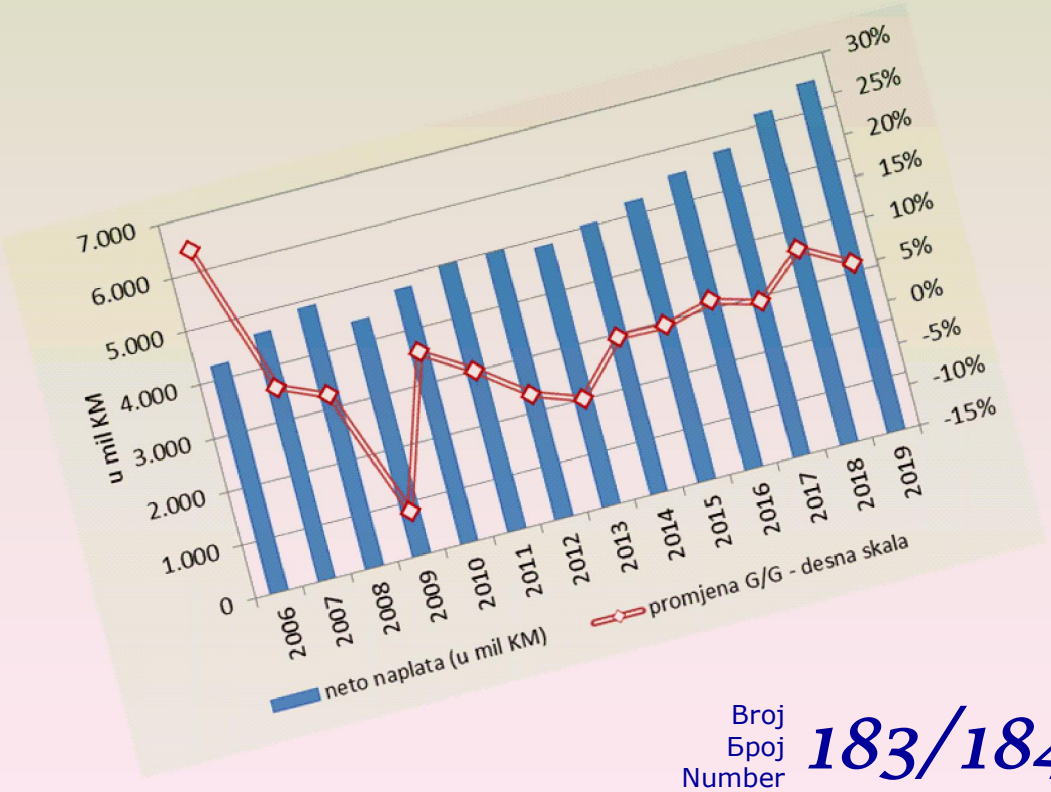
Bosna i Hercegovina
Odjeljenje za makroekonomsku analizu
Upravnog odbora Uprave za indirektno - neizravno oporezivanje

Босна и Херцеговина
Одјељење за макроекономску анализу
Управног одбора
Управе за индиректно опорезивање

Macroeconomic Unit of the Governing Board of the Indirect Taxation Authority

OMA Bilten



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With this issue

The negative trends in the indirect tax revenue collection, caused by the appearance of coronavirus, have deepened significantly in August 2020. According to the preliminary ITA report on cash flow, 582,4 million BAM of gross revenues was collected in August 2020, which is 118,1 million KM less than in the same month in 2019. Since the August refund payments were at the same level as in the August of the previous year, the net deficit in revenues corresponds to a gross revenue deficit. When expressed as a percentage, the monthly decrease in net collection compared to August 2019 is as high as 20,1% (Chart 1, monthly collection). The continuation of negative trends in August led to an increase in the cumulative deficit in the collection of indirect taxes to 555,5 million BAM, while the deficit in net income, due to a decrease in refund payments of 15,4%, amounted to 402,9 million BAM. Finally, the net collection of revenues from indirect taxes in the period January - August 2020 decreased by 9,4% compared to the same period in 2019 (Chart 1, cumulative).

Chart 1

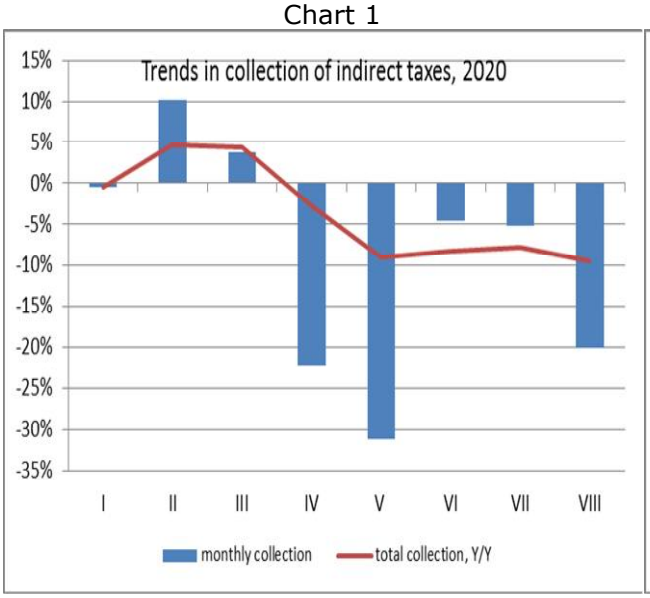

Chart 2

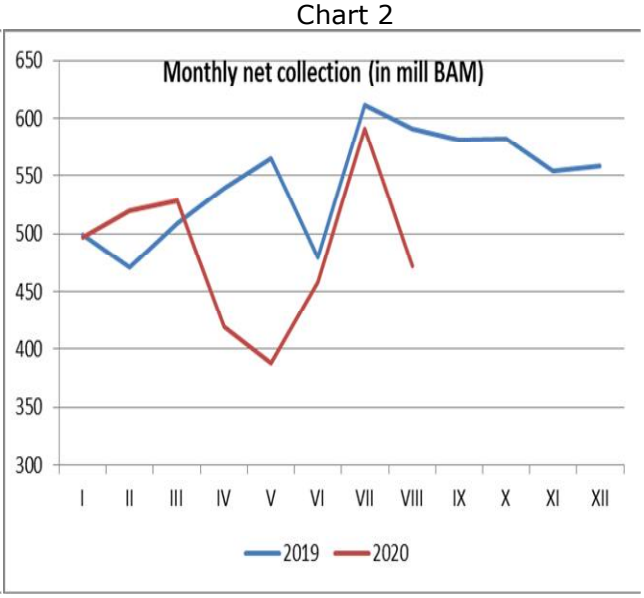

Chart 2 shows that the collection in July approached the level from the corresponding month of 2019, after which the revenue collection gap has widened again in August. The main factors of negative VAT growth in August were the large decline in imports and the unexpected growth of VAT refunds for the international projects. Although it was expected that in the summer months the consumption of non-residents (diaspora, tourists, transit and cross-border consumption) would contribute to the recovery of VAT and excise revenues, this did not happen, due to the retaining of the restrictions on entry into B&H by both domestic authorities and western countries. In addition, the slow recovery in the EU has a negative impact on the B&H economy, employment and consumption of citizens, and thus on the collection of indirect taxes.

Dinka Antić, PhD
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Analysis of allocation of revenues from indirect taxes for the period January-June 2020

(Author: Mirjana Popovic, expert advisor - macroeconomist)

The analysis presents the movement of the allocation of revenues from indirect taxes in Bosnia and Herzegovina (hereinafter: B&H) for the period January-June 2020. The period of the first six months of the current year, as well as the same period of previous years, was used as a sample in the analysis.

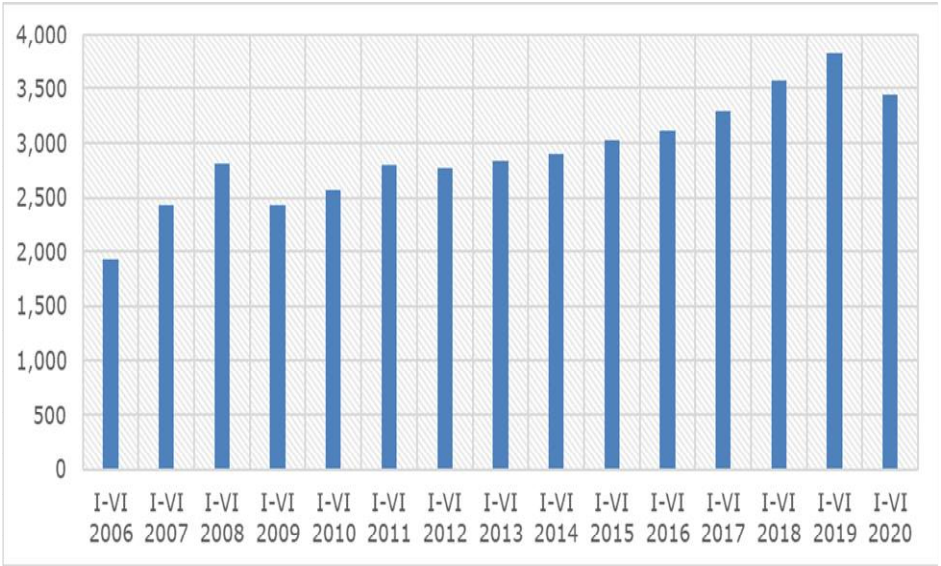
Given that revenues from indirect taxes are the most significant revenues in the budget structure of all levels of government in B&H, the dynamics of filling the Single Account and the allocation of funds collected are of great importance. In accordance with the measures taken in order to prevent the spread of the virus caused by the COVID-19 pandemic, in the first six months of the current year, the economy of B&H was significantly affected. The measures that caused the economic shock have led to a reduction in operations in various sectors, reduction in foreign trade, reduction in demand for certain types of products and services sensitive to measures, difficulties in collecting receivables and the like. All these measures directly affected the collection and allocation of revenues from indirect taxes in the country.

The focus of the analysis is the system of allocation by vertical structure, in accordance with the prescribed methodology and procedure for the allocation of revenues from indirect taxes, which is defined by the Rules on the calculation of remittance coefficients to entities (hereinafter: the Rules)[1].

1. Collection of gross revenues from indirect taxes

Revenues from indirect taxes most significantly participate in public revenues in B&H, and the collection and allocation of these funds are crucial for all budgets. As the revenues intended for allocation depend on their collection, before analyzing the allocation, it is important to perform an analysis of the collection of gross revenues from indirect taxes.

Chart 1.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

[1] "Official Gazette of B&H" No. 62/08

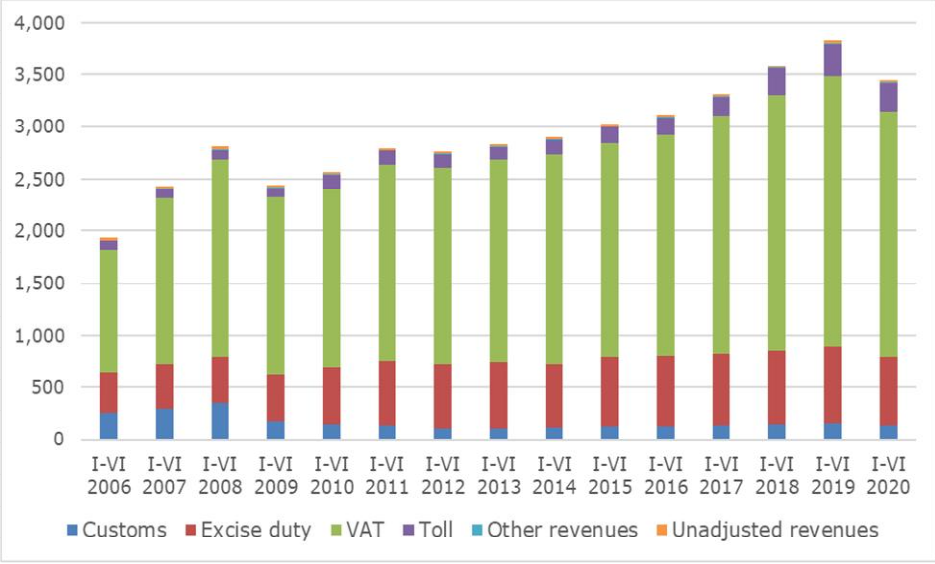
Chart 1 shows the trend in the collection of gross revenues from indirect taxes for the first six months in the period 2006-2020, in millions of BAM.

Observing the semi-annual data on the collection of total gross revenues from indirect taxes in the time series shown in Chart one, the largest collection was realized in the first six months of 2019. In the period January-June 2006-2008, the collection of gross revenues recorded growth, after which in the first half of 2009 there was a significant decline, as a result of the global economic and financial crisis that significantly affected the country's economy. After 2009, the collection of gross revenues in the period January-June recorded a constant growth each year until 2019. In the first half of the current year, there was a significant decline in gross revenue collection compared to the same period last year, as a result of the economic shock caused by the COVID-19 crisis, and measures taken to prevent the spread of coronavirus.

The decline in gross revenues collected in the first half of 2020 was caused by a decline in revenues in the main categories, primarily a decline in revenues from import / export duties, which is a decline in gross customs revenues, which are lower by 16.30% compared to the first half of 2019. The decline in gross customs revenues is the result of measures taken, which imply appropriate restrictions on foreign trade. Also, gross revenues from excises decreased by 10.78%, while gross revenues from VAT decreased by 9.25% as a result of the economic shock caused by the growing negative growth rate of imports, limiting work in various sectors, reducing household costs and the like. Thus, in the first six months of 2020, the collection of total gross revenues from indirect taxes was lower by 9.95% compared to the same period last year.

Chart 2 shows the movement of the structure of collected gross revenues from indirect taxes for the first six months during the observed period by types of revenues individually. The chart shows that the most significant gross revenues were generated from VAT, followed by excise revenues, which over time significantly participate in total revenues, as a result of the increase in excise duties on certain products, which is defined by amendments to the Law[2]. In addition, the share of toll revenues increased in the observed period, while customs revenues over time took a smaller share in total revenues, which is a result of the process of liberalization of foreign trade implemented in phases.

Chart 2.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

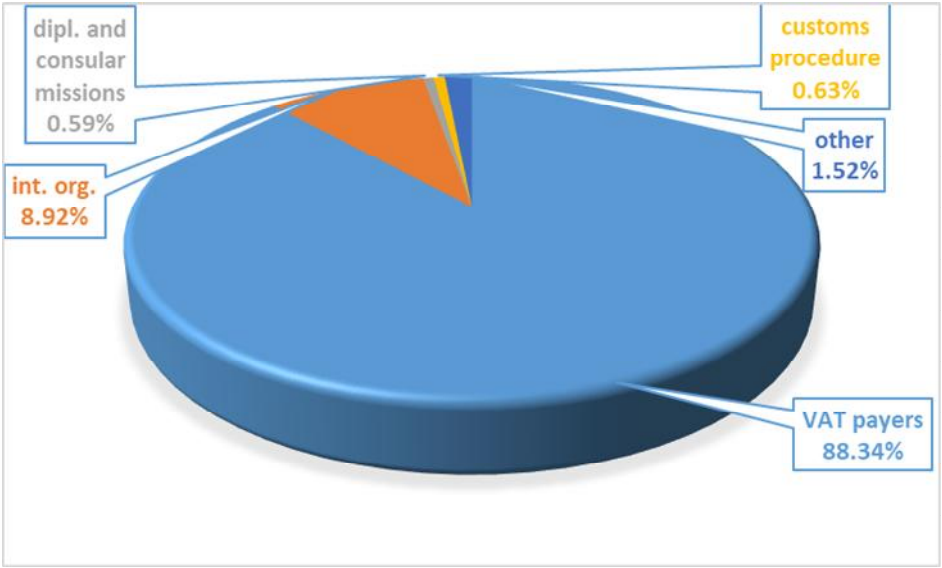
[2] Law on Excise Duties ("Official Gazette of B&H" No. 49/09, 49 / 14.60 / 14.91 / 17) and the Decision on Determining the Specific and Minimum Excise Duty

2. Allocation of revenues from indirect taxes in the period January-June 2020

2.1. Allocation of gross revenues from indirect taxes

Gross revenues from indirect taxes are total revenues intended for allocation, which include the amount of funds intended for refunds. Given that the refunds to taxpayers have priority in the allocation of total revenues from indirect taxes collected on the Single Account, the amount of revenues collected on the Single Account (VAT, customs, excise duties, tolls 0.15 BAM) is reduced by the amount of the minimum reserves[3] necessary for the Indirect Taxation Authority of B&H for continuous and uninterrupted payment of refunds. Thus, in the first six months of 2020, 19.37% of the total allocated revenues from indirect taxes were allocated for minimum reserves, represented by Chart 4, while Chart 3 shows the structure of refunds in the first half of 2020, in percentages.

Chart 3.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

The most significant allocation of 88.34% refers to the VAT refund to taxpayers who, according to their VAT refunds, are entitled to a refund, followed by the allocation of 8.92%, which relates to VAT refund under international agreements.

The next step in the allocation is the distribution of the corresponding amount to the budget of B&H institutions, where 11.27% of the total allocated revenues from indirect taxes were allocated in the first six months of 2020, shown in Chart 4.

The remaining amount after deducting the amount for minimum reserves and the amount belonging to the budget of Institutions of B&H is the amount to be allocated to the entities and Brcko District according to pre-determined allocation coefficients at the quarterly level[4], while the allocation coefficient to Brcko District has been fixed since mid-2007[5]. From the amount that

[3] The amount of the minimum reserve is determined in accordance with the Rulebook on Collection, Reconciliation, Allocation of Revenues and Reporting, "Official Gazette of B&H", no. 05/05

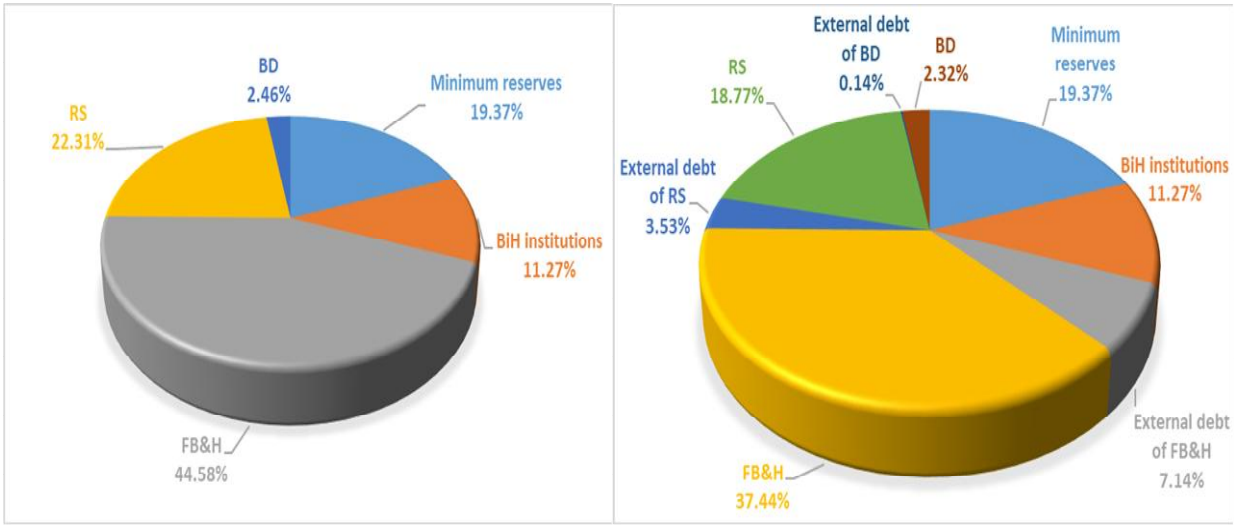
[4] The ratio of the amount of final consumption expressed in VAT returns of taxpayers in the territory of a given entity, or a given user of income, and the amount of final consumption expressed in VAT returns in the entire territory of B&H.

[5] The High Representative, while protecting the fiscal autonomy established by the Final Arbitration Award, on 1st of June 2007. imposed a fixed coefficient for the Brcko District in the amount of at least 3.55% or at least 124 million BAM per year in absolute terms.

belongs to the entities and the Brcko District in the allocation, priority is given to funds for repayment of external debt.

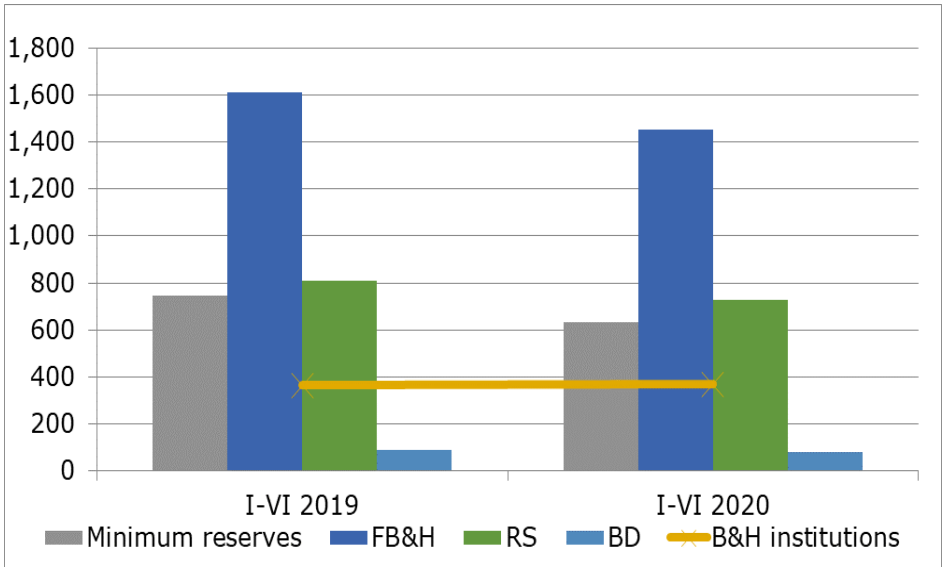
Charts 4 and 5 show the percentage of participation in the allocation of revenues from indirect taxes by users in the first half of 2020. Chart 4 shows the percentage of allocation to the entities and Brcko District includes the amount for financing the external debt, which is deducted from the amount intended for allocation to the entities and Brcko District, while Chart 5 shows the percentage of allocation distributed for external debt repayment in the first six months of 2020.

Chart 4. and Chart 5.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

Chart 6.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

Chart 6 shows the movement of the allocation of gross revenues from indirect taxes for the first six months of 2019 and the first six months of 2020, in millions of BAM[6]. The allocated gross amount in the first six months of 2020 is lower by 9.95% compared to the same period last year.

[6] The amount of gross revenues excludes the collection of a dedicated toll.

The largest decrease was recorded in gross revenues intended for minimum reserves of 15.40%, while the entities and Brcko District recorded a decline, namely the Federation of B&H 9.85%, the Republic of Srpska 9.95% and Brcko District 9.89%.

Table 1 shows the allocation of gross revenues from indirect taxes for the first half of 2019 and the first half of 2020, in percentages. Compared to other participants in the process of allocation, the presented data show changes in the structure of the allocation. The percentage increase in participation in the allocation in the first six months of 2020 compared to the same period last year refers to the Institutions of B&H (1.20 p.p.) and the Federation of B&H (0.05 p.p.), while, on the other hand, the decrease was recorded in allocation of gross revenues intended for minimum reserves (-1.25 p.p.).

Table 1.

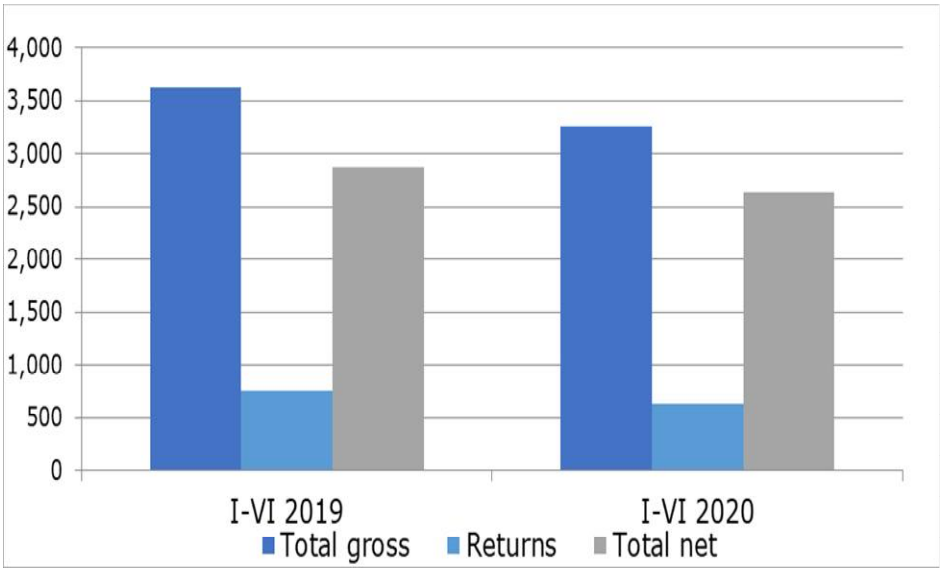
in %	I-VI 2019	I-VI 2020	index 2020-2019
Minimum reserves	20.62	19.37	-1.25
B&H institutions	10.07	11.27	1.20
FB&H	44.54	44.58	0.05
RS	22.31	22.31	0.00
BD	2.46	2.46	0.00
Total	100.00	100.00	0.00

Source: Data from the Indirect Taxation Authority of B&H, OMA overview

2.2. Allocation of net revenues from indirect taxes

Net revenues from indirect taxes represent revenues intended for allocation to users after refunds.

Chart 7.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

Chart 7 shows the allocation of gross revenues, refunds and net allocated revenues from indirect taxes after refunds, for the period of the first six months of 2019 and the first six months of 2020, in millions of BAM.

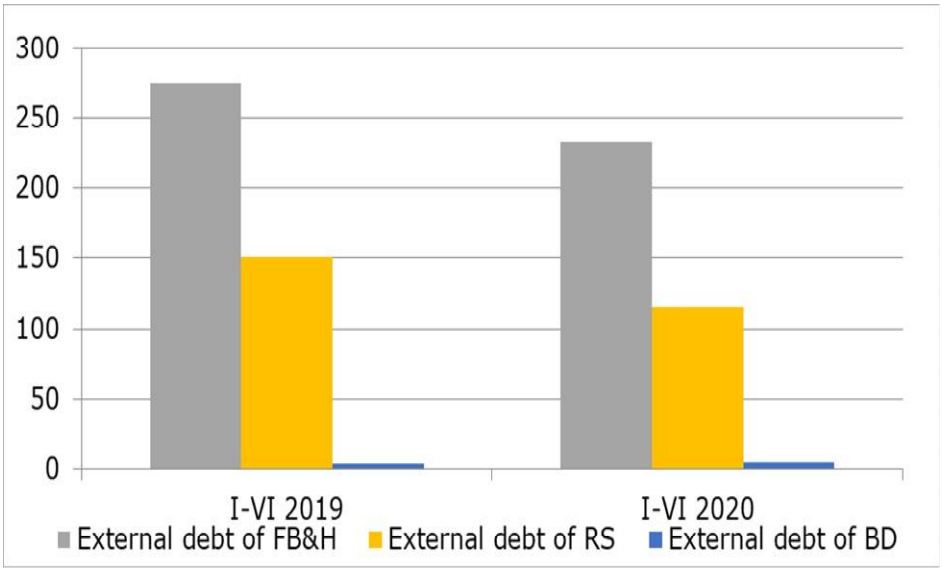
As previously stated, the allocated gross amount in the first six months of 2020 is lower by 9.95% compared to the same period last year, while the refunds are lower by 15.51%, and the allocated net amount is lower by 8,50%.

If we look at the allocation of net revenues from indirect taxes in the first half of 2020 compared to the same period in 2019, there is a decrease in the coefficient in the Republic of Srpska in favor of the Federation of B&H (-0.02 p.p.). The coefficient for allocation to Brcko District is fixed, in accordance with the decision of the High Representative.

2.3. External debt

The increase in the allocation of revenues from indirect taxes intended for financing external debt indicates an increased repayment of external debt to foreign creditors. Chart 8 presents the movement of the allocation of revenues from indirect taxes intended for financing external debt in the first six months of 2019 and the first six months of 2020, in millions of BAM.

Chart 8.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

The amount of allocation for the repayment of the external debt of the Brcko District in the first half of 2020 is slightly higher, more precisely 2.89% compared to the same period last year, while the amount for repayment of the external debt of the entities is lower in the first six months of 2020. In the first half of 2020, compared to the same period of the previous year, the amount intended for repayment of the external debt of the Federation of B&H is lower by 15.27%, while the amount intended for repayment of the external debt of the Republic of Srpska is lower by 23.51%[7].

Table 2 shows the percentage of participation of the entities and Brcko District in the total allocations for external debt repayment. Observing the movement of external debt, there is a noticeable increase in the allocation of funds in the Federation of B&H as well as a slight increase in the participation of Brcko District, and consequently a decrease in funds in the Republic of Srpska for the first six months of 2020, compared to the same period last year.

[7] Repayment of external debt is made in accordance with previously assumed international obligations and the dynamics of repayment of external debt. The tendency to reduce the repayment of the entity's external debt does not necessarily represent lower indebtedness, but represents the dynamics of repayment.

Table 2.

in %	I-VI 2019	I-VI 2020
External debt of FB&H	63.92	66.02
External debt of RS	35.05	32.69
External debt of BD	1.04	1.29
Total	**100.00**	**100.00**

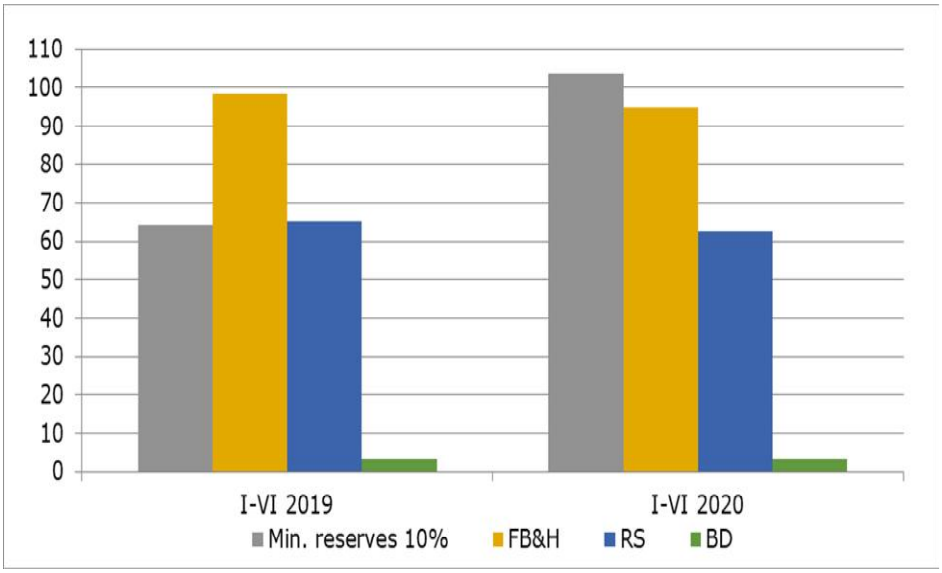
Source: Data from the Indirect Taxation Authority of B&H, OMA overview

2.4. Allocation of toll revenue for highways

In accordance with the amendments to the Law on Excise Duties in B&H[8] (hereinafter: the Law), the amount of toll for highways per liter of derivatives sold on the B&H market, which is collected on a special sub-account of the Single Account, is 0.25 BAM. After the amended Law came into force, a Decision on the temporary allocation of toll revenues for the construction of highways and the construction and reconstruction of other roads[9] (hereinafter: the Decision) was adopted, which prescribes the methodology of allocation.

According to the methodology, revenues are collected on a special sub-account within the Single Account, after which 10% of total revenues remain in the Single Account sub-account and serves to settle revenues after determining the final methodology, while the remaining 90% is divided between the entities and Brcko District. Chart 9 shows the allocation of revenue from tolls for highways, which, in proportion to the prescribed coefficients, is allocated in the first six months of 2019 and the first six months of 2020, in millions of BAM.

Chart 9.



Source: Data from the Indirect Taxation Authority of B&H, OMA overview

[8] "Official Gazette of B&H", No. 91/17
[9] "Official Gazette of B&H", No. 50/18

Statistical analysis of the consumption of oil derivatives

(Author: Aleksandra Regoje)

Introduction

The dynamics of consumption of oil derivatives is extremely important for indirect tax revenues. Revenues from excises on oil derivatives and road tax accounted for 18% of net revenues from indirect taxes in 2019. With the corresponding VAT revenues, that percentage was even higher and amounted to 21%. The results of statistical analysis of the consumption of oil derivatives will be presented below. There are presented the seasonal oscillations of consumption by individual categories, and the importance of the seasonal component. After that, the results of regression analysis are presented, simple and multiple, where the dependent variable is the consumption of diesel fuel and gasoline. First, the results of a simple regression were presented, with one independent variable- GDP level. After that, other variables were included in the model, in order to try to achieve a higher percentage of explanation of the variability of the dependent variable by the regression model.

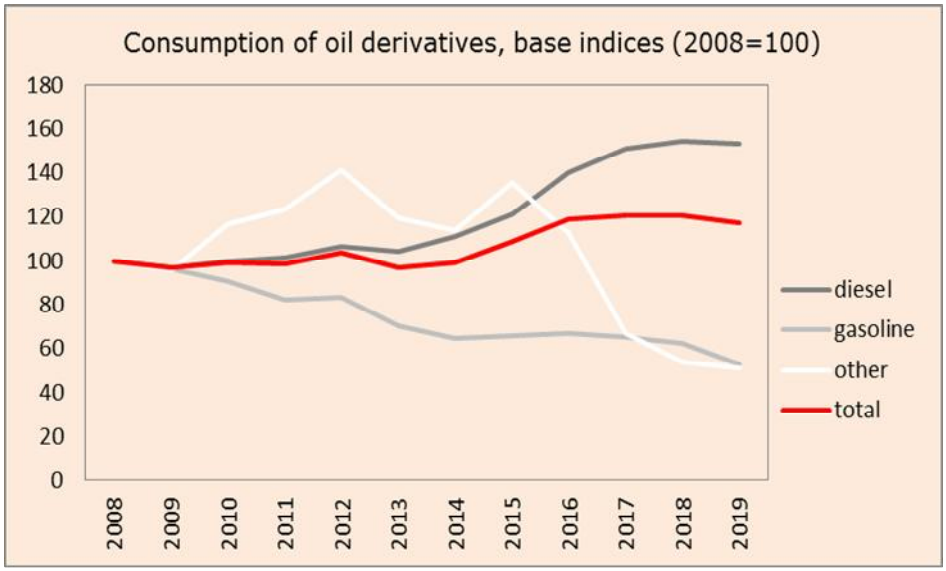
It should be noted that the term "consumption of oil derivatives" in this article refers to the quantities calculated by the author, including the amount of imported oil derivatives and the amount of domestic derivatives placed on the market. Amounts of domestic derivatives from excise declarations were taken with the time lag m-1, in order for the base to be correctly presented in accordance with the provisions of the Law on the occurrence of the obligation and payment of excise duties.

1. Consumption of oil derivatives– dynamics and structure

Consumption of oil derivatives in relation to the base year - 2008 is shown in Chart 1. The total consumption of oil derivatives in the period from 2008 to 2019 increased by 17,5%. In the same period, consumption of diesel fuel increased by as much as 53,1%, while gasoline consumption decreased by 47,6%. The component "other", consisting mostly of heating oil, was by 35,6% higher in 2016 than in 2008. After that year, it began to decline sharply, so that in 2019 it was lower by 49,2% compared to 2008. The growth of the heating oil component since 2009 can be explained by the introduction of earmarked road tax for highways as of 2009, which has not been collecting on heating oil, and therefore the growth of tax burden on diesel fuel and gasoline has been an incentive for the illegal use of heating oil as a fuel for vehicles. The decline in the heating oil component since 2016 was the result of efficient ITA control activities and measures of the entity governments, as well as of reduction the gap between the prices of diesel fuel and gasoline on the one hand and heating oil on the other, with the start of new legislation appliance in 2018.

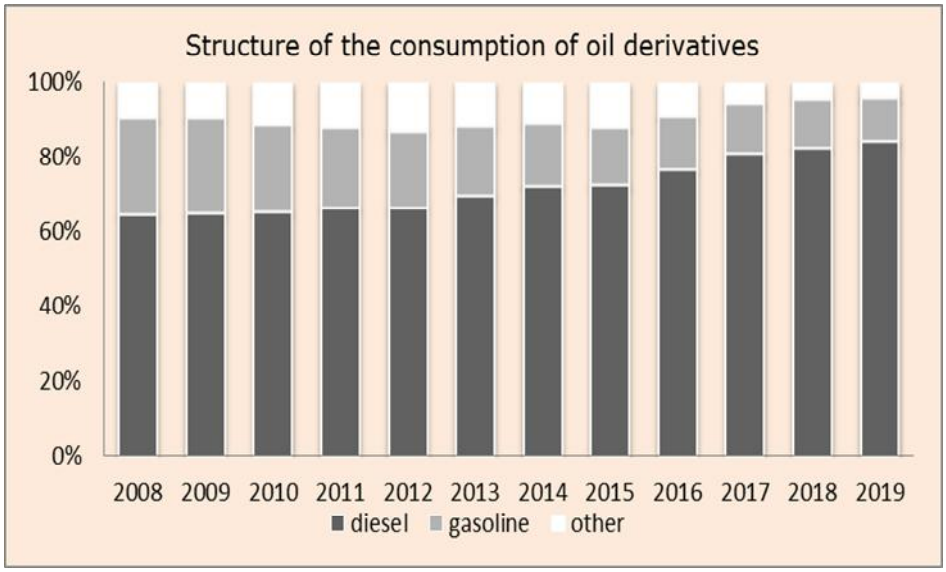
According to the ITA data, ratios of gasoline and diesel import prices have not change significantly during the observed period, and therefore this cannot be the reason for the high decline in gasoline consumption. The reasons for the increase of diesel and decline in gasoline in the structure of consumption of oil derivatives (Chart 2) can be found in changes in consumption preferences, as well as in long-term higher gasoline prices compared to diesel.

Chart 1



Source: Calculation of the author based on ITA data

Chart 2



Source: Calculation of the author based on ITA data

2. Seasonal component of the consumption of oil derivatives

An article on monthly fluctuations in indirect tax revenues was published in January 2020, in the Bulletin number 174-175.[10] There was presented a simple procedure for extraction the seasonal component by using the methods of seasonal indices.[11] The method is based on the calculation of the seasonal indices using the corrected median of the ratios of the original data and centered moving averages. [12] After calculating seasonal indices, regression models were estimated and the

[10] Regoje A., „Monthly fluctuations in indirect tax revenues", OMA Bulletin 174-175, January-February 2020

[11] The calculation was performed based on the methodology presented in Newbold, P. et al. *„ Statistika za poslovanje i ekonomiju* ", Mate, Zagreb (2010), p. 732; Original name: „Statistics for Business and Economics"

[12] Although more complex than this procedure, the official correction procedures are generally based on the moving averages.

coefficients of determination of seasonal indices and actual shares of monthly amounts of individual types of revenue in the corresponding period were calculated, in order to show how well the seasonal indices "fit" into the real shares in the observed period. The results of the calculations indicated a very high importance of the seasonal component in the road tax revenues and a smaller, but not insignificant, importance in the revenues from excises on oil derivatives.[13] In this article, the author went further in the research, in order to conclude which type of consumption of derivatives has a more pronounced seasonal component. Based on a series of data on the consumption of derivatives from 2011 to 2019, seasonal indices were calculated, in the same way as in the article in Bulletin no. 174-175. Regression models were set up again, and the coefficients of determination of seasonal indices and actual shares of monthly consumption levels by individual derivatives in the corresponding period were calculated.

Charts 3-5 present the calculated seasonal indices (red line) and the actual shares of derivatives consumption in the year (black dashed line) in the period 2011-2019. Tables 1-3 present the correlation coefficients between seasonal indices and actual shares of derivatives consumption by years.

We see that the consumption of diesel fuel and lead-free gasoline (LFG) has a greater significance of seasonal component than the consumption of heating oil. Coefficients of determination between seasonal indices and actual shares of consumption in the year of diesel fuel and LFG for the period 2011-2019 were 81,7% and 79,3%, respectively. We did not stop at this, but went further in the analysis, to see in which year there was the largest deviation from the calculated seasonal indices. The correlation coefficients of seasonal indices and actual monthly shares of consumption by years have been calculated. We can see from Table 2 that in the case of diesel fuel consumption, the largest deviation from the seasonal scheme was recorded in 2014, as indicated by the lowest correlation coefficient in the observed period of 78,5%. When we exclude data from diesel fuel consumption for 2014 from our original sample, and then calculate the coefficient of determination with the same seasonal indices, then it amounts to 84,6%, or 2,9 percentage points more than the coefficient of determination for the whole sample. We can see from Table 3 that in the case of LFG consumption, the largest deviation from the seasonal scheme was recorded in 2012, which was indicated by the lowest correlation coefficient in the observed period (71,2%). When we exclude the data for BMB fuel consumption for 2012 from our original sample, then the coefficient of determination between the real shares and the same seasonal indices amounts to 85,6%, which is even 6,3 percentage points more than the coefficient of determination for the whole sample.

It can be seen from Chart 5 that the consumption of heating oil does not have a pronounced seasonal component. This may be one of the reasons for the above mentioned more pronounced seasonal component in road tax revenues than in excise tax revenues on oil derivatives, since heating oil is not included in the road tax base. The coefficient of determination between seasonal indices of heating oil consumption and corresponding actual shares in the year for the period 2011-2019 was only 41,6%. When we exclude from the sample data the years with the lowest correlation coefficients between the real shares and seasonal indices (2012 and 2016, Table 3), then the coefficient of determination between real shares and the same seasonal indices increases by as much as 17,1 p.p., but is still quite low compared to the corresponding calculations for diesel fuel and LFG.

[13] The coefficients of determination between seasonal indices and real shares of revenues from road tax and excises on oil derivatives for the period 2010-2017, according to the author's calculation were 85,0% and 60,7%, respectively.

Chart 3. Diesel fuel

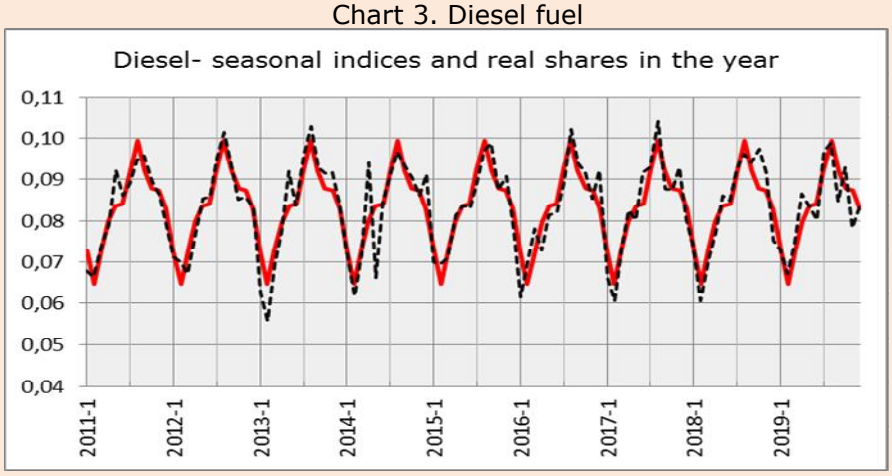


Table 1. Diesel fuel

year	correl.c.
2011	0,92
2012	0,96
2013	0,97
2014	0,79
2015	0,94
2016	0,87
2017	0,94
2018	0,93
2019	0,88

Chart 4. Lead-free gasoline (LFG)

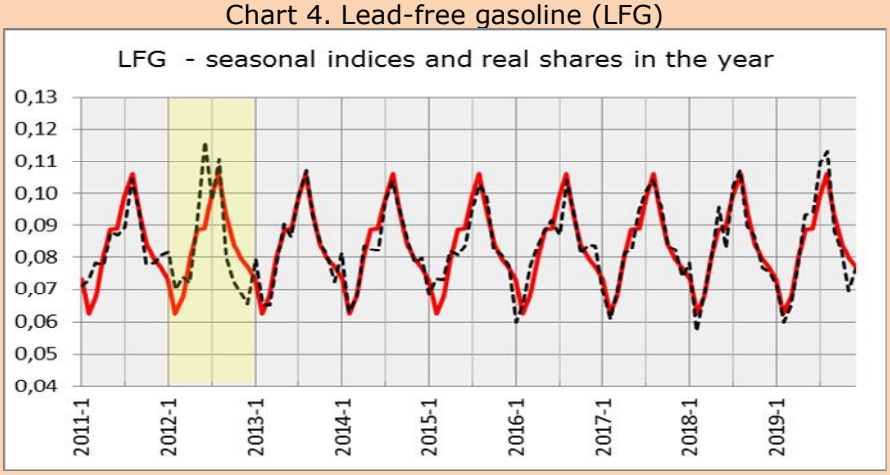


Table 2. LFG

year	correl.c
2011	0,90
2012	0,71
2013	0,97
2014	0,95
2015	0,91
2016	0,85
2017	0,97
2018	0,96
2019	0,96

Chart 5. Heating oil

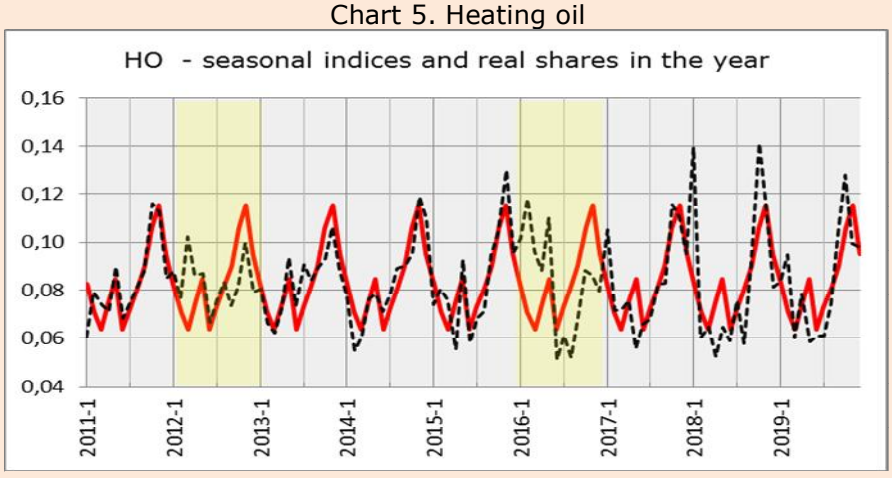


Table 3. Heating oil

year	correl.c
2011	0,84
2012	0,26
2013	0,84
2014	0,89
2015	0,89
2016	0,08
2017	0,78
2018	0,68
2019	0,74

Source for Tables 1-3 and Charts 3-5: Calculation of the author based on ITA data

It can be concluded from the above that the consumption of diesel fuel and LFG has a pronounced seasonal component. The highest consumption of diesel fuel (Chart 3) usually takes place in the third quarter of the year (seasonal indices for July, August and September are over 1,1, or over 9% after converting into shares[14]). The same is the case with LFG consumption (Chart 4), with even higher seasonal indices in these months. The consumption of heating oil does not have a pronounced seasonal component, but the shares in consumption are usually most significant in the months of the last quarter (Chart 5).

3. Regression analysis

Simple regression analysis provides: (1) estimated values of the dependent variable as a function of the independent variable and (2) the estimated marginal change of the dependent variable as a result of the unit change of the independent variable. On the other hand, multiple regressions make it possible to determine the combined influence of several independent variables on a dependent variable. Marginal change is more difficult to assess here because independent variables are not only related to the dependent one, but also to each other. In order to obtain good estimates of the model coefficients, one should consider more independent variables and choose among them **those that are not in a strong interrelationship** and find a model that will be well built into all data.[15]

Below are the results of a regression analysis in which the dependent variable is the consumption of diesel fuel and gasoline in B&H. For the independent variables were chosen those that, according to the calculated statistical parameters, showed relevant for the model. [16] After evaluating the parameters of the regression model, its quality and ability to explain the dynamics of the dependent variable are examined. Table 4 presents the coefficients of determination R^2 and the adjusted coefficients of determination. The coefficient of determination R^2 is defined as the proportion of variability of the sample which is explained by regression or SSR / SST ratio, where SSR represents the explained variability of the sample and SST the total. From the calculated R^2 we can determine the percentage of variability of the dependent variable which is explained by independent variables, i.e. by regression equation. There are certain shortcomings in terms of using the coefficient of determination R^2 as a comprehensive measure of the quality of the regression equation. When additional independent variables are added to the model, the explained variability (SSR) will increase even if the additional independent variable does not represent an important predictor variable. In this case, an increased value of R^2 can lead to misleading results. To avoid this problem, the adjusted coefficient of determination is used, giving a better comparison of two multiple regression models with a different number of independent variables. The difference between R^2 and the adjusted R^2 is significant in the case when the regression model contains a series of independent variables that do not represent important conditional predictors.

Multiple regression coefficients are calculated by the least squares procedure, similar to simple regression. The variance of the estimated coefficients increases directly with the distance of the points from the regression line. It should also be noted that the variance of the estimated coefficients increases with increasing correlation between the independent variables. **If possible, highly correlated independent variables should be avoided.** Multiple regression coefficients are conditional coefficients, i.e. they also depend on other variables included in the model. This is always the case with multiple regressions, except when the correlation between independent variables is equal to zero.

[14] Seasonal index divided by 12 months.
[15] Newbold, P. et al. „*Statistika za poslovanje i ekonomiju*", Mate, Zagreb (2010); Original name: „Statistics for Business and Economics"
[16] Based on the calculated Student t-test and p-value, and knowing the other variables of the regression model, we can conclude whether a particular variable is important for the model.

We can see from Chart 1, that the consumption of diesel fuel in B&H has recorded a huge increase in the past ten years, while the consumption of gasoline has dropped dramatically. The causes of such trends cannot be found in the dynamics of independent variables that are selected for regression analysis presented below (movement of derivative prices, GDP, etc.), given that these are substitutes whose consumption, as already mentioned, was strongly influenced by changes in preferences of the consumers. Consumption of oil derivatives will therefore be analyzed together. The dependent variable (y) in our model will be "diesel and gasoline consumption (in million liters)". There were analyzed the annual data ranging from 2005 to 2019.

First, a simple regression model was built, where the independent variable was the GDP level (in million BAM). The results of the regression analysis are shown in equation (1) in Table 4. It can be seen that the coefficient of the independent variable amounts 0,029, which means that GDP growth by 1 million KM should lead to an increase in diesel and gasoline consumption by 29 thousand liters (0,029 million liters). The p-value of the coefficient is zero, which means that the independent variable is important for the model. The coefficient of determination R^2 is only 74,1%, which means that the variability of diesel fuel and gasoline consumption explained by the dynamics of GDP in the regression model amounts only that percentage level.

In order to explain the dynamics of diesel and gasoline consumption with greater certainty, we will develop a multiple regression model, by adding other independent variables. First, the prices of derivatives on imports were added to the analysis, namely "*the weighted average annual price of diesel fuel and gasoline on imports*". The results of the regression analysis are shown in equation (2) in Table 4. The intercept[17] of the regression equation and the coefficient of GDP variable have changed slightly after introducing this variable. The coefficient of price variable is expectedly negative and amounts to -171,61, which means that an increase in prices by 1 KM per liter should lead to a decrease in the consumption of diesel fuel and gasoline by this number of millions of liters, with other conditions unchanged. The adjusted coefficient of determination amounts 81,9%, which means that this percentage of variability in diesel and gasoline consumption is explained by a linear relationship with GDP and average weighted prices on imports.

As we have not yet reached a high coefficient of determination, we will include additional independent variables in the model. We tried with the variable "*weighted average amount of excise and road tax*", calculated on the basis of annual data of prescribed amount of excise and road tax per liter and the amount of consumption by type of derivative. In the years 2009 and 2018, the legal amount of burden was not the same throughout the year, so the amounts were also weighted by the number of months of application of the same tax rate. The results of the regression analysis are shown in equation (3) in Table 4. The adjusted R^2 here amounts 80,2% but the p-value of the variable "*weighted average amount of excise and road tax* " is unsatisfactory and amounts 0,92. The mentioned variable in this regression model is not a significant statistical predictor of the dynamics of diesel fuel and gasoline consumption. Further analysis showed that there was a high degree of correlation between the independent variable "*GDP*" and this variable (83,7%), which explains the aforementioned high p-value.[18] In the further analysis, the variable "*weighted average amount of excise and road tax*" is therefore excluded.

In equation (4), Table 4 presents the results of the regression analysis where the next independent variable "heating oil consumption" was introduced. Consumption of heating oil is important for the consumption of diesel fuel and gasoline, due to abuses in the use of heating oil as a fuel. The adjusted R^2 in this regression model is even 86,7%, and all variables are significant at a level of 5%.

[17] Constant of the model

[18] If we remove the „GDP" variable from the analysis, the p-value would then be satisfactory for the coefficient of the variable " weighted average amount of excise and road tax ", but the level of the adjusted coefficient of determination would fall significantly (56,4%).

Table 4. Results of the regression analysis for diesel and gasoline consumption (in million liters) for the period 2005-2019

Variable	(1)	(2)	(3)	(4)
Intercept	509,914	769,434	778,665	1011,206
GDP (in million BAM)	0,029	0,028	0,029	0,023
the weighted average annual price of diesel fuel and gasoline on imports (BAM/l)		-171,607	-170,838	-122,377
the weighted average amount of excise and road tax (BAM/l)			-48,743	
consumption of heating oil (in million liters)				-1,227
R^2	74,1%	84,5%	84,5%	89,5%
R^2 adjusted	72,2%	81,9%	80,2%	86,7%
Standard error*	81,63	65,87	68,77	56,51
F- test**	37,27	32,61	19,95	31,30
Observations	15	15	15	15
Significance level	0,05	0,05	0,05	0,05

** Absolute indicator of the model representativeness (expressed in units of measurement of the independent variable)*
*** Test of overall significance in regression analysis*

4. Conclusion

From the analysis of the seasonal component (Part 2), we saw that the consumption of diesel fuel and LFG has a greater significance of the seasonal component than the consumption of heating oil. Although statisticians, based on the coefficient of determination showed above, could conclude that there is a high relationship between the seasonal component and monthly shares of excise taxes on oil derivatives and road tax, relying only on these indices when making monthly revenue projections could lead to significant errors of estimated monthly amounts, even if the annual projection would prove to be completely correct. We have seen that the amount of the irregular component (that can hardly be predicted) is very high, so the indirect tax revenue planning is only possible on an annual basis, in accordance with the basis of projections of macroeconomic indicators (DEP).

From the presented regression analysis (Part 3) we can also see all the complexities of the process of planning revenues from indirect taxes, i.e. excises on oil derivatives and road taxes, and the associated VAT. The regression results summarize the information contained in the data and do not prove a causal relationship, but provide evidence to support it.

Even if we had accurate information on GDP trends, weighted average prices of diesel and gasoline on imports, and heating oil consumption, we would not be able to estimate the consumption of oil derivatives with 100% certainty, based on the presented model. The coefficient of determination of 86,7% shows that there is a significant percentage of consumption variability that is not explained by the regression model (13,3%). That percentage would certainly increase if we included 2020 in the analysis, in which the effects of the coronavirus brought significant distortions to the oil derivatives market.

In the end, we can conclude that a high-quality projection of revenues requires a combination of theory, experience in economic flows, and, finally, a good statistical analysis.

Trade of goods and services for the period January - June 2020

(Author: Mirjana Popovic, expert advisor -macroeconomist)

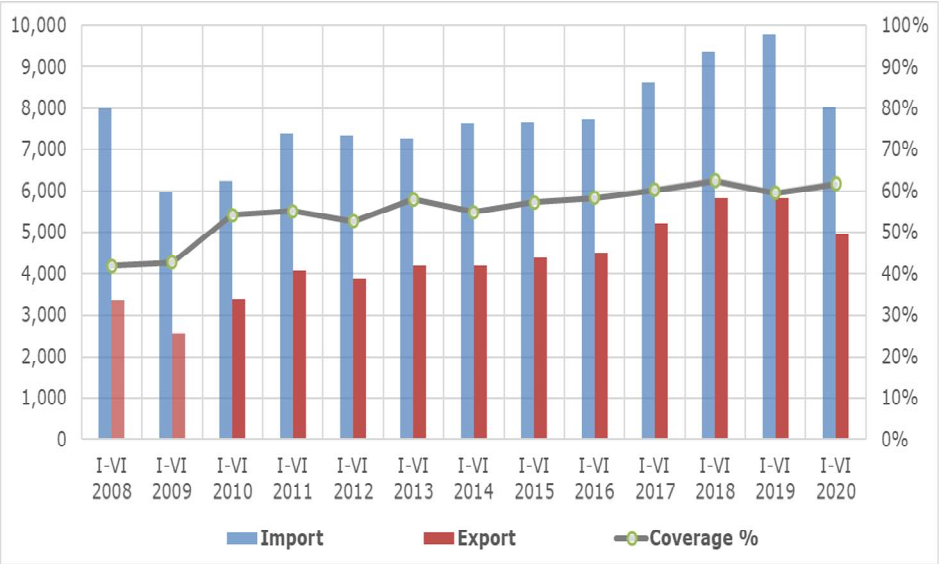
Analysis of trade of goods and services of Bosnia and Herzegovina (hereinafter: B&H) with other countries, for the period January - June 2020 (hereinafter: I-VI 2020) which is a continuation of the analysis of foreign trade of B&H for the first quarter of 2020, emphasizes the impact of current global trends. For the purposes of analyzing the trends of imports, exports and trends of certain product groups for I-VI 2020, the period of the first six months of the current year was used as a sample, as well as the same period of previous years, analyzing the condition of foreign trade during and before restrictions imposed by the coronavirus pandemic.

1. Main trends in foreign trade

In the first six months of 2020, B&H recorded a decline in the volume of foreign trade. Exports decreased by 15.1%, while imports decreased by 18.0% compared to the first six months of the previous year. The coverage of imports by exports is 61.7% and is higher by 3.5 p.p. compared to the same period last year.

Chart 1 shows the trends in B&H foreign trade for the first six months in the period 2008-2020. The values of imports and exports in millions of BAM (left vertical scale) and the percentage values of the coverage of imports by exports (right vertical scale) for the observed period are presented.

Chart 1.



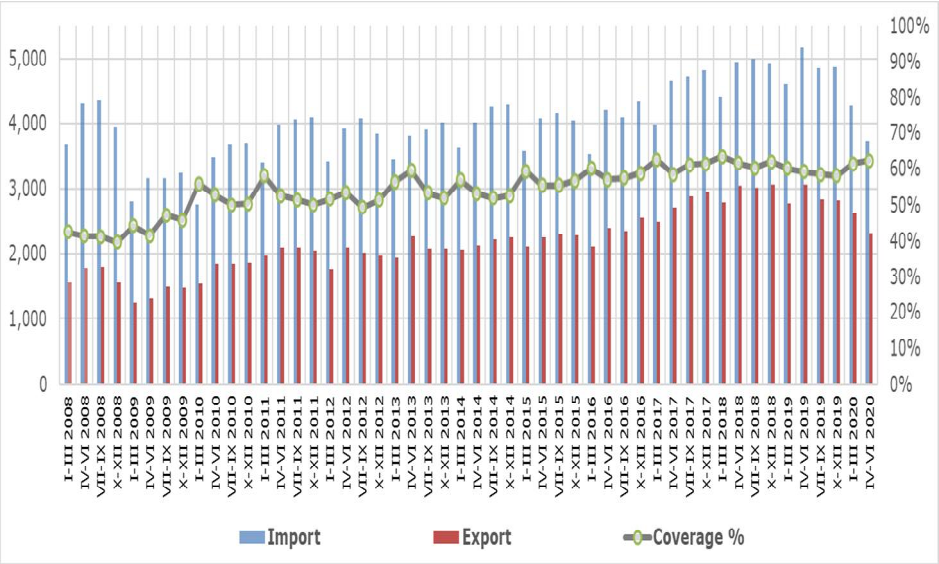
Source: Agency for Statistics of B&H, OMA review

Although in the first six months of this year there was a decline in the volume of foreign trade, in this period there was a total reduction of the foreign trade deficit of 22.3% compared to the same period last year. Given that imports were reduced due to extraordinary circumstances, the reduction of the foreign trade deficit cannot be viewed on the positive side. It is a consequence of declining overall foreign trade activity due to the crisis caused by the Covid-19 pandemic caused by coronavirus, which can be characterized as one of the most serious threats to the B&H economy.

Chart 2 shows the quarterly movement of imports and exports, and the coverage of imports by exports from the first quarter of 2008 to the second quarter of 2020 (I-III 2008 - IV-VI 2020). Observing the movement, seasonal oscillations are noticed at the beginning of each year, where B&H's foreign trade during one year is the lowest in the first quarter, which is not the case in the current year.

Restrictive measures introduced due to the coronavirus pandemic are the cause of the decrease in imports and exports in the second quarter compared to the first quarter of 2020. While the trend of trade until 2020 in the observed period shows an increase in imports and exports in the second quarter compared to the first quarter, in the current year imports in the second quarter compared to the first quarter decreased by 12.92%, while exports decreased by 11.69%.

Chart 2.



Source: Agency for Statistics of B&H, OMA review

Table 1 shows the percentage of increase/decrease in foreign trade on a monthly basis for the first six months of 2020, compared to the same period in 2019. The table shows that global and national virus control measures have led to a decline in activity and consumption in the country, resulting in a decline in total exports and imports.

Table 1.

	January 2020 / January 2019	February 2020 / February 2019	March 2020 / March 2019	April 2020 / April 2019	May 2020 / May 2019	June 2020 / June 2019	I-VI 2020 / I-VI 2019
Export	0.0	-0.3	-14.2	-32.7	-28.3	-10.8	-15.1
Import	-4.4	1.2	-16.3	-35.2	-34.6	-11.9	-18.0
Volume	*-2.6*	*0.6*	*-15.6*	*-34.3*	*-32.3*	*-11.5*	*-16.9*
Coverage	*4.5*	*-1.5*	*2.5*	*3.9*	*9.5*	*1.3*	*3.5*
Deficit	*-12.9*	*3.4*	*-19.0*	*-38.9*	*-42.8*	*-13.7*	*-22.3*

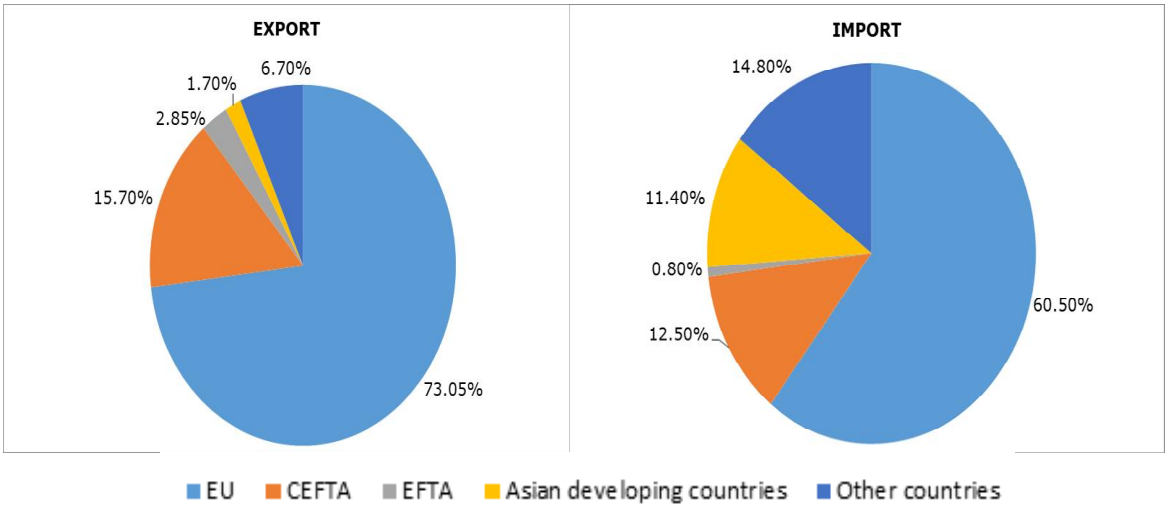
Source: Agency for Statistics of B&H, OMA review

Observing the movement of foreign trade on a monthly basis in the current year, March marked the beginning of a significant decline in imports and exports compared to the same period last year. March officially represents the beginning of a natural disaster caused by the Covid-19 pandemic in B&H, i.e. a new situation that has continued in the coming months. The largest decline in exports and imports was recorded in April, when pandemic control measures were most rigorous.

1.1. Foreign trade of B&H towards the most important regions for the period I-VI 2020

Chart 3 shows the percentage of participation of the most important regions in foreign trade with B&H in the first six months of 2020.

Chart 3.



Source: Agency for Statistics of B&H, OMA review

The EU[19], as the most important partner of B&H in foreign trade, in the first six months of 2020 participates with 73.1% of exports and 60.5% of imports. Exports to EU countries in the observed period decreased by 16.8% while imports decreased by 20.1% compared to the same period last year. The coverage of imports by exports is 74.6%, which is for 3.0 p.p. higher compared to the same period in 2019.

In the first six months of the current year, CEFTA[20] member countries participate in foreign trade with B&H with 15.7% of exports and 12.5% of imports. Exports decreased by 14.9%, while imports decreased by 12.1% compared to the same period last year. The coverage of imports by exports is 77.6%, which is by 2.5 p.p. less than in the same period in 2019.

EFTA[21] member countries participate in foreign trade with B&H in the first six months of the current year with 2.9% of exports and 0.8% of imports. Exports increased by 2.2%, while imports increased by 16.0% compared to the same period last year. The coverage of imports by exports is 215.4%, which is by 38.3 p.p. higher compared to the same period in 2019.

In the first six months of 2020, B&H realized 1.7% of exports and 11.4% of imports in foreign trade with a group of Asian developing countries. Of the total realized imports from this group of countries, 69.0% refers to imports from China. Exports increased by 2.2%, while imports decreased by 10.8% compared to the same period last year. The coverage of imports by exports is 9.1%, which is by 1.2 p.p. higher compared to the same period in 2019.

[19] European Union
[20] Central European Free Trade Agreement - CEFTA (Albania, B&H, Montenegro, Northern Macedonia, Moldova, Serbia and UNMIK / Kosovo)
[21] European Free Trade Association uniting the markets of Switzerland, Norway, Iceland and Liechtenstein

1.2. B&H foreign trade exchange by the most important foreign trade partners for the period I-VI 2020

Table 2 shows the share in exports to the ten most important foreign trade partners of B&H in the first six months of 2019 and 2020. Also, the percentage of increase/decrease in exports in the first half of the current year, compared to the same period last year, is shown.

Table 2.

BH EXPORT (% of participation)				
No.	Country	I-VI 2019	I-VI 2020	growth (%)
1	Germany	14.7	15.9	-8.4
2	Croatia	12.6	13.8	-6.8
3	Serbia	10.8	10.6	-16.4
4	Austria	9.4	9.9	-10.8
5	Italy	12.1	9.3	-34.9
6	Slovenia	8.7	8.8	-14.8
7	Montenegro	3.4	3.1	-20.7
8	Turkey	2.4	2.7	-4.4
9	Switzerland	2.1	2.6	3.4
10	The Netherlands	2.3	2.3	-17.5
	other countries	21.5	21.1	-16.7
	total	100.0	100.0	

Source: Agency for Statistics of B&H, OMA review

The table shows that the most important partner, i.e. the country to which B&H exported the most in the first six months of 2020, is Germany. It is also the most important export partner of B&H in the EU. In the same period, from the group of CEFTA member countries, B&H exported the most to Serbia, while the largest export from B&H to EFTA countries was recorded by Switzerland. The Switzerland is the only country to which B&H exported more in the first six months of the current year compared to the same period of the previous year.

The table also shows the percentage of increase/decrease in exports. Exports to Italy fell the most, 34.9%, due to the early emergence of coronavirus and the early introduction of measures to prevent the spread of the virus in that country, with a significant decline in activity at the beginning of this year, i.e. a drop in total trade. Restrictions on foreign trade, which continued throughout the first half of the current year, caused a significant decline in exports, which B&H recorded with other countries.[22]

Table 3 shows the share in imports to the ten most important foreign trade partners of B&H in the first six months of 2019 and 2020. Also, the percentage of increase/decrease in imports in the first half of the current year, compared to the same period last year, is shown.

[22] The comparison of exports to the Turkey in the first six months of the current year with exports in the same period last year is not relevant due to problems caused by the stagnation of exports last year because of non-ratification of the Free Trade Agreement.

Table 3.

BH IMPORT (% of participation)				
No.	Country	I-VI 2019	I-VI 2020	growth (%)
1	Germany	12.2	12.4	-17.0
2	Italy	11.6	11.6	-17.8
3	Serbia	10.4	11.1	-12.3
4	Croatia	10.1	9.0	-27.2
5	China	7.3	7.9	-12.0
6	Turkey	4.8	5.1	-14.0
7	Slovenia	4.6	4.9	-13.7
8	Austria	3.6	4.0	-10.1
9	Poland	3.0	3.0	-16.4
10	Hungary	2.8	2.7	-18.5
	other countries	29.6	28.4	-21.2
	total	100.0	100.0	

Source: Agency for Statistics of B&H, OMA review

The table shows that the most important partner, i.e. the country from which B&H imported the most in the first six months of 2020, is Germany. It is also the most important import partner of B&H from the EU. In the same period, from the group of CEFTA member countries, B&H imported the most from Serbia, while the largest import to B&H from the group of Asian developing countries was recorded from China.

The table also shows the percentage of increase / decrease in imports, which shows that imports from Croatia fell the most, 27.2%. As in exports, the crisis caused by the early introduction of measures and the restrictions caused by the appearance of the pandemic, significantly affected decline in imports from Italy, 17.8%, as one of the most important foreign trade partners of B&H. Also, imports from Hungary, Germany, China and other most important import partners of B&H are in a big decline.

1.3. B&H foreign trade exchange by the type of product for the period I-VI 2020

Table 4 shows the share in exports of the ten most significant product groups in the first six months of 2019 and 2020. Also, the table presents the percentage of increase / decrease in exports of certain types of goods.
Of the ten most significant presented product groups, only one group of products, code label 39 - Plastics and plastic products, achieved positive exports compared to the same period last year. Exports of the remaining most important product groups decreased significantly.

Table 5 shows the share in imports of the ten most significant product groups in the first six months of 2019 and 2020. Also, percentage of increase / decrease in imports of certain types of goods is presented.

Of the ten most significant presented product groups, only one group of products, code label 30 - Pharmaceutical products, achieved positive imports compared to the same period last year. As exports, imports of the remaining most important product groups also decreased significantly.

Table 4.

EXPORT (% of participation)					
No.	Code	Code description	I-VI 2019	I-VI 2020	growth (%)
1	94	Furniture; bed equipment and like products; lamps and other lighting fixtures	9.0	8.9	-15.6
2	27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	8.4	8.1	-18.6
3	85	Electrical machinery and equipment and parts thereof; sound recording or reproducing apparatus; television sets, etc.	6.8	7.9	-1.9
4	84	Nuclear reactors, boilers, machinery, apparatus and mechanical appliances; their parts	7.1	7.1	-14.7
5	73	Iron and steel products	6.6	6.9	-10.3
6	44	Wood and wood products; charcoal	6.4	6.5	-12.8
7	64	Footwear, slippers and the like; parts of these products	6.4	6.1	-19.0
8	28	Inorganic chemical products; organic and inorganic compounds of precious metals, radioactive elements, etc.	5.6	5.3	-19.5
9	39	Plastics and plastic products	4.0	4.9	4.1
10	72	Iron and steel	5.2	4.1	-32.9
I		In total (1-10)	65.5	65.9	-14.5
II		Other products	34.5	34.1	-16.2
		TOTAL (I + II)	100.0	100.0	

Source: Agency for Statistics of B&H, OMA review

Table 5.

IMPORT (% of participation)					
No.	Code	Code description	I-VI 2019	I-VI 2020	growth (%)
1	27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	15.2	10.0	-39.0
2	84	Nuclear reactors, boilers, machinery, apparatus and mechanical appliances; their parts	8.6	7.2	-22.4
3	87	Vehicles other than railway or tramway rolling-stock and parts and accessories thereof	8.3	6.3	-30.4
4	85	Electrical machinery and equipment and parts thereof; sound recording or reproducing apparatus; television sets, etc.	6.2	5.8	-12.9
5	39	Plastics and plastic products	5.6	5.6	-8.0
6	30	Pharmaceutical products	3.3	3.9	7.8
7	72	Iron and steel	3.6	3.0	-20.7
8	73	Iron and steel products	2.8	2.5	-16.0
9	76	Aluminum and aluminum products	2.6	2.1	-24.0
10	48	Paper and cardboard; products of paper pulp, of paper or of paperboard	1.9	1.9	-9.1
I		In total (1-10)	58.1	48.2	-22.9
II		Other products	41.9	51.8	14.7
		TOTAL (I + II)	100.0	100.0	

Source: Agency for Statistics of B&H, OMA review

2. Conclusion

In the first six months of this year, the country faced the consequences of the globally level problem, and under the influence of the recession caused by the measures taken worldwide after the outbreak of coronavirus. Thus, the foreign trade of B&H, i.e. imports and exports in the first half of the current year is in a big decline, with a larger decline in imports than exports of goods and services from the country. From the data, it can be concluded that the measures that many countries, as important foreign trade partners of B&H, have taken in the fight against the pandemic, have significantly jeopardized the overall economic activity of the country. Measures such as restriction and cessation of work of business entities, closing the borders, disruption of supply chains, resulted in a decline in domestic and foreign demand, which directly affected the exchange of goods and services. Some sectors that are more oriented towards the domestic market are not directly affected by the new created situation.

The coronavirus pandemic in the world as the biggest cause of negative trends could additionally jeopardize foreign trade in B&H and trade in the whole world in the second half of this year. Since the virus is not dormant, it is possible to expect devastating data on foreign trade in the second half of the current year. However, after the spring impact of the pandemic on the import-oriented economy of B&H, the country needs to "revive" foreign trade activity, especially in business with EU countries as the most important foreign trade partners.