure we will use one of the product groups which plays a significant role in terms of volume, number of products

and value in Serbia's exports. This is 772 SITC group which refers to electrical switches and devices for the protection of electric circuits.

In this product group, almost all exports take place with more developed countries of the European Union and less with the Russian Federation.

By applying the Grubel-Lojda index, we find that the trade in this group's products is intra-industry, because the import of products from the same group is extremely high.

By applying the first proposed option we chose Germany as the most important trading partner of Serbia. The product group 772 is included entirely, that is to the lowest available five-digit level.

Group 772 includes five subgroups, of which only one is horizontal trade and has a minimum value. In all the remaining four vertical trade flows, the export prices of Serbia, although a far less developed economy, are many times higher than the import ones. However, only in exports of the group 77254 SITC (relays) it can be said with certainty that this is a multiple crossing of the border (marked with X), since Serbia has higher export prices to Germany than imports, with significant trade deficit at same time.

Statistical exports of these products from Serbia to Germany amount $13.36 million (Table 1). The calculated adjusted value of exports, therefore, the value of exports that can have positive effects on the economy is only $12.14 million, or less by 1.22 million% (9.13%).

Table1. Trade of Republic Serbia and Germany

Trade flow	SITC code	Weight (kg)	Value ($)	P ($)	Px/Pm	Type IIT	Type VIIT	Corrected value ($)
Export	**772**		**13,364,778**					**12,141,264**
Export	77232	12,821	256,427	20.00	0.17	H		
Import	77232	214	24,766	115.73				
Export	77235	213	76,916	361.11	8.12	V		
Import	77235	175	7,779	44.45				
Export	77254	11,834	1,223,514	103.39	4.19	V	X	
Import	77254	705,456	17,425,545	24.70				
Export	77281	91,525	679,034	7.42	1.06	V		
Import	77281	60,596	423,936	7.00				
Export	77259	315,018	11,128,887	35.33	1.25	V		
Import	77259	13,404	378,394	28.23				

Legend: P - price per unit of product; Px / Pm - the ratio of the export and import price; IIT - intra-industry trade; H - Horizontal IIT; V - vertical IIT; VIIT - vertical intra-industry trade; X - questionable value of exports.

Source: Data on export and import https://comtrade.un.org/, accessed 12.09.2017; author calculation.

We also analysed other important partners in this group and received similar results for export to Italy, which in some subgroups is several times more expensive than import. A similar situation is also with exports to France, while Serbian export to Austria in several subgroups has higher export prices and at the same time a significant trade deficit.

The data obtained in this way can be further used in various quantitative research. The adjusted value of exports of different groups of products in analysed country will give very valid estimates of the coefficient of conformity (matching) with its import needs, as well as the competitive advantages in a certain area (Balassa index).

Finally, even without further application in a quantitative model, this approach gives very valuable information for a qualitative analysis of the real importance of trade with specific partners.

The proposed second option is to include one subgroup of products and all major export partners (Table 2). We selected the subgroup 77281 (electric panels, panels, consoles, electrical cabinets) for the sake of a simple illustration, since more than 90% of the value of exports is placed in only five countries.

Table 2. Assessment of international trade of Serbia by goods of group SITC 77281

Trade Flow	Partner	Weight (kg)	Value ($)	P ($)	Px/Pm	Tip IIT	Tip VIIT	Corrected value ($)
Export			3,684,516					**2,172,191**
Export	Germany	91,525	67,9034	7.42	1.06	V		
Import	Germany	60,596	423,936	7.00				
Export	Austria	8,783	97,134	11.06	1.82	V	X	
Import	Austria	226,030	1,376,183	6.09				
Export	France	17,236	201,243	11.68	1.81	V		
Import	France	10,360	66,671	6.44				
Export	Russia	3,519	28,559	8.12	3.49	V	X	
Import	Russia	58,654	136,142	2.32				
Export	Slovenia	4,908	45,090	9.19	1.88	V		
Import	Slovenia	128,885	630,524	4.89				

Legend: P - price per unit of product; Px / Pm - the ratio of the export and import price; IIT - intra-industry trade; H - Horizontal IIT; V - vertical IIT; VIIT - vertical intra-industry trade; X - questionable value of exports.

Source: Data on export and import https://comtrade.un.org/, accessed 12.09.2017; author calculation.

Using the described method, Serbian exports to all major markets are classified as vertical (V). The analysis shows that in two of the five export flows there is a multiplied crossing the border of the same goods (X). The statistical value of Serbia's total export to these five countries of the 77281 group is $ 3.68 million, while the adjusted value is $ 2.17 million. Such corrected data can be further used in the models of regression analysis and gravity model type. These models should include the corrected data on Serbian exports and import from the target market, but also data on the products of a specific group instead the usual total exports, which, under contemporary conditions, do not yield satisfactory results. Data must relate to several years for obtaining the most accurate panels. The application of the corrected data in these models will give very precise information on the impacts of all the factors involved in the model, which can further enable the development of an adequate export strategy.

6. Conclusion

An intensive process of globalization of the world economy at the end of the 20th and the beginning of the 21st century, in addition to the liberalization of the flow of goods and capital, led to a relatively new phenomenon called the fragmentation of production. In the modern world economy there are almost no products, especially those of a higher degree of processing, which are entirely produced within the boundaries of one national economy. It is not just the question of classical trade in goods that contains the imported raw materials and semi-products, but of the fact that all more complex products are created within international production chains involving companies from a large number of countries, whereby before the finalization the product crosses several borders of national economies, including the same border several times.

What is crucial for the methodology of international trade research is that the fragmentation of production has largely limited the usability of classical, previously very useful, econometric models.

Therefore, data on foreign trade must be corrected before being applied in existing quantitative models. The value of international trade as statistical data on goods crossing national borders is not called into question. What is questionable is the value of exports from which positive effects on the growth and development of the economy are expected, as this is one of the key objectives of scientific research.

Our basic assumption was that there is a significant distortion of data on the volume of foreign trade and hypothesis is that if the export data is being corrected to approximate to real (economic useful) value, they will provide

more relevant basis for research in international trade, and consequently more appropriate economic policy based on them.

The proposed methodological procedure for data correction consists of the three steps related to the analysis of a specific trade route, i.e. bilateral trade for a particular product group. The proposed methodological procedure leads to that value of exports whose application in quantitative research gives an objective picture of its development potentials. *The first step* is to classify a trade route into inter-or intra-industry trade. Only intra-industry trade is subjected to further correction, which in the *next step* is defined as horizontal or vertical. The questionable value of exports, which is actually only the result of the multiple crossing the same border of one product, can only be a part of a vertical intra-industry trade. Defining this questionable value is the result of the *third step*.

The hypothesis is proved by applying suggested procedure to international trade of the selected groups of export products of Serbia and its most important partners showed that the corrected export value could be lower than the recorded exports by 10% to over 40%. The export value that is set as controversial should be deducted from the value of exports of the analysed product group. This results is relevant only for the tested group of products and partners, but hypothesis can stand even opposite case, for example, that value can be higher than statistical one in more developed economies. In that case, getting closer to real value, also will improve assessment of trade and even investment directions.

Such a high probability of error in delicate models of international trade can certainly not lead to objective assessments of the country's export potential, both in terms of product types and export partners. Recommendations for trade, production and other economic policies derived from such distorted data can be completely contrary to the economic interests of the country. Corrected value of statistical data can be further successfully applied in the existing econometric models, and provide more appropriate trade policy.

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