

УДК 338.516:339.132/.133

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## АНАЛИЗ МОДЕЛИ ВРЕМЕННОГО ПОВЫШЕНИЯ СТАВКИ НДС В СЛОВАЦКОЙ РЕСПУБЛИКЕ

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*НДС в настоящее время во всем мире представляет собой основной тип универсального косвенного налога и является одним из главных доходов государственного бюджета. Словакия не является исключением. Общей чертой является то, что большинство стран применяют основную и пониженную ставку налога. В Словакии в данный момент размер основной ставки составляет 20%, пониженной - 10%, что является результатом временного увеличения НДС на один процентный пункт от 19% до 20% от 1 января 2011 года. Повышенная ставка НДС будет действовать до момента достижения дефицита в размере 3% валового внутреннего продукта. Целью данной работы является анализ влияния увеличения временного ставки НДС на цены в условиях Словацкой Республики.*

**Ключевые слова:** НДС в Словакии, модель Стриешки, эластичность спроса, эластичность предложения, модель влияния НДС на цены.

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## THE ANALYSIS OF THE MODELS OF TEMPORARY VAT RATE INCREASE IN THE SLOVAK REPUBLIC CONDITIONS

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*The VAT represents currently the basic type of universal indirect tax all over the world and one of the main state budget revenues, as well. A common feature is that most countries apply a base tax rate and a reduced tax rate. For 2013, there is the base tax rate of 20 % and reduced tax rate of 10 % for the condition of the Slovak Republic. The representatives of the coalition parties agreed temporary VAT increase by one percentage point from 19% to 20% on coalition board with effect since 1st January 2011. The increased VAT rate will have been applied until the public finance deficit in Slovakia decrease below 3% of gross domestic product. The target of this paper is to analyze the models of temporary VAT rate increase in the conditions of the Slovak Republic.*

**Keywords:** VAT in Slovakia, model of Strieshka, supply elasticity, demand elasticity, impact of a VAT on the price

In general, the reason for tax implementation is the revenue to the state budget of country, where the economic activity was performed. Using a value-added tax «VAT» [1] is taxed is taxed consumption. This tax was introduced in 1954 in France by French economist Morris Moriem. In accordance with some other sources, the introduction belongs to German entrepreneur in 1920. At present, VAT is imposed «in more than 156 countries around the world». [2] VAT exists in all «27 Member States of the European Union and it is part of the daily lives of its 495 million citizens». [3] Number of states in which the VAT is used suggests that its idea and meaning are successful. Basic information about analyzed country can be seen in Table 1.

**Table 1. The Slovak Republic characteristics**

<b>THE SLOVAK REPUBLIC</b>	
<b>Area (km<sup>2</sup>)</b>	49 033
<b>No. of inhabitants (in mill).</b>	5,4
<b>GDP as % from world «GDP» [7]</b>	0,17
<b>GDP decrease in «crisis 2009» [8]</b>	-4,3%
<b>Political structure</b>	Parliament republic
<b>Euro</b>	Slovakia has been using Euro since 2009. Insecurity in Eurozone could result to acceleration in customer prices index in 2012.
<b>Inflation (in 2011)</b>	In the begginin of 2011 there is inflation on the supply side, because of more expensive entry factors and tax increase. Domestic demand is weaker and there is no prediction to push the price growth in 2011 and 2012.
<b>Frequency of price change</b>	High frequency of price change «40% prices in supermarkets changes every week )». [9] The small and domestic business reaction is slower. The price change is change, what needs to be. The price change is a risk, which will «some of Slovak managers not undergo. Many of them remain the price level, to refuse responsibility.» [10]
<b>State competitiveness</b>	In accordance with «World economic forum there is remarkable decrease of competitiveness index» [7]
<b>Estimation of «VAT fraud» in 2006 [12]</b>	28%

Source: Own elaboration.

### **The basic type of universal indirect tax**

The VAT represents currently the basic type of universal indirect tax all over the world. The VAT represents one of the main state budget revenues, as well. The VAT system generally works the way where tax prescribed for the product or service is paid by the final consumer in the price of the product. All members of the distribution channel pays instead of consumer tax to state. They use

sophisticated payment system, which ensures that the tax is really paid for any concerned goods or services. The distribution channels represent the arrangement of subjects involved in the distribution process by ensuring the availability of resources on the way from producer to consumer. The tax base can be everything a supplier has taken, or should be obtained from the customer or from another person. The VAT rate depth depends on the concrete products and services and has a variable character. The VAT rate depth varies in member countries of the European Union. A common feature is that most countries apply a base tax rate and a reduced tax rate. For 2013, there is the base tax rate of 20 % and reduced tax rate of 10 % for the condition of the Slovak Republic.

The representatives of the coalition parties agreed temporary VAT increase by one percentage point from 19% to 20% on coalition board with effect since 1<sup>st</sup> January 2011. The increased VAT rate will have been applied until the public finance deficit in Slovakia decrease below 3% of gross domestic product. In accordance with current consolidation plan this should occur in 2013. «According to Ministry of Finance of the Slovak Republic estimates the proposed VAT rates changes, will increase tax revenues in 2011 of 185.5 million €, in 2012 of 196.3 million €, in 2013 of 209.3 million €. Overall, the deficit in the next year should decrease by 1.7 billion €, of which the revenue measures bring in 770 million €.» [4]

### The constant consumption model

The stat changes the tax rate from 19 to 20%, demand elasticity is zero  $E_D = 0$ , trade does not change trade margin rate  $z_1 = z_2$ , supply elasticity has any value.

(1)

$$I_{PS} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S}{E_S + E_D}} = \left( \frac{1,2 * z}{1,19 * z} \right)^{\frac{x}{x+0}}$$

= 1,0084, consumer prices will increase by 0.84%

$$I_Y = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{-E_S * E_D}{E_S + E_D}} = \left( \frac{1,2 * z}{1,19 * z} \right)^{\frac{-x * 0}{x+0}}$$

= 1, the production value does not change

$$I_{MO} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S - E_D * E_S}{E_S + E_D}} * \frac{k_1 * z_1 * (z_2 - 1)}{k_2 * z_2 * (z_1 - 1)} = \left( \frac{1,2 * z}{1,19 * z} \right)^{\frac{x - 0 * x}{0 + x}}$$

= 1, the trade margin value does not change

$$I_T = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S - E_S * E_D}{E_S + E_D}} * \frac{k_1 * z_1 * (k_2 - 1)}{k_2 * z_2 * (k_1 - 1)} = \left( \frac{1,2 * z}{1,19 * z} \right)^{\frac{x - x * 0}{x + 0}}$$

= 1,0526, the VAT value increases by 5,26%.

The constant consumption model is valid only for products with low or zero elasticity of demand, such as pepper or salt.

### The constant trade margin rate model

The stat changes the tax rate from 19 to 20%, demand has elasticity or does not have elasticity. The supply elasticity is high and trade does not change trade margin rate

$z_1 = z_2$ .

$$\begin{aligned}
 I_{PS} &= \frac{ps_2}{ps_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S}{E_S + E_D}} = \left( \frac{1,2}{1,19} \right)^{\frac{E_S}{E_S + E_D}} \\
 I_Y &= \frac{y_2}{y_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{-E_S * E_D}{E_S + E_D}} = \left( \frac{1,2}{1,19} \right)^{\frac{-E_S * E_D}{E_S + E_D}} \\
 I_{MO} &= \frac{MO_2}{MO_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S - E_D * E_S}{E_S + E_D}} * \frac{k_1 * z_1 * (z_2 - 1)}{k_2 * z_2 * (z_1 - 1)} = \left( \frac{1,2}{1,19} \right)^{\frac{E_S - E_D * E_S}{E_S + E_D}} * \frac{1,2}{1,19} \\
 I_T &= \frac{T_2}{T_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S - E_S * E_D}{E_S + E_D}} * \frac{k_1 * z_1 * (k_2 - 1)}{k_2 * z_2 * (k_1 - 1)} = \left( \frac{1,2}{1,19} \right)^{\frac{E_S - E_S * E_D}{E_S + E_D}} * \frac{1,2 * (1,2 - 1,19)}{1,2 * (1,19 - 1)}
 \end{aligned} \tag{2}$$

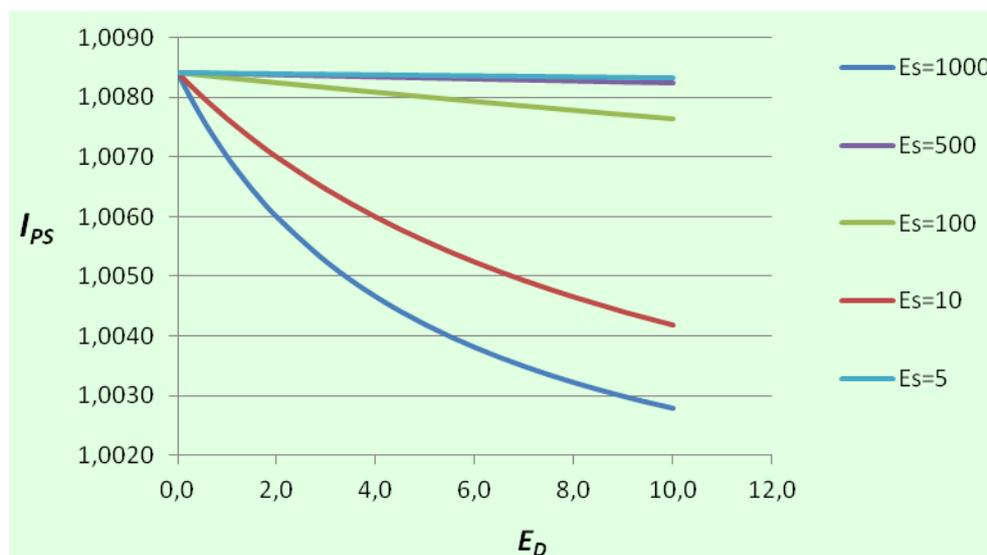
As we can see, the supply and demand elasticity is not known. As we know that the elasticity of demand for majority of goods and services has a relatively low value, the  $E_D$  variable is substituted in the range 0 – 10. Elasticity of supply is more or less constant within the time, because the supply curve grows slowly and thus supply elasticity is high, we substitute 5, 10, 100, 500 and 1 000. We focus on the consumer price index and we will find out what is the impact of supply elasticity and demand elasticity on consumer prices by the trade margin constant rate. The consumer price will increase less significantly than by higher levels, by low supply elasticity. This is shown in the following Table 2 and Graph1.

Table 2. The influence of supply elasticity and demand elasticity on the consumer prices

$E_D$	$E_S=5$	$E_S=10$	$E_S=100$	$E_S=500$	$E_S=1000$
0,0	1,0084	1,0084	1,0084	1,0084	1,0084
0,2	1,0081	1,0082	1,0084	1,0084	1,0084
0,5	1,0076	1,0080	1,0084	1,0084	1,0084
0,7	1,0074	1,0079	1,0083	1,0084	1,0084
1,0	1,0070	1,0076	1,0083	1,0084	1,0084
1,2	1,0068	1,0075	1,0083	1,0084	1,0084
1,4	1,0066	1,0074	1,0083	1,0084	1,0084
1,6	1,0064	1,0072	1,0083	1,0084	1,0084
2,0	1,0060	1,0070	1,0082	1,0084	1,0084
3,0	1,0052	1,0065	1,0082	1,0084	1,0084
4,0	1,0047	1,0060	1,0081	1,0083	1,0084
5,0	1,0042	1,0056	1,0080	1,0083	1,0084
6,0	1,0038	1,0052	1,0079	1,0083	1,0084
7,0	1,0035	1,0049	1,0079	1,0083	1,0083
8,0	1,0032	1,0047	1,0078	1,0083	1,0083
9,0	1,0030	1,0044	1,0077	1,0083	1,0083
10,0	1,0028	1,0042	1,0076	1,0082	1,0083

Source: Own elaboration.

Graph 1 The  $I_{PS}$  value by change of  $E_D$  a  $E_S$



Source: Own elaboration.

The consumer prices will increase in average of 0.82% in the range from 0.79% to 0.84% at high supply elasticity. By the elasticity of less than 10, consumer prices rise by the demand elasticity of from 0% to 2% in average of 0.7% in the range from 0.84% to 0.6%.

This model does not have to accept the trade because of the fact, that it loses the volume of trade margins (see Table 3). On the other hand, in accordance with our opinion, this model was accepted by a large number of entrepreneurs who did not manage to react to the VAT change and only by time influence they will increase the trade margin rate, which will bring a sufficient amount of the trade margin. The state will be profitable as well, because the amount of VAT will increase on average by 4.3%.

**Table 3. Indicators valuation**

$E_D$	$E_S$	$I_T$	$I_{PS}$	$I_Y$	$I_{MO}$
0,0	1 000	1,052620	1,008403	1,000000	1,000000
0,2	1 000	1,050870	1,008402	0,998328	0,998326
0,5	1 000	1,048234	1,008399	0,995827	0,995823
0,7	1 000	1,046482	1,008397	0,994163	0,994158
1,0	1 000	1,043860	1,008395	0,991675	0,991667
1,2	1 000	1,042116	1,008393	0,990020	0,990010
1,4	1 000	1,040376	1,008392	0,988369	0,988357
1,6	1 000	1,038640	1,00839	0,986721	0,986708
2,0	1 000	1,035178	1,008387	0,983436	0,983419
3,0	1 000	1,026586	1,008378	0,975281	0,975257
4,0	1 000	1,018082	1,00837	0,967210	0,967178
5,0	1 000	1,009665	1,008361	0,959222	0,959182
6,0	1 000	1,001334	1,008353	0,951315	0,951268
7,0	1 000	0,993089	1,008345	0,943489	0,943434
8,0	1 000	0,984927	1,008336	0,935743	0,935681
9,0	1 000	0,976848	1,008328	0,928075	0,928006
10,0	1 000	0,968852	1,00832	0,920486	0,920409

Source: Own elaboration.

### The trade margin constant volume model

As we mentioned in the previous model, the trade could respond to change by the same trade margin rate, because of lack of the time. But over time it realizes profit losing and customizes the trade margin rate to reach the volume of trade margin at least at the same level before rate changes. Every trader should know the price elasticity of their product, because of:

$ED < 1$  monopoly may arbitrarily increase the rate, the rate depth may be depending on the existence of competition and state intervention,  
 $ED > 1$  reaches a function of the trade margin volume by low trade margin rates.

Thus, the enterprises with lower competition and low elasticity of their products have the biggest scope for increasing the trade margin.

$$I_{MO} = \frac{MO_2}{MO_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S - E_D * E_S}{E_S + E_D}} * \frac{k_1 * z_1 * (z_2 - 1)}{k_2 * z_2 * (z_1 - 1)} = 1 \text{ and } M_{O1} = M_{O2}, \quad (3)$$

To find  $z_2$  it is needed to solve this formula and then we can detect a change in consumer prices, depending on the elasticity of demand and supply and mainly from the changes in trade margin rate change. According to the calculations of Mr. Strieška, consumer prices increases on average by 1.5% in the range from 0.8 to 5.22%.

### The constant consumer price model

If state increases the VAT rate and trade does not change consumer prices, the trade must reduce the rate and volume of trade margin. This results to profit decrease and is valid:

$$I_{PS} = \frac{ps_2}{ps_1} = \left( \frac{k_2 * z_2}{k_1 * z_1} \right)^{\frac{E_S}{E_S + E_D}} = 1 = \frac{k_2 * z_2}{k_1 * z_1}, \quad (4)$$

We can calculate the volume of trade margins and VAT substituting expressed variable into the formula:

$$z_1 = \frac{k_2 * z_2}{k_1} \text{ or } z_2 = \frac{k_1 * z_1}{k_2}, \quad (5)$$

Slovak businessmen used this model in order to retain and attract new customers after a change in the VAT rate. The similar advertisement had «Galan»[5] business center as well as some grocery chains. In their case, consumer prices have not increased.

Consumer prices in January, according to the Statistical Office of the SR increased significantly, by 1.9% within one month, the changes in indirect taxes in non-regulated prices in January increased the inflation by 0.54 percentage points, in February by 0.01 percentage point, in March by 0,03 percentage

point, in April by 0.04 percentage point, in May by 0.0 percentage point «within one month». [6] The consumer prices increase in average from 0.82 to 1.5% in accordance with our calculations. It is shown in Table 4.

**Table 4. The market subjects behaviour types models**

The market subjects behaviour types models	Values	Interval	Average I <sub>PS</sub>	
	I <sub>PS</sub> min	max	I <sub>PS</sub>	in %
Constant consumption	1,0084	1,0084	1,0084	0,84
Constant trade margin rate	1,0079	1,0084	1,0082	0,82
Constant trade margin volume	0,0080	0,0522	1,0150	1,50
Constant customer price	1	1	1	0,00

We assign share of the total to each of the models.

The market subjects behaviour types models	Connected model businesses share	Price increase in %	Average in %
Constant consumption	0	0,84	<b>0,73</b>
Constant trade margin rate	1/3	0,82	
Constant trade margin volume	1/3	1,50	
Constant customer price	1/3	0,00	

Source: Own elaboration.

The January VAT increase was not in total amount transported into price of all goods and services. It was partially transported to margins of sellers/producers, what means, that the constant trade margin model or consumer price. Increasingly the higher VAT amount gets into price and this trend will remain probably also in next months. Therefore, constant trade margin volume model will be valid. The VAT change impact will be included in net inflation and its identification will be more difficult in the coming months.

## Conclusion

The VAT system generally works the way where tax prescribed for the product or service is paid by the final consumer in the price of the product. All members of the distribution channel pays instead of consumer tax to state. The most empirical studies finding is that tax shifting occurs quite rapidly and sometimes prior to reforms implementation, which may be due to inventory purchases. Case studies show that in the case of an VAT rate increase there is tax shifting faster than by VAT rate reduction. This could occur because of fixed entering factors (mainly capital, or qualified labour work). The impact to price by tax

change in one country could be different from impact in other state or EU as a whole.

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