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EMPIRICAL ANALYSIS OF VALUE ADDED TAX AND INFLATION RATE: TUCKEY'S HSD TEST IN SELECTED WESTERN BALKAN COUNTRIES

Abstract

In economic theory the price movement at a general level is one of the essential issues that can significantly affect on economic flows. The aim of this paper is to show that there is a significant difference in the average price level in the countries of the region, where the value added tax rates are analysed at the same time. The subject of the paper is manifested by the reflection of the inflation rate and value added tax rate in seven countries in the region from 2008 to 2016. Selected countries are Serbia, Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Slovenia. Based on the graph, it was found that in the years when there was a growth of value added tax, the inflation rate was declined which means there is no positive impact of tax form on inflation ie. there is a reduction of the inflation rate. Also, bearing in mind fact that inflation rate is not primarily caused by the movement of value added tax rate, authors have focused on determining the difference between average inflation rate in observed countries. Using ANOVA and Tuckey's HSD test, it is determined a statistically significant difference between all countries in the group, while in the case of Serbia, it can notice there is a statistically significant difference between other countries in the region, except for Montenegro, where there is no statistical significance.

Key words: inflation, value added tax, ANOVA, Tuckey's HSD test, Western Balkan

JEL classification: C01, E31, H2

ЕМПИРИЈСКА АНАЛИЗА ПОРЕЗА НА ДОДАТУ ВРЕДНОСТ И СТОПЕ ИНФЛАЦИЈЕ: TUCKEY'S HSD ТЕСТ У ОДАБРАНИМ ЗЕМЉАМА ЗАПАДНОГ БАЛКАНА

Апстракт

У економској теорији кретање цена на општем нивоу представља једно од важних питања које могу значајно утицати на економске токове. Циљ овог рада је приказати да постоји значајна разлика у кретању просечног нивоа цена у земљама у региону, где су истовремено анализиране стопе пореза на додату вредност. Предмет рада је манифестован кроз приказ стопе инфлације и стопе

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пореза на додату вредност у седам земаља у региону од 2008 до 2016 године. Посматране земље су: Србија, Албанија, Босна и Херцеговина, Хрватска, Македонија, Црна Гора и Словенија. На основу графичких приказа утврђено је да у годинама када је дошло до раста стопе пореза на додату вредност, стопа инфлације је опадала, што подразумева да не постоји позитиван утицај пореског облика на инфлацију, тј. присутно је смањење стопе инфлације. Такође, уважавајући чињеницу да инфлација није примарно условљена кретањем пореза на додату вредност, аутори су се фокусирали на детерминисање разлика између просечне стопе инфлације у посматраним земљама. Користећи АНОВА и Tuckey's HSD тест, утврђено је да постоји статистички значајна разлика између свих земаља у групи, док је у случају Србије присутна статистички значајна разлика између осталих земаља у региону осим Црне Горе где није утврђена статистичка значајност.

Кључне речи: *инфлација, порез на додату вредност, АНОВА, Туцкеу'с ХСД тест, Западни Балкан*

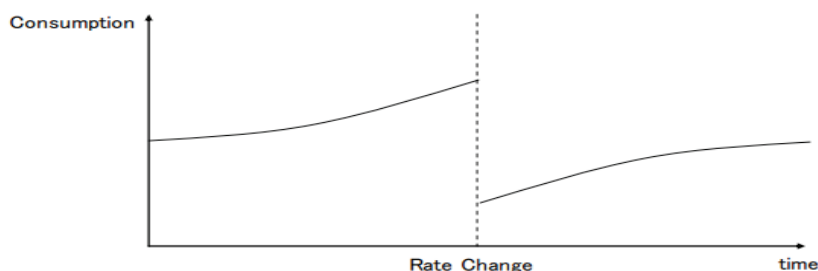
1. Introduction – Theoretical background

In modern government, taxes have an important place in their programs and they are a powerful tool for achieving main goals in the economy. Stojanović and Đorđević (2016) argue that taxes are the most essential public revenue of all modern states. Kalaš and Milenković (2017) point out that tax effects on economic activity is one of the main area of public finance. Grun (2000) defined a tax as mandatory statutory payment collected by the state, municipalities or other public entities for covering public needs while Karolak (2011) determined tax as a compulsory payment created by the government of a country from that main products and services are performed. Gatawa et al. (2016) determine the taxes as one of the most important revenue generation mechanisms in every economy. They are used to achieve economic growth and equity in income and wealth distribution, while on the other hand, their characteristics are reliability and predictability. The biggest share of the state budget revenues has taxes and their total share should be 50% to 80% (Mankiw et al. 2009). By definition of Netherlands Economic Institute (1998) value added presents the difference between the value of the production and the value of the goods and services which are used in the production, where VAT burden ultimately rests on the final consumers. It represents a form of consumption tax. From the buyer's perspective, it's a tax on the purchase price while from that of the seller, it's a tax only on the value added to a product or services (Sivasakkaravarthi and Ganesan 2011).

Aliyzadeh and Motallabi (2016) defined value added tax as a multistep tax obtained in different steps of importing, production and distribution based on the added value of the sold goods and delivered services. A value added tax is less distortionary than other tax forms (Auerbach 2008; Banks and Diamond 2010; Claus 2013). Inflation represents an important indicator in the economy and there are many determinants whose effect to her. Anbarci (2015) determined inflation tax as a phenomenon when prices increase and the real value of individual's money holdings decreases. When it looks taxes, value added tax presents the most used tax form which can have an impact on inflation. There are many studies that researched relationship between value added tax and inflation (Katz and Rosen 1985; Stern 1987; Poterba and Rotemberg 1990; Bayoumi and Gagnon 1992; Besley

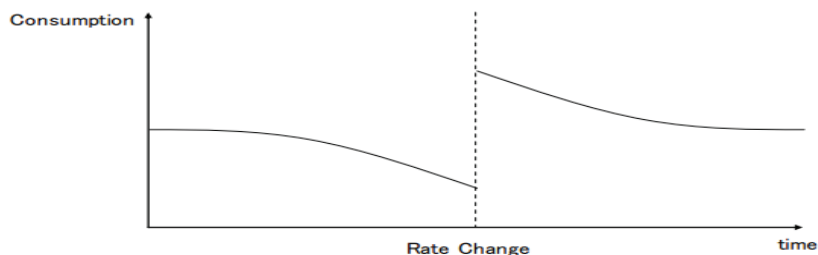
1999; Mankiw and Reiss 2002, Caballe and Panades 2004; Carbonnier 2007; Carare and Danninger 2008; Gabriel and Reiff, 2010; Miki 2011; Benkovskis et al. 2012; Benkovskis and Fadejeva, 2014). Poterba and Rotemberg (1990) reported a positive relationship between inflation and tax rates in the United States, as well as the fact that government uses these components to increase revenues in the budget. Benkovskis and Fadejeva (2014) examined the effect of value added tax rate on inflation in Latvia using the CPI microdata provided by the Central Statistical Bureau of Latvia. They argued that changes in the VAT rate could have an important implication for inflation, especially at the moments of VAT rate revisions. Using panel data models for 14 developed countries from the second quarter in 1980 to the third quarter in 2010, Miki (2011) reflects that aggregate consumption and economic growth display three trends when the value added tax rate is changed, where they increase or decrease just before the rise or reduction of the VAT rate.

Figure 1. The movement of aggregate consumption - increase of VAT rate



Source: Miki (2011)

Figure 2. The movement of aggregate consumption - decrease of VAT rate



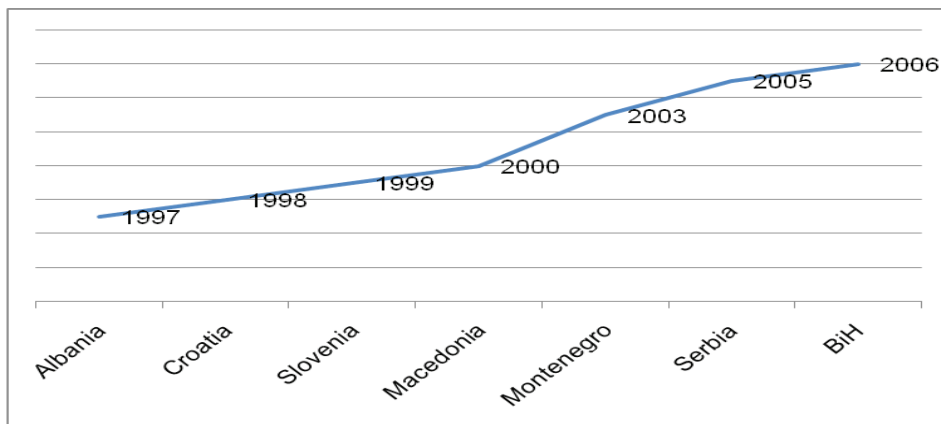
Source: Miki (2011)

In theory, if there is an announcement that the government will increase the VAT rate, people will buy things which may store before increasing this tax form. After its increase, aggregate consumption will decline because people will use the reserves of previously purchased products instead of buying new items. Furthermore, aggregate consumption will gradually grow as people used these things and have no need for new items.

2. Value added tax and inflation in Western Balkan countries

This chapter of paper is focused on a historical review of the introduction of value added tax and inflation rate in selected countries and also it's presented their trends rate from 2008 to 2016.

Figure 3. Review of VAT introduction by country



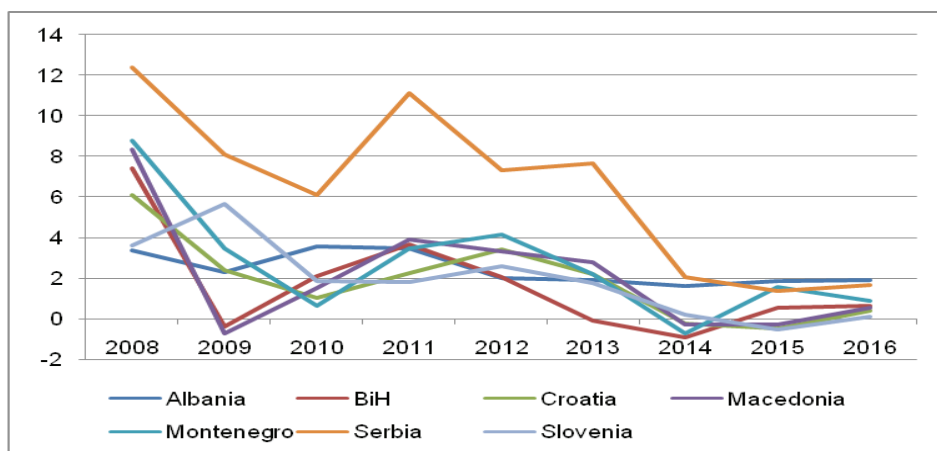
Source: Author based on <http://eurofast.eu>

Figure 3 reflects a historical overview of the introduction of VAT rates in the countries in the region. Bearing in mind that France was the first country which introduced this tax form in 1954 (Shenk and Oldman 2007), there is a noticeable time lag in relation to the countries in this region. Namely, Albania, Croatia, and Slovenia have succeeded to modernize their tax systems by introducing value added tax before 2000, while other countries take much more time for this step. This applies particularly to Serbia and Bosnia and Herzegovina which have recently introduced VAT in 2005 and 2006.

Table 1. Review of VAT registration threshold in 2016

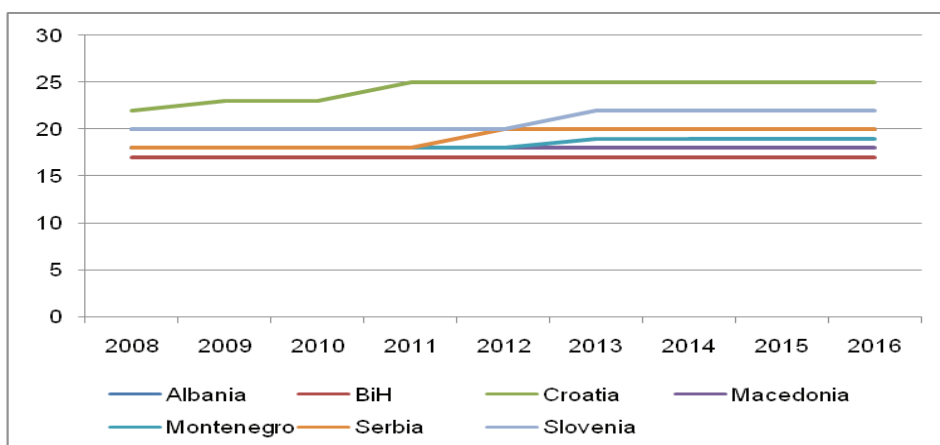
Country	Per year	Amount
Albania	Turnover for the last 12 months	5.000.000 ALL
Bosnia and Herzegovina	Turnover for the last 12 months	50.000 BAM
Croatia	Turnover for the last 12 months	230.000 HRK
Macedonia	Turnover for the last 12 months	1.000.000 MKD
Montenegro	Turnover for the last 12 months	18.000 EUR
Serbia	Turnover for the last 12 months	8.000.000 RSD
Slovenia	Turnover for the last 12 months	35.000 EUR

Source: Author based on <http://eurofast.eu>

Figure 4. Trend of inflation rate in observed countries

Source: Author based on www.imf.com.

Looking at a price level in the countries in the region, it can be seen that the highest inflation rate is in Serbia during the whole period. This is especially evident in the period from 2008 to 2011, when the average inflation rate in Serbia amounted 9.45%, provided that at the beginning of the period recorded a maximum inflation rate of 12.41%. In other countries for the same period, the average inflation rate ranged from 2% to 3%. If it compares the price level for the last three years, Albania had the highest average inflation rate of 1.82%, while Macedonia recorded a decrease of the general level of price by an average of 0.01%.

Figure 5. Value added tax rate in observed countries

Source: Author based on www.kpmg.com.

Figure 5 shows the movement of standard VAT rates in the countries in the region for the period 2008-2016. As can be seen, Croatia has the highest rate of 25% while on the other hand, Bosnia and Herzegovina has the lowest rate of 17%. When it comes to

the constancy of the VAT rate, it didn't change in Albania, Bosnia and Herzegovina and Macedonia and it remained the same during the observed period. In other countries, there has been an increase in the VAT rate by 1% or 2% as is the case in Montenegro, Serbia, and Slovenia, while Croatia recorded the highest increase in the VAT rates, there has been an increase in the VAT rate by 1% or 2% as is the case in Montenegro, Serbia and Slovenia, while Croatia recorded the highest increase in the VAT rate of 3% from the beginning to the end of the period.

3. Results

The aim of this paper is estimating the impact of value added tax on inflation in seven observed countries from 2008 to 2016. The author used the database from International Monetary funds for inflation and KPMG for value added tax rate for selected countries: Serbia, Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, and Slovenia. First, it's reflected descriptive statistics.

Table 2. Descriptive statistics

Country	N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Serbia	9	6.4400	4.03468	1.34489	3.3387	9.5413	1.39	12.41
Albania	9	2.4511	.77143	.25714	1.8581	3.0441	1.63	3.55
BiH	9	1.6844	2.58833	.86278	-.3051	3.6740	-.90	7.43
Croatia	9	1.9022	2.03871	.67957	.3351	3.4693	-.46	6.08
Macedonia	9	2.1200	2.87830	.95943	-.0925	4.3325	-.74	8.33
Montenegro	9	2.7122	2.75274	2.75274	.5963	4.8282	-.71	8.76
Slovenia	9	1.8956	1.91893	.63964	.4205	3.3706	-.52	5.65
Total	63	2.7437	2.91930	.36780	2.0084	3.4789	-.90	12.41

Source: Author based on SPSS

As it can see, the largest average inflation was recorded in Serbia and it amounts to 6.44% which is almost three times more than the average inflation in the observed group of countries. Similarly, the largest standard deviation is presented in Serbia of 4.03468 which is nearly double the total standard deviation. This can be attributed to a wide range of minimum and maximum rates of inflation in Serbia, where it ranged from 1.39% to 12.41%. Looking at the other countries, the average inflation rate is the lowest in Bosnia and Herzegovina, Slovenia and Croatia which didn't exceed 2%, while it's at a level of 2.5-2.7% in Albania, Macedonia and Montenegro.

Table 3. ANOVA test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	150.189	6	25.032	3.706	.004
Within Groups	378.192	56	6.753		
Total	378.192	62			

Source: Author based on SPSS

Testing the null hypothesis of significance, results reflect that there is a statistically significant difference among the observed countries ($p=0.004<0.05$). After that, authors used multiple comparisons procedure and statistical test Tukey's HSD test to find means which are significantly different from each other.

Table 4. Multiple Comparisons - Tukey's HSD test

(I) Countries	(J) Countries	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Serbia	Albania	3.98889*	1.22506	.030	.2427	7.7351
	BiH	4.75556*	1.22506	.005	1.0093	8.5018
	Croatia	4.53778*	1.22506	.008	.7915	8.2840
	Macedonia	4.32000*	1.22506	.014	.5738	8.0662
	Montenegro	3.72778	1.22506	.052	-.0185	7.4740
	Slovenia	4.54444*	1.22506	.008	.7982	8.2907
Albania	Serbia	-3.98889*	1.22506	.030	-7.7351	-.2427
	BiH	.76667	1.22506	.996	-2.9796	4.5129
	Croatia	.54889	1.22506	.999	-3.1973	4.2951
	Macedonia	.33111	1.22506	1.000	-3.4151	4.0773
	Montenegro	-.26111	1.22506	1.000	-4.0073	3.4851
	Slovenia	.55556	1.22506	.999	-3.1907	4.3018
BiH	Serbia	-4.75556*	1.22506	.005	-8.5018	-1.0093
	Albania	-.76667	1.22506	.996	-4.5129	2.9796
	Croatia	-.21778	1.22506	1.000	-3.9640	3.5285
	Macedonia	-.43556	1.22506	1.000	-4.1818	3.3107
	Montenegro	-1.02778	1.22506	.980	-4.7740	2.7185
	Slovenia	-.21111	1.22506	1.000	-3.9573	3.5351
Croatia	Serbia	-4.53778*	1.22506	.008	-8.2840	-.7915
	Albania	-.54889	1.22506	.999	-4.2951	3.1973
	BiH	.21778	1.22506	1.000	-3.5285	3.9640
	Macedonia	-.21778	1.22506	1.000	-3.9640	3.5285
	Montenegro	-.81000	1.22506	.994	-4.5562	2.9362
	Slovenia	.00667	1.22506	1.000	-3.7396	3.7529
Macedonia	Serbia	-4.32000*	1.22506	.014	-8.0662	-.5738
	Albania	-.33111	1.22506	1.000	-4.0773	3.4151
	BiH	.43556	1.22506	1.000	-3.3107	4.1818
	Croatia	.21778	1.22506	1.000	-3.5285	3.9640
	Montenegro	-.59222	1.22506	.999	-4.3385	3.1540
	Slovenia	.22444	1.22506	1.000	-3.5218	3.9707
Montenegro	Serbia	-3.72778	1.22506	.052	-7.4740	.0185
	Albania	.26111	1.22506	1.000	-3.4851	4.0073
	BiH	1.02778	1.22506	.980	-2.7185	4.7740
	Croatia	.81000	1.22506	.994	-2.9362	4.5562
	Macedonia	.59222	1.22506	.999	-3.1540	4.3385
	Slovenia	.81667	1.22506	.994	-2.9296	4.5629

Slovenia	Serbia	-4.54444*	1.22506	.008	-8.2907	-.7982
	Albania	-.55556	1.22506	.999	-4.3018	3.1907
	BiH	.21111	1.22506	1.000	-3.5351	3.9573
	Croatia	-.00667	1.22506	1.000	-3.7529	3.7396
	Macedonia	-.22444	1.22506	1.000	-3.9707	3.5218
	Montenegro	-.81667	1.22506	.994	-4.5629	2.9296

*. The mean difference is significant at the 0.05 level.

Source: Author based on SPSS

Table 4 manifests the difference between the average values of the inflation rate for the observed group of selected countries. Looking at the value for Serbia, it's evident that there is a significant difference compared to other countries, apart from Montenegro where there is no significant difference on the basis of p-value ($0.052 > 0.05$). The highest difference between the average value was recorded between Serbia and Bosnia and Herzegovina, where it is 4.7556 which is slightly more compared with the Croatia, Macedonia, and Slovenia, where it is also above 4. Considering that the total value of the observed countries, the average inflation rate is almost three times higher in Serbia than the average of other countries. On the other hand, if we exclude Serbia from the analyzed group, there is a difference between the average inflation rate, but it's not statistically significant.

Conclusion

Inflation is one of the two most important macroeconomic phenomena in addition to the gross domestic product. It depends on a number of determinants, and one of the reasons for an increase in the level of prices on the general level and greater inflationary risks can be value added tax. This tax form represents on the most abundant forms of taxation in the countries in the region. Observing the tax rates in the region, it's showed that Albania, Bosnia and Herzegovina and Macedonia didn't change rates in the analyzed period, while other countries had increased value-added tax rates. It's noticeable that in the years when it came to the increase of this tax form in these countries, inflation rate declining. Thus it can be concluded that the value added tax doesn't have a positive effect on the inflation rate in terms of its growth. However, using ANOVA test and Tuckey's HSD test, it was found out a significant difference in terms of the average inflation rates between countries. The results showed that there is a statistically significant difference between the average values of the inflation between countries, where if we look only Serbia, it has been found that the average inflation rate is significantly different compared to all the countries in the region, except Montenegro, where it has been established that there is no significant difference in terms of this indicator. Future research will be focused on the creation of regression model of inflation and including more independent variable how it would be easy to get an answer on a question which variables have a significant impact on inflation.

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