

INFLUENCE OF THE INCOME TAX RATE REDUCTION ON GDP GROWTH IN THE REPUBLIC OF CROATIA

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Abstract

Fiscal policy is one of the factors that can positively or negatively affect the GDP value movements. The Republic of Croatia with its last tax reform, which was adopted at the end of December 2016 and which came into force on 1 January 2017 attempted to reduce the tax burden of its citizens and boost the GDP growth, aiming to have an impact on economy's positive growth as a long-term goal. The study analyzes the macroeconomic variables, their intercorrelations, the GDP movements, with an emphasis on the impact of income tax on GDP growth. The paper also shows the limitations of fiscal and monetary policy, as well as some guidelines that may stimulate the GDP growth in the Republic of Croatia.

Keywords: economic growth, income tax, monetary policy, gross domestic product (GDP), fiscal policy

JEL code: E62

1. Introduction

The question how a change in tax policy affects economic activity and social well-being is an issue constantly at the centre of the economic policies of all economies. The general assumption is that taxes are in a negative relationship with economic growth, which means that higher taxes cause the decrease of economic growth rate. The literature mentions the term “deadly tax burden” which signifies a loss of efficiency due to the distortion that taxes impose on economy. Taxes are creating incentives for people to change their behaviour, for example, to work the same as before and to reduce their spending or to work more and spend less time in leisure, so their spending will not have to be reduced greatly (Kesner-Škreb, M., 1999, p.62).

The survey of relevant empirical research related to the impact of the taxes on economic growth began with Arnold Harberger's claim from the 1960's that tax policy in theory is a very important determinant of investment and growth, while in practice its effects on growth are quite negligible, as he demonstrated in his estimation that tax changes cannot increase the growth rate of national income by more than 0.1-0.2 percentage points (Mendoza, E. G., et al, 1995, p.2). Harberger's thesis was tested by Mendoza, Milesi-Ferretti and Asea using endogenous growth models, and with their results they have confirmed that the effect of the taxes on growth is small and that major changes in the tax system are required to bring about significant changes in economic growth. They believe that tax reforms are not useless, given that the reduction of tax distortions affects the increase of well-being (Mendoza, E. G., Tesar, L. L., 1995, p.34).

Engen and Skinner initially developed a theoretical model, using a sample of 107 countries, which united the effects of government spending and distorting tax effects in output growth model and found a very negative effect of fiscal activity on short-term and long-term growth rates (balanced growth in government spending and taxes by 10 percentage points in long run would cause the decrease of growth rate by 1.4 percentage points) (Engen, E. M., Skinner, J., 1992, p.32). This duo focused their further research on impact of taxes on economic growth, but they based their research on Solow's approach to the rate of economic growth in which the rate depended on available physical and human capital and changes in their productivity. According to them, it is more likely that countries which collect taxes through an extensive tax base and efficient administration would

realize faster growth rates than countries lacking these features.

Furthermore, although Easterly and Rebelo revealed a link between various fiscal policy measures (tax impact), level of development and rate of economic growth and concluded that it is difficult to isolate empirically the impact of taxes, they still formed following conclusions regarding taxes and growth:

- public investment in traffic and communications and the budget surplus correlate with growth from the perspective of fiscal variables;
- from the perspective of tax variables only the marginal income tax rate correlates with growth;
- the share of government revenue in GDP is increasing with a rise of income per capita;
- by the income increase the share of customs in total state revenues decreases, and the share of income tax increases (Easterly, W., Rebelo, S., 1993, p.419).

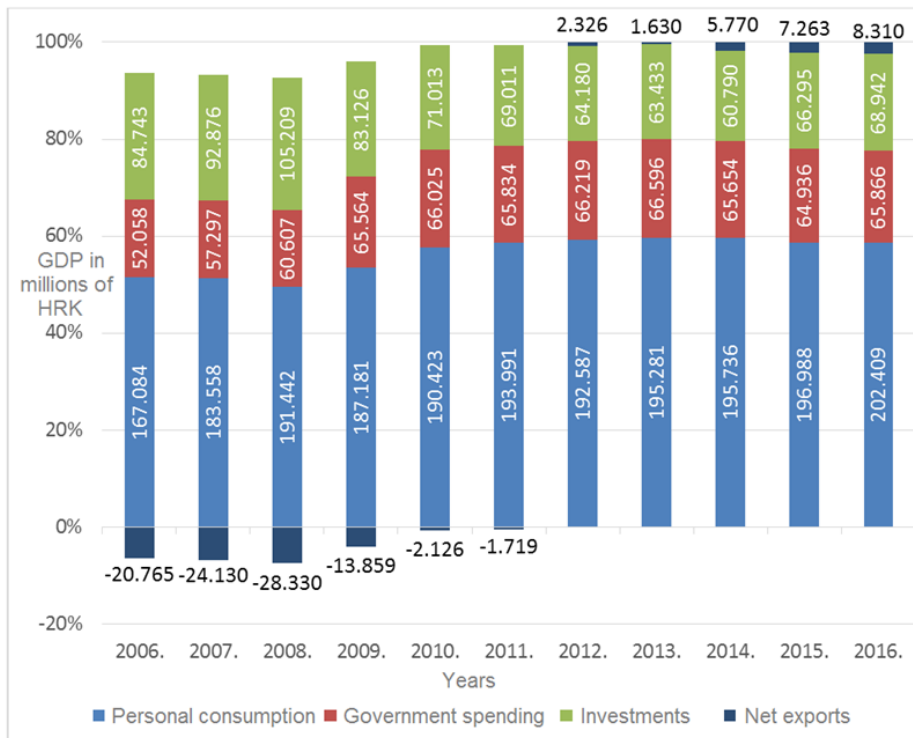
Xu argued that from the previous theoretical and empirical studies he cannot identify an unambiguous answer to how the taxes impact growth, although regression analysis suggested that there was a negative correlation between the rate of economic growth and the tax variable. However, his opinion is that direct income or investment taxation in the long run perspective could have a negative impact on growth, because taxes would lower the rate of real return on equity, which would encourage individuals to behave in a way that would diminish growth (Xu, B., 1994, p.26). The transformation of the USA taxation system based on income taxation into a system that would rely on taxation of consumption was studied by Milesi-Ferretti and Roubini and they arrived to a conclusion that the taxation of labour provokes growth suffocation and that in creating an optimal tax system more focus should be directed on consumption taxes instead of income tax (Milesi-Ferretti, G. M., Roubini, N., 1998, p.738). Bassini and Duval explored the impact of taxation on labour and possible impact of taxation and other policies on employment and unemployment on a sample of 21 OECD countries during 1983 and 2003, and they arrived to the conclusion that a reduction in working tax by 10 percentage points caused an increase in employment rates by 3.7 percentage points (Dolenc, P., Laporšek, S., 2010, p.346).

2. Gross domestic product in the Republic of Croatia

Gross domestic product (GDP) is the main macroeconomic indicator used to measure the value of final products and services produced in the economy over a given period (Blanchard, O., 2005, p.22). In addition to the above definition, there are two more indicators which can be found in the literature, and the first perceives GDP from the production side, whereby it represents the sum of additional value in the economy over a given period, while the other considers it from the income side, whereby GDP is the sum of income in the economy over a given period (Blanchard, O., 2005, p.23) “The components of GDP are contained in the following formula: $GDP = C + I + G + X$, where C stands for consumption, and denotes private domestic investment, G denotes state consumption and X denotes net exports ($X = \text{export} - \text{import}$)” (Samuelson, P. A. & Nordhaus, W. D., 2007, p.424). The listed components relate only to the GDP observed from the production side. From the quantitative perspective, household consumption is the most significant component of GDP allocation of any country, and consumption expenditures can be generally divided into three categories: durable goods (e.g. cars), non-durable goods (e.g. food, hygiene goods) and services (e.g. health) (Denona Bogović, N., 2002., p.622). In the last few years, precisely the category of services recorded a significant increase in personal consumption.

The following chart shows the available data on the movement of each component of GDP in the period from 2006 to 2016.

Chart 1. The Republic of Croatia GDP Overview in the period from 2006-2016



Source: Author work according to the Croatian Bureau of Statistics data, [accessed 15/07/2017]

The above chart shows the GDP of the Republic of Croatia in the period from 2006 to 2016 according to the components which demonstrate that personal consumption accounts for about 60% of GDP.

3. Income tax position in the tax system of the Republic of Croatia

The Republic of Croatia has had the opportunity to create its own policy (hence the creation of fiscal policy) since its independence in 1991. Apart from the desired autonomy and positive economic results, Croatia faced problems related to transition and central planning in the market economy as well as debts inherited from the former state, which resulted in a long-lasting and devastating crisis that led to destruction of production capacities (Vranjican, S., 2004, p.342). "At the end of 1993, the Stabilization Program started to consolidate and strengthen the Croatian economy, create a market climate and proper ownership structure in the economy, and generate conditions for stable development and growth. Already in 1994, Croatia achieved for the first time a positive economic growth rate and thus stopped the three-year decline in production" (Jurković, P., 2002, p.272).

The reform of the tax system began in 1994 with the aim of creating a modern tax system based on the principles of neutrality, fairness, progressiveness, broad tax base in which the spending would represent the main tax base and increase of the public revenue. Professor Manfred Rose from the University of Heidelberg together with another 7 associates had the leading role in this reform, and he is likely to be considered the founder of the Croatian tax system (Jelčić, B. & Bejaković, P., 2012, p.143). This reform resulted in the Income Tax Act, the Profit Tax Act, and excise duties have been introduced as indirect taxes. "Income tax is an emergent form of internal economic intervention instruments with features of direct (immediate) taxation, since a taxpayer, i.e. a person who is obliged to calculate and pay it to the state in a prescribed manner, is also the person who pays it directly from his economic strength without the possibility of legal tax evasion" (Javorović, M., 2015, p.83).

"A taxpayer" in the Republic of Croatia is:

- natural person who produces income (if several physical persons produce income, the taxpayer is separately each natural person for its share respectively in jointly achieved income);
- inheritor, for all tax liabilities arising from the income the testator made up to its demise;

-resident (a natural person who has a permanent or temporary residence in the Republic of Croatia);
-non-resident (a natural person who does not have a residence or habitual residence in the Republic of Croatia and achieves an income taxable under the Income Tax Act)".¹

"Income is the difference between receipts occurred in the tax period and expenses incurred in the same tax period. Income taxed under provisions of the Income Tax Act is:

- non-independent work income,
- self-employment income,
- income from property and property rights,
- income from capital (equity),
- insurance income,
- other income"²

"Resident tax base is the total amount of the aforementioned income achieved by the resident in the country and abroad, reduced by the personal deduction for the resident, whereas the tax base of non-resident is the total amount of the aforementioned income realized by the non-resident in the country and reduced for the personal deduction of the non-resident" (Kesner-Škreb, M. & Kuliš, D., 2010, p.222). Personal deduction is non-taxable part of the income which serves to cover the existential minimum (principle of fairness). The basic personal deduction under the present Income Tax Act amounts to 3,800.00 Croatian kuna, while the personal deduction is calculated by multiplying the base with the prescribed coefficients for dependent family members and children and persons with disability/bodily damage. Income tax is determined according to Article 7 of the Act for the calendar year (tax period). The tax period can be established even for a shorter period, provided that the resident changed status to non-resident (and vice versa) and if the taxpayer was born or deceased during the year (Javorović, M., 2015, p.87).

The income tax in the tax system of the Republic of Croatia belongs to the group of common taxes shared between the state budget and the budget of local and territorial (regional) self-government (ULT (R) SG). The Law on Financing ULT (R) SG regulates the distribution percentage of income tax on the following participants: city/municipality - 60%, county - 16%, decentralized functions - 6%, SBRC³ (equalization positions) - 16% and SBRC (EU assistance co-financing position) - 1,5%.⁴ Since the City of Zagreb acquired conditions for special status of the city and county, its share of income tax amounts to 76.5% and respectively the share of the county, which amounts to 16.5% is added to its basic share of 60%, because it performs administrative tasks within the jurisdiction of the county.

The tax changes which entered into force on January 1, 2017 also caused the change of wages tax rates, as well as the shift from three tax grades to only two, which pertains to one of the features of high quality tax systems. Yet, in order to follow modern tax systems the number of tax reliefs should also be reduced and invest additional efforts on reduction of other tax imposts on wages to avoid negative impact on economic growth. The tax reform which related to changes in tax rates had too narrow range to expect significant shifts and effects in terms of economic growth. The tax reform did not affect the total cost of the employer's wages due to the fact that the tax was borne by the employees and the reduction of this tax achieved only a relatively small increase in net wages of the employees. In this respect, there has been no decrease in labour prices in the Republic of Croatia that would encourage employers to employ more personnel, but still produced some sort of relief. Below the text there is a chart of trends in income tax revenue in comparison with the unemployment rate trend for the first five months of 2015, 2016 and 2017.

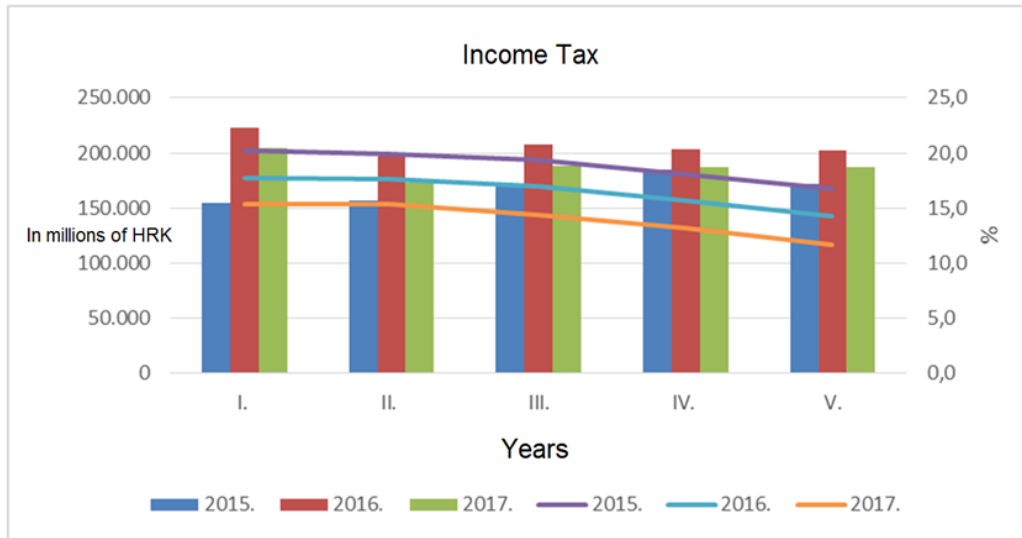
¹ The Income Tax Act, 2016, Official Gazette, No. 115, Article 3.-4., [accessed: 05/08/2017]

² The Income Tax Act, 2016, *ibid.* [accessed: 05/08/2017]

³ SBRC -Abbreviation for State Budget of the Republic of Croatia

⁴ Ministry of Finance, Income Tax distribution pursuant to the Funding Act, JLP(R)S, 2015, [accessed: 06/08/2017]

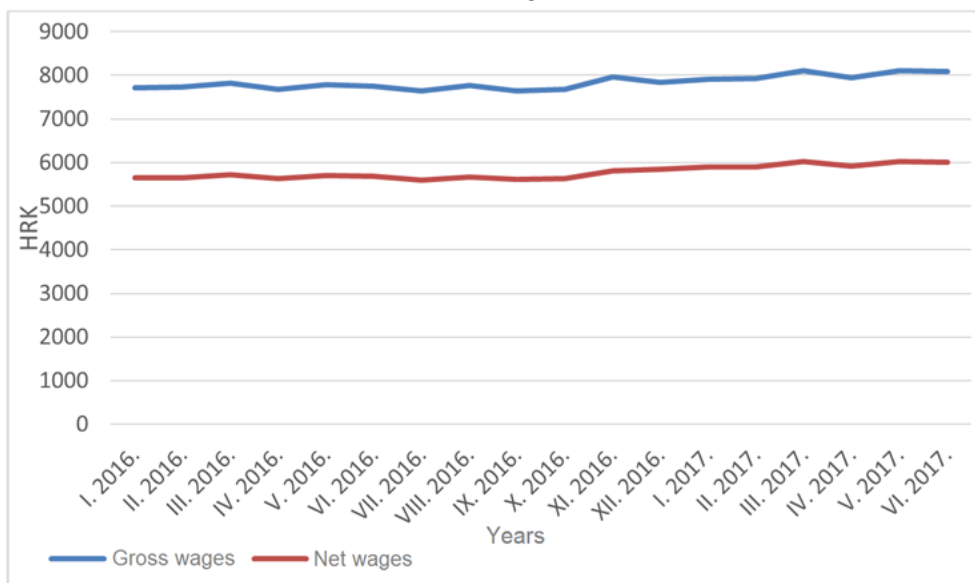
Chart 2: Comparison of Income Tax and Unemployment Rate



Source: Author processing according to the Ministry of Finance data, Time Data Sequences, [accessed: 30/07/2017]

From the previous chart it is clear that there is a lower income from tax in 2015, which is the result of higher unemployment rate, and the decline of unemployment in 2016 fall resulted in the increase of tax revenues. In 2017 there is a deviation, where we have further continuation of unemployment reduction, but also decline in income tax revenues as a result of the implemented tax reform. The following chart shows trends in average gross and net wages paid in 2016 and the first half of 2017.

Chart 3. Gross and net wages in 2016 and 2017



Source: Author design according to the State Institution of Statistics data, Statistics in Sequence [accessed: 06/09/2017]

From the previous chart, it is evident that in 2017 there was a slight increase in average net wage as a result of reduced tax burden. This resulted in a smaller increase in purchasing power of households, which could have a positive impact on the movement of personal consumption, and that is one of the major components of the gross social product. The Republic of Croatia has a high tax burden on labour (about 40% gross II category wages on various contributions and taxes), but still collects relatively less income tax than the EU28 average, due to low number of employees compared to the European Union countries average. For this reason, it is very important to separate the base (number of employees) and the tax rate, so that there is no misguided conclusion that tax rates need to be raised to approach the EU average” (Brkljača, I., 2017).

4. Regression model - economic growth in the period 2006 – 2016

Regression analysis displays relations between dependent and one or more independent variables. There are many different types of regression analysis, but for the purpose of this paper the Ordinary Least Squares or OLS methods were used. The dependent variable in the analysis is the one attempted to be explained or its movement predicted, whereas independent variable is used to predict and clarify the movements of the dependent. For the implementation of this regression analysis, the Gretl program (version 2017c) was used, and the analysis covered the period from January 2006 to December 2016 (10 years). Gretl is an “open-source” software package that is primarily intended for use in econometrics. GRETL is an abbreviation for “Gnu Regression, Econometrics and Time-Series Library” in English. The following table lists the variables used in the model, which are assumed to have had an impact on the economic growth of the Republic of Croatia in that period. The Y tag denotes a dependent variable, and the X1, X2 tags, etc. denote independent variables.

Table 1. List of variables for analysis in GRETL program

Variable	Tag	Variable title	Measure unit
Y	GDP	Gross domestic product	Millions of HRK ⁵
X ₁	EXR	Net export	Millions of HRK
X ₂	EXD	Gross external debt	Millions of HRK
X ₃	HH	Household consumption	Millions of HRK
X ₄	GOS	Government spending	Millions of HRK
X ₅	INV	Gross investments	Millions of HRK

Source: Author design, statistical data collected at the pages of State Bureau of Statistics and Croatian National Bank

After the correlation test was performed, the obtained correlation coefficients were included in the table in order to observe the relations between the variables. Variables with a correlation coefficient of +/- 0.8 have been compared to the variable with which they correlate and after a consideration which one could have a lesser impact on the dependent variable Y (GDP), the decision to discard (or not) the variable was made.

Table 2. Variables in correlation matrix

	x1	x2	x3	x4	x5
x1	1,0000	0,2974	-0,2387	0,1818	-0,9003
x2	0,2974	1,0000	0,3569	0,5071	-0,5319
x3	-0,2387	0,3569	1,0000	0,7570	0,0989
x4	0,1818	0,5071	0,7570	1,0000	-0,3249
x5	-0,9003	-0,5319	0,0989	-0,3249	1,0000
	EXR	EXD	HH	GOS	INV

Source: Author processing in GRETL program

The table above shows that the variable X5 (Gross Investment) has a coefficient of -0,9003 (greater than 0,8) and correlates with variable X1 (Net exports). By comparing the importance of these two variables, X5 (Gross Investment) variable was eliminated from further analysis, due to the fact that many authors confirmed that the investments cannot influence long-term growth rate because of the effect of declining yields, indicating that there is no correlation between the investment rate and the growth rate (Vukoja, O., 2009, p.18-33). Another reason why the X5 variable was eliminated is because further testing (unit root test) determined that it was not

⁵ HRK-Croatian national currency, Croatian kuna

stationary.

After checking the variables in the correlation matrix, the unit root test was used to test the stationarity of the time series. This test is conducted because the inclusion of non-stationary time series into the econometric model can lead to a wrong conclusion about the correlation between the variables. For the purposes of this analysis, the Augmented Dickey-Fuller (ADF) test was used, which is the most popular test for variable integrity analysis in the model. The stationarity decision is made by comparing the size test and critical values of the Dickey-Fuller distribution. When testing is performed, the variables in the levels are first analysed, and then if the sequence is not stationary, it is differentiated and then the stationarity of the first differences sequence is re-examined.

Table 3. ADF test results

Variable	Level		First difference	
	t-statistic	p-value	t-statistic	p-value
Y	-3,09674	-3,09674		
d_x1			-3,54138	0,007013
d_x2			-12,7057	9,17E-19
x3	-3,6176	-3,6176		
x4	-3,60538	-3,60538		

Source: Author processing in GRETL program

After the implementation of Augmented Dickey-Fuller test, the table below contained variables that satisfy the condition of stationarity. Variables X1 (net exports) and X2 (gross external debt) were not stationary in the levels and were therefore derived, so that in the re-examination of stationarity they met the criteria (p-value <0.05). Variable X5 (gross investment) did not satisfy the ADF test in levels and in the first derivation and therefore it was not used in the OLS model.

Table 4. OLS model results

	Coefficient	Std. Error	t-ratio	p-value	Tag
const	32951,7	7293,10	4,518	<0,0001	***
x3	-0,0746424	0,224692	-0,3322	0,7403	
x4	3,29732	0,601631	5,481	<0,0001	***
d_x1	0,214026	0,0504165	4,245	<0,0001	***
d_x2	-0,103616	0,174719	-0,5930	0,5542	

Sum squared residual	2,79e+09
Mean dependent variable	82502,51
R-squared	0,388869
F(4, 126)	20,04377
Log-likelihood	-1291,023
Schwarz criterion	2606,421
rho	0,791202

S.E. of regression	4701,583
S.D. dependent variable	5920,939
Adjusted R-squared	0,369468
P-value(F)	8,57e-13
Akaike criterion	2592,045
Hannan-Quinn	2597,887
Durbin-Watson	0,409859

Source: Author processing in GRETL program

The OLS model results are displayed in the table above, whereby it is apparent that the most significant variables statistically are the ones in the model d_X1 (net export) and X4 (government spending), which can be seen from the mark*** in the last column of the table. From the aforementioned results we can assume that a rise in government spending for 1 unit would cause GDP growth of 3,297 units, and if net exports would increase for one unit, this would result in GDP growth of 0,21 units. This result complies with the empirical research carried out by Barro in 1990, where he investigated the impact of public investment on economic growth. "He determined the correlation of the increase in resources targeting the creation of public goods offer and state services with lower GDP growth per capita, confirming that 76 countries from his analysis were approaching a mass of public investment and thereby maximizing the rate of economic growth" (Sever, I., et al., 2011, p.293).

Sampling a longer sequence of time series would surely produce different results, especially because this time series covers the period of the crisis that lasted from 2008 to 2014. After determining which variable encouraged mostly economic growth in the observed period, a new GRETL analysis was conducted to confirm or reject the hypothesis set at the beginning of the paper. The following table lists the variables to be used in the test.

Table 5. Variables for analysing the impact of the GDP tax on GRETL

Variable	Tag	Variable title	Measure unit
Y	GDP	Gross domestic product	Millions of HRK
X ₁	IT	Income tax	Millions of HRK
X ₂	PT	Profit tax	Millions of HRK
X ₃	VAT	Value added tax	Millions of HRK
X ₄	OTHR	Other taxes	Millions of HRK

Source: Author work, statistical data collected on pages of the Croatian Bureau of Statistics and Croatian National Bank

The data used in the regression analysis were collected at the quarterly level, because the GDP data are not available on a monthly basis. The following table shows variables in the correlation matrix used to eliminate variables which correlation coefficient is greater than 0.8.

Table 6. Variables in the Correlation Matrix - Taxes and GDP

	x1	x2	x3	x4
x1	1,0000	-0,4114	-0,1814	-0,1691
x2	-0,4114	1,0000	-0,1415	-0,3482
x3	-0,1814	-0,1415	1,0000	0,8077
x4	-0,1691	-0,3482	0,8077	1,0000
	DOH	DOB	PDV	OTHR

Source: Author processing in GRETL program

The variables that correlate in this table are X₄ (Other Taxes) and X₃ (Value Added Tax), and X₄ and Other Taxes have been respectively excluded from further testing because they did not satisfy the stationarity test any longer. The other reason is that the consumption tax (VAT) through which the personal consumption is partly financed has a greater share in the structure of public revenues, having a significant impact on the positive GDP trend. The following table shows the results of the stationarity testing using an ADF test.

Table 7. Results of ADF test - taxes and GDP

Variable	Level		First difference	
	t-statistic	p-value	t-statistic	p-value
Y	-4,17869	0,0007137		
X ₁	-4,25636	0,003608		
X ₂	-4,61658	0,003172		
d_X ₃			-3,48209	0,008486

Source: Author processing in GRETL program

The results of the ADF stationarity test showed that the variables Y, X₁ and X₂ are stationary in the levels, whereas the variable X₃ complied with the stationarity criteria only after the first derivation. Since all previous

steps have been completed, the following table presents the results of the OLS regression model which analyses the impact of income tax on GDP trends.

Table 8. OLS model results - taxes and GDP

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	<i>Tag</i>
const	67560,6	2797,85	24,15	<0,0001	***
x1	-0,00899778	0,00311087	-2,892	0,0062	***
x2	0,000677593	0,00106202	0,6380	0,5272	
d_x3	-0,000607225	0,000476151	-1,275	0,2098	

Sum squared residual	64943,30
Mean dependent variable	4,28e+08
R-squared	0,231991
F (4, 126)	3,926876
Log-likelihood	-407,4300
Schwarz criterion	829,9048
rho	-0,190237

S.E. of regression	3640,656
S.D. dependent variable	3310,971
Adjusted R-squared	0,172913
P-value(F)	0,015300
Akaike criterion	822,8600
Hannan-Quinn	825,4579
Durbin-Watson	2,253064

Source: Author processing in GRETL program

It is apparent from the table that variable X1 - Income tax has the *** tag, which confirms that it is statistically the most significant variable in this model. Based on this model it can be concluded that if income tax increased by 1 unit, GDP would decrease by 0.009 units, or if income tax decreased by 1 unit, then GDP growth would increase by 0.009 units. The results of this model confirm the results Xu obtained and determined that there was a negative correlation between the rates of economic growth and tax variables.

5. CONCLUSION

Gross domestic product is one of the major macroeconomic indicators of economic growth, but almost all variables of a certain economy affect it directly or indirectly. Results of the implemented regression analysis confirmed the assumed hypothesis that reducing tax revenues through tax reform could positively influence the movement of gross domestic product in the Republic of Croatia and hence the authors have proposed further tax relief for employers to encourage them to employ more personnel, which could lead to a decrease of the unemployment and increase in the base of workers paying the taxes. This leads to the above mentioned claim that EU28 countries have higher revenues of income tax even though they have lower tax rates, precisely because they have a higher employment rate than the Republic of Croatia.

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