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Article

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The Assessment of Taxation Impact on Economic Development. A Case Study of Romania (1995-2014)

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Abstract: The paper aims at identifying tax variables that have an influence on economic development, in the case of Romania. The results of previous studies show that there are various influences of taxation on development, with multiple implications. A model is employed, showing the influence of tax variables, with GDP per capita as proxy for economic development, for 1995-2014 period. The results suggested that tax variables have a statistically significant impact on development. Tax policy has tools which may be used in the process of stimulating economic development. The results of the paper may represent one starting point for future research in order to identify relevant types of taxes to be analyzed in relationship with development. The paper underlines the impact of taxation on economic development in the case of Romania. Also, the hypotheses checking for the regression model is another goal of the paper, because their violations may lead to inaccurate results.

Keywords: taxation; development; Romania

JEL Classification: H71; O11

1. Introduction

The process of underlying the current tax trends in Romania and in other EU countries is important, the components of the tax system having a different impact on economic growth and economic development. Through tax policy adopted the economic growth, employment, competitiveness, etc. may be influenced. During the periods of economic crisis, but also afterward, the improvement of the revenue collection system represents a necessity, by adopting various measures in this respect. Careful consideration is needed and it is important to determine if there is a positive impact of taxes on development, and there are no effects that may prove harmful.

The paper aims to identify factors that influence the economic development and it is structured in four chapters, as follows: the following section presents some implications in the tax area of Romania's accession to the European Union; the third section presents ideas and theories that underline the relation between taxation and development; the fourth section contains the analysis of the tax impact on economic development (GDP per capita) in Romania; the last section highlights the main conclusions of the study. In this paper, the importance of verifying the hypotheses for a regression model is underlined.

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2. Implications in the Taxation Area of Romania's Accession to the European Union

Decisions at European Union (EU) level on tax issues require the unanimous agreement of member governments. This ensures that the interests of each EU country are taken into account. Within the EU, there is no institution with a direct role in adopting taxes or setting their tax rates, the amount of taxes that a citizen has to pay is decided by the government of each country. The EU is concerned with the surveillance of national tax rules - to ensure that they are in line with certain EU policies, such as (European Commission, 2016):

• promoting growth and job creation;

• ensuring the free movement of goods, services, and capital in the EU (single market);

• businesses in a country do not have an unfair advantage over competitors in another state;

• taxes do not discriminate consumers, workers or businesses in other EU countries.

Romania's tax policy in the post-communist period has been marked by many transformations, with the public decision maker taking measures to support the country's economic progress during the transition to the market economy. In direct taxation area, the policy reflected an important change over the past 28 years, since the 1989 events, namely moving from a policy orientation to progressive taxation, which marked the period 1990-2004 to an orientation that targeted a single tax rate applied during 2005-2017 (for income and profit). Beyond the political guidelines, the pre-accession to EU period (until 2007) and the post-accession period (after 2007) were also marked by the need to align with EU tax trends.

Tax legislation in Romania has undergone various stages of improvement to align with European legislation in this area. Both direct and indirect taxation have gone through a period of transformations that had an important impact on the economic environment and aimed to support the development of the domestic business environment. Romania's application for EU membership was filed in 1995 and, after this moment, the EU closely monitored the legal framework for direct and indirect taxation, regularly reporting on Romania's progress towards alignment with the *acquis communautaire*.

Within the EU, in the case of direct taxes, such as income tax and corporation tax, the principles of non-discrimination and free movement in the single market must be respected. In the EU, there is a need for a coordinated approach among all Member States to meet these challenges, as well as to face common challenges, such as tax evasion (European Commission, 2016).

In 1995, in Romania a corporation tax with a rate of 25% and a tax of 5% for profits from export were applied. In the Report from 1997, the European Commission (EC) concluded that the transposition of the *acquis communautaire* in the field of direct taxation should not present major difficulties for Romania. Regarding indirect taxation, the EC asked Romania to make a sustained effort to comply with the VAT and the excise *acquis*, in the medium term. In 1997, measures to increase VAT rates to 22%, and 11% respectively were adopted.

The Report from November 1998 highlighted the fact that some progress has been made in the area of VAT, but efforts were needed in this area and in the excise duties area, in order to fully align with the *acquis*. Further efforts were needed to strengthen the efficiency of tax authorities.

The 1999 Report indicated that Romania should continue its efforts to align legislation to the *acquis*. Tax administration required a restructuring to improve its capabilities and administrative cooperation. Tax reform, which involved reducing VAT exemptions and increasing excise rates, was essential. In 2000 a VAT rate of 19% came into effect.

The 2000 Report emphasized that alignment was made in the area of VAT. The number of exemptions has been reduced. Certain transactions subject to reduced rates were exempted and the scope of the

exemptions extended (construction of new buildings or buildings intended for religious purposes, extension or repairing of existing accommodation locations). A VAT refund procedure has entered into force for foreign airlines and specific regimes for second-hand goods and tourism have been introduced. The VAT regime for real estate transactions has been brought in line with the *acquis*. Regarding the excise duties, the system was characterized by rates applied to all products which were below the EU's minimum rates.

Concerning direct taxation, the European Commission's Report from November 2000 indicated that attention should be given to the compatibility between the special rate of taxation applicable to export profits with the Community and WTO rules. Regarding the administrative cooperation and mutual assistance, the pilot scheme was extended to the whole country on 1 January 2000 and a new harmonized tax return was introduced.

The share of tax revenues in GDP reduced significantly between 2000 and 2004 and then increased until 2007 as GDP growth accelerated. Over the next two years, the share decreased by 2 percentage points (p.p.) mainly due to the sudden decrease in VAT revenue.

In 2001, the Romanian legislation had to be amended, in order to comply with the principles of the Code of Conduct for Business Taxation. The 2001 Report noted that Romania has made some progress, especially in the area of excise duties. Romania continued to modernize the tax administration by setting up training programs and programs for introducing IT systems.

The Report from October 2002 highlighted the progress made by Romania, especially in terms of alignment of VAT legislation. In June 2002 a strengthened VAT law was adopted and the new excise legislation came into force in January 2002. Romania has continued to modernize its tax administration and improve its revenue collection system.

A revised corporation tax law was adopted in June 2002. Certain tax incentives for SMEs and taxpayers, established in deprived areas and free zones, were phased out. It was necessary for Romania to continue to align its legislation to eliminate potentially harmful tax measures. Romania had to transpose the Directive on interest and royalty payments, the Directive on savings and the Parent-Subsidiary Directive. Romania had only to introduce tax measures which were in line with the principles of the Code of Conduct on Business Taxation and had to eliminate all harmful tax measures so as to comply the Code of Conduct with the same extent as the other Member States.

In 2002, the reduced rate of 5% for profit from export increases to 12.5% and criminal sanctions for fraud regarding VAT refund were adopted.

In 2003 VAT exemptions were adopted. The 2003 Report highlighted some progress in alignment with the *acquis* in the area of taxation and administrative reform. However, it showed that Romania had to maintain the pace of transposition in all areas of the *acquis* and to pay particular attention to the reform and modernization of the tax administration. It was also necessary to work on improving its IT systems. In 2003, negotiations on the tax chapter were provisionally closed. Overall, Romania has fulfilled its commitments and requirements in the accession negotiations on this chapter.

The 2004 Report stressed that Romania should continue its efforts to align legislation with the *acquis*. Romania has consolidated existing laws into a single Tax Code which entered into force on 1 January 2004 and continued the alignment in various areas. The new Tax Procedure Code entered into force on 1 January 2004. The 2005 Report showed that Romania generally has complied with the commitments in the area of VAT, excise duties and direct taxation. Romania had to comply with legislative alignment with the *acquis* in several areas, such as the modernization of the tax administration.

In 2004 a number of VAT exemptions, contrary to EU legislation, were eliminated and replaced by the reduced rate, and barter transactions were included in the scope of VAT, and in 2005 a number of VAT exemptions incompatible with the *acquis* were eliminated. A 5% turnover tax on night clubs, casinos, and gambling was established, and also a 2% turnover tax for micro-enterprises, a 16% flat tax rate on income and profits, and a reduced VAT rate of 9%.

In 2005, Romania registered progress in transposition of directives on direct taxes. As regards the taxation applicable to interest and royalty payments, Romania achieved a transition period until 1 January 2011. In 2005, the share of tax revenue in GDP in Romania was 28.0%, by 9.4 p.p. below the EU27 average. The level of taxation in Romania was the lowest in the EU. Romania ranked third in terms of dependence on indirect taxes within the EU, after Bulgaria and Cyprus. In 2005, indirect taxes provided 46.3% of total tax revenues, compared with 39.1% which was the EU27 average, while the share of direct taxes and social contributions was only 19.1%, and 34.6%, respectively. Romania was ranked second in the EU, in terms of the share of VAT in total tax revenues (29.0%) in 2005. The low level of direct taxes was mainly due to low income taxes (only 2.4% of GDP in 2005), which represented about one-third of the EU27 average. Revenues from corporation tax as a percentage of GDP were below the EU average by 0.4 p.p. A single rate of tax for income and profit of 16% was introduced at 1 January 2005, instead of the previous progressive system.

The Accession Treaty was signed on 25th of April, 2005. The accession took place on 1 January 2007. The EU acquis in the area of direct taxation refers mainly to some aspects of corporate tax and capital taxes. The four freedoms of the Treaty have a great impact on national tax systems.

On 1 January 2007, Romania adopted the EU legislation, a step that brought an important series of reforms. In the post-accession period of Romania to the EU, the country had to align the legislation with the *acquis communautaire* and to take measures to support development. After 2007, significant increases in excise duties on tobacco and the standard VAT rate (from 19% to 24%), as well as higher fuel prices, contributed to high inflation. The Tax Code has undergone changes in December 2011.

In 2007, the sixth EU VAT Directive was transposed into national legislation. Capital gains from the sale of shares of companies were subject to 16% tax rate.

In 2008 the share of tax revenues in GDP in Romania was 28.0%, by 9 p.p. below the EU27 average (37.0%). The level of taxation in Romania was the lowest in the EU, and significantly lower than in the neighbouring countries: Bulgaria (33.3%), and Hungary (40.4%). Romania ranked 4th in the EU, with the highest dependence on indirect taxes, after Bulgaria, Cyprus, and Malta. Indirect taxes provided 42.7% of total tax revenues, compared to the EU27 average of 37.6%, while the share of social contributions accounted for 33.3% (30.2% in the EU27) and direct taxes only 24.0% (32.4% in the EU27). Due to this structure, the share of VAT in total taxes (including social contributions) in 2008 (28.2%) ranked Romania in the third place in the EU. The low level of direct taxes was mainly due to reduced income taxes (only 3.4% of GDP), which amounted about 42% of the EU27 average.

In 2008, a standard VAT rate of 19% and a reduced rate of 9% were in force. For micro-enterprises, a turnover tax of 2.5% was applied. In 2009, the short-term economic prospects for Romania were not very good, with a very high GDP decline of 6.6 p.p. (annual average), compared to 2008.

Increases in excise rates in 2009 and in the standard VAT rate in 2010 provided higher indirect tax revenues that offset the further decline in direct tax and social contributions revenues. As a consequence, in 2010, the share of tax revenues in GDP increased by 0.4 p.p., compared to the previous year. In 2009 a standard VAT rate of 24%, a reduced VAT rate of 5% for the provision of social housing and for some categories of private dwellings, and a 3% turnover tax for micro-enterprises were applied.

Since 2010, Romania has ranked third in the EU, in terms of dependence on indirect taxes. Indirect taxes provided 45.2% of total tax revenues, compared to 38.6% - the EU27 average - while the share of social contributions accounted for 32.2% (EU27 average was 31.1%), and direct taxes only 22.6% (EU27 average was 30.4%). In 2010, the share of tax revenues in GDP was 27.2% in Romania, with more than 8 p.p. below the EU27 average (35.6%). The level of taxation in Romania was the lowest in the EU, except Lithuania (27.1%), but comparable to the level of taxation in Latvia (27.3%) and Bulgaria (27.4%). In 2010 a standard VAT rate of 24% and a 9% reduced rate for pharmaceuticals, medical equipment for people with disabilities, books, newspapers, school textbooks, access to cultural and accommodation services were applied.

In 2012, the share of tax revenues in GDP was 28.3% in Romania, with more than 10 p.p. below the UE28 average (39.4%). Romania ranked 4th in the EU in terms of the lowest share of tax revenues in GDP, at a level comparable to that of Latvia (27.9%) and Bulgaria (27.9%). Romania ranked 2nd in the EU, in terms of dependence on indirect taxes. In 2012, indirect taxes accounted for 47.2% of total tax revenues, compared to 34.5% for the EU28 average, while the share of social contributions accounted for 31.2% (EU28 average was 32.4%), and direct taxes only 21.6% (EU28 average was 33.4%).

In 2013, Romanian economy registered a growth of 2.2%, while for the year 2014 the growth rate was expected to be 2.1%. However, revenue declines in the first three quarters of 2013 have led the public decision-maker to increase the rates for certain taxes (mainly excise duties) and to introduce new taxes. A series of amendments to the Tax Code were adopted on 1st of February, 2013, including an optional 3% tax rate on gross income for certain micro-enterprises, which became mandatory for any micro-enterprise; for gambling revenue, a tax rate of 25% was applied; a reduced VAT rate of 9% was applied to bread, bakery products, bakery flour, wheat, and rye. The change of the Tax Code from the beginning of 2013 has aligned the excise duty on alcoholic beer and alcoholic fermented beverages, as well as the production process, and those for beer were increased. An increase in excise duties on cigarettes was planned each year on 1st of April, until 2018, when the EU minimum level of excise duties is to be reached. In 2014 there was a further increase of the excise duties of 7 eurocents/litre for unleaded gasoline, leaded gasoline, diesel and kerosene - used as fuel. In 2016, the standard VAT rate was reduced to 20% and the 5% reduced VAT rate was applied to schoolbooks, books, newspapers and some magazines, access to castles, museums, cinemas, sporting events, and so on. In January 2016, a new Tax Code entered into force in Romania, including a reduced rate of 1% applicable to newly established Romanian legal persons, with at least one employee, constituted for a minimum period of 48 months, and with shareholders/associates without shares in other legal entities.

In 2017, the standard VAT rate was reduced to 19%. For some taxes, such as VAT or excise duties on gasoline, tobacco, and alcohol, all 28 EU countries have agreed to broadly align the rules and minimum rates, in order not to distort cross-border competition within the EU (European Commission, 2016). The legal framework for indirect taxation mainly consists of harmonized legislation on VAT and excise duties. In the area of excise duties, the *acquis* consists of harmonized tax structures and minimum rates, together with common rules on the holding and movement of excise goods (including the use of tax warehouses).

The current VAT system in Romania incorporates the basic principles of EU legislation. Recent changes include reducing the scope of exempt transactions, eliminating differences in taxation between imported services and similar domestic services, and redefining the provisions governing exemptions for the export of goods, passenger transport and other services. The public deficit is expected to increase, which will lead to a slight increase in public debt. In addition to the VAT reduction, public sector wage growth measures were adopted (15% for teachers and 25% for the public health sector), along with a reduction of dividend tax from 16% to 5%. Additional revenue resulted from economic growth, from the reduction

of tax evasion, linked to the informal economy, and also from the restructuring of public companies, often with losses, and did not compensate the budget deficit (COFACE, 2016).

Finally, the EU legislation on administrative cooperation and mutual assistance provides tools for avoiding intra-Community tax evasion for both direct and indirect taxation. The tax reforms adopted in Romania took into account changes of the base or the rates. They were focused on various aspects of the tax area, with an important emphasis being placed on indirect taxes.

3. The Relationship between Taxation and Development

In the literature, the analysis of the economic development in different countries has an important place. The economic development is the qualitative change and restructuring of a country's economy, in conjunction with technological and social progress, the main indicator of economic development being GNP growth per capita (or GDP per capita), reflecting an increase in the economic productivity and average level of the country's welfare (World Bank, 2016).

The evolution of taxes has been constantly accompanied by various theories regarding the role, or the types of taxes that should be used in the economy. The theories of taxation also refer to an important aspect, namely the state viewed as a result of the social contract. According to Gliga (1992), this theory is supported by H. Grotius, Montesquieu, Sargant and others, taxes being the price of state services, and A. Hansen (1941) emphasizes that taxes are prices established by coercion for government services. Musgrave (1996) examines the relationship between fiscal theory and the theory of the state, highlighting four variants of the fiscal state: the service state, welfare state, communal state and the flawed state.

Şaguna et al (1996) highlight the ideas of J. Locke and F. Quesnay, influenced by the classical liberalism, which shows that the state played a role in guarding the law and ensuring public safety, with high importance offered to the contract between the state and the citizen. According to Corduneanu (1998), Proudhon (1845) had the opinion that proportionality is the right form of taxation, and progressivity is merely an illusion for the goal of social justice. Gliga (1992) highlights the ideas of Wagner, Jéze, and Trotabas, according to which the tax is requested by the state due to its sovereignty, and represents money claimed from the citizens in order to cover the expenditure.

Corduneanu (1998) underlines K. Marx's ideas, the tax being a useful tool in transforming the capitalist mode of production, the proposed capital tax being progressive. According to Şaguna et al (1996), citizens cause a series of expenditure that needs to be financed by those who cause them, the payment of taxes being a duty to ensure the existence and the development of the society.

Some taxes are levied to correct the negative externalities caused by market imperfections. Sandmo (2000) mentions that the first treatment of externalities, as a justification for public policy, is found in Pigou's works (Wealth and Welfare, 1912 and The Economics of Welfare, 1920), but some ideas are found at Marshall. According to Sandmo (2000), Pigou (1920) discusses the aspect of the "social and private net product" divergence, mentioning as a "positive divergence" the case of resources to prevent smoke emanating from the chimneys of factories, showing that in large cities it causes losses to the communities resulting in damage to buildings, expenditure on room cleaning, expenditure on the provision of additional artificial light, and in many other ways. The latter elements describe a case of "negative divergence" (i.e., negative externality), Pigou (1928) suggesting the use of taxes to bring on the same line, the net social and private product, using the taxes on alcoholic beverages and gasoline as examples.

Another tax was created to reduce the volatility of currency markets, J. Tobin having the idea of a tax on currency transactions ("Tobin tax"). Soros (2002) underlines that this tax will discourage currency speculation and reduce liquidity on the market, and massive transactions may have a greater impact on the exchange rate. According to J. Tobin, the real economy suffers from the deregulated capital flow, the recommendation being to levy one percent tax on all transactions (Peter-Martin and Schumann, 1999).

Tax policy is an important tool for governments, but there are opinions that a high tax rate could slow the development, while a reduction in tax rate could boost it. Taxes can create distortions in terms of resource allocation and thus there may be effects on the economic growth (Mandl et al., 2008). Riedl (2008) underlines that tax cuts are not conducive to economic growth, as they are not associated with productivity. Similarly, an increase in spending could boost the economy, while a cut may slow it down.

The reforms of tax systems aim to stimulate development, and Gandullia (2003) provides a comparison of tax systems and reforms in some EU countries, underlining that measures have been taken to reduce tax rates, measures to extend the tax base for taxes on income and profit, measures to reduce the tax burden on low wages and incentives for employment were implemented. Buettner (2002) reconsidered the relationship between taxation and foreign direct investment (FDI), the analysis of bilateral FDI flows showing significant effects of tax incentives on the FDI location. Braşoveanu and Braşoveanu (2008) test the correlation between tax policy and economic growth, revealing a negative relationship between economic growth and tax revenues. Other studies address various aspects of major importance for the development of the economy, like the study of Baldacci et al (2004) on the identification of transmission channels between fiscal policy and growth, or the research of Carmignani (2008) which studies the effects of fiscal policies on private consumption per capita and social outcomes, underlining that public health and social protection expenditure improves social outcomes.

In any country, taxation plays an important role. Afonso and Furceri (2008) discuss the variables which influence in an undesirable way the economic growth, i.e. indirect taxes, and social contributions. According to Engen and Skinner (1996), fiscal policy influences the economic growth, and beneficial changes in tax policy may have modest effects on output growth. Mashkoor et al (2010) underline the idea that the low ratio between direct and total taxation promotes a strong economic growth. Widmalm (2001) underlines that there are negative correlations between economic growth and personal income taxation, economic growth and tax progressivity, and that a consumption tax is less harmful to growth. According to Alm and El-Ganainy (2013), an increase in the VAT rate leads to a reduction in aggregate consumption.

The results from the literature differ from country to country, analyzed periods, and so on, and it is important that these types of analyses clearly identify the variables that have a significant influence on development. The literature has various methodologies and results. Previous studies and researches provide various answers, from the one where tax cuts support the development, to the one where they have no effect, slow the development or do not produce clear results.

4. The Impact of Taxation on GDP/Capita in Romania

The analysis in this section aims at identifying connections between tax variables and GDP per capita in the case of Romania, for the analyzed period (1995-2014). The variables used in the model are sourced from Eurostat:

• GDP, euro per capita;

• current taxes on income, wealth, etc., euro - are taxes on income, profit, taxes on holding gains, payments made by households for licenses to own or use cars, for hunting or fishing, current capital taxes that are paid on a regular basis and other taxes;

• taxes on production and imports, euro - this category includes VAT, import duties, excise duties and taxes on consumption, stamp taxes, payroll taxes, pollution taxes and others. These are taxes levied on production and import of goods and services, employment, ownership or use of land, buildings or other assets used in production. These taxes are paid regardless of the profits made.

According to the Eurostat classification, the two tax categories from above form the total tax revenues (representing the main source of public revenues), together with capital taxes and social contributions.

In the following figure the GDP levels (expressed in euro per capita) are highlighted, for Romania, for the 1995-2014 period, and the current taxes on income, wealth, etc., and taxes on production and imports.

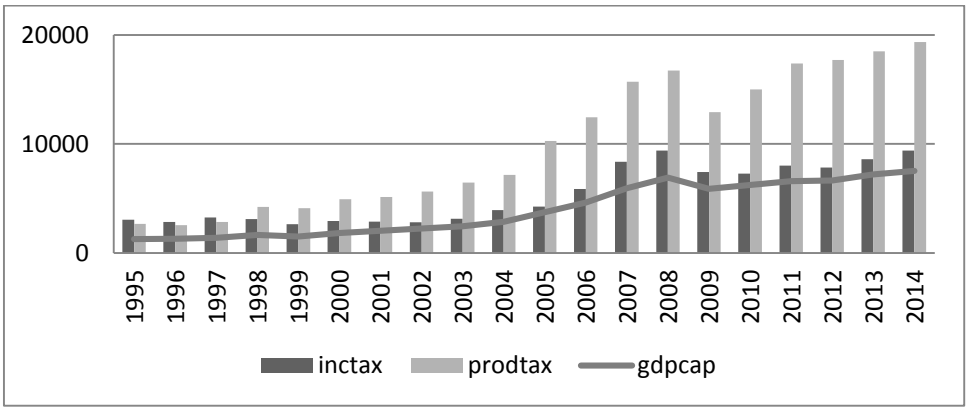


Figure 1. GDP per capita (gdpcap - euro), current taxes on income, wealth, etc. (inctax - milions euro), taxes on production and imports (prodtax - milions euro) in Romania, 1995-2014

Source: Created with data from Eurostat

GDP evolution has generally followed the trend of tax revenues from both categories, and a significant decline is recorded in 2009, during the economic crisis.

From the following analysis, positive signs of coefficients for current taxes on income, wealth, etc. and taxes on production and imports are expected. The hypotheses of regression analysis, that will be checked, are related to aspects such as the absence of measurement errors, homoscedasticity, errors' uncorrelation, etc.

Table 1. Description of the variables used in the analysis

Variables	Description	Expected sign of the coefficient
lngdpcap	natural logarithm of gross domestic product per capita, the proxy for economic development, the dependent variable	
lninctax	natural logarithm of current taxes on income, wealth, etc.	(+)
lnprodtax	natural logarithm of taxes on production and imports	(+)

Source: Author contribution

Table 2. The hypotheses regarding the impact of tax variables on economic development and the hypotheses of regression analysis

No.	Hypotheses regarding the impact of tax variables
1	there is a direct relationship between economic development and current taxes on income, wealth, etc. - lninctax
2	there is a direct relationship between economic development and taxes on production and imports - lnprodtax
No.	Hypotheses of regression analysis
1	the absence of measurement errors in observed values
2	errors' mean is equal to zero (tends to zero)
3	the homoscedasticity of the model (constant variance of the residuals in relation with any value of *xi* variable)
4	independent residuals or uncorrelated errors
5	independent residuals in relation to exogenous variables

Source: author contribution

The analysis aims to develop a model to highlight the relationships between economic development and variables such as current taxes on income, wealth, etc., *and* taxes on production and imports, for the case of Romania and 1995-2014 period. Using the Least Squares method, the regression model is described as follows:

Equation 1. Formula for regression model

$$Y_t = \alpha + \beta X_t + u_t$$

where Y_t is the dependent variable (GDP per capita) and X_t is the set of explanatory variables (current taxes on income, wealth, etc. and taxes on production and imports). In the following, the hypotheses of regression analysis are checked (Săvoiu, 2011).

The absence of measurement errors in observed values is checked by validating the relationships $x \in (\bar{x} \pm 3\sigma_x)$ and $y \in (\bar{y} \pm 3\sigma_y)$. A descriptive statistics is the starting point for testing this hypothesis. Thus, the data in Table 3 validates the hypothesis of the absence of measurement errors.

Table 3. Descriptive statistics of the variables used

	LNGDPCAP	LNINCTAX	LNPRODTAX
Mean	8.095023	8.469044	9.003720
Median	8.093113	8.313720	9.057865
Maximum	8.926829	9.148837	9.871099
Minimum	7.143934	7.874435	7.843456
Std. Dev.	0.668669	0.495567	0.712501
Skewness	-0.103572	0.181367	-0.266742
Kurtosis	1.375668	1.262360	1.613802
Jarque-Bera	2.234470	2.625809	1.838459
Probability	0.327183	0.269037	0.398826
Sum	161.9005	169.3809	180.0744
Sum Sq. Dev.	8.495243	4.666155	9.645492
Observations	20	20	20

Source: Authors' contribution

The validation of the hypothesis is made through the following steps:

- $y \in (\bar{y} \pm 3\sigma_y)$, for y = (8.095023 $\pm$ 3 x 0.668669) or the interval (6.089016; 10.10103) which captures the values of y (LNGDPCAP);

- $x \in (\bar{x} \pm 3\sigma_x)$, for x_1 = (8.469044 $\pm$ 3 x 0.495567) or the interval (6.982343; 9.955745) which captures the values of x_1 (LNINCTAX); for x_2 = (9.003720 $\pm$ 3 x 0.712501) or the interval (6.866217; 11.141223) which captures the values of x_2 (LNPRODTAX).

The hypothesis regarding the absence of measurement errors in observed values (x_i and y_i) is satisfied by capturing all of the values in the computed intervals.

Errors' mean is equal to zero (tends to zero) is another hypothesis checked by using the residuals' descriptive statistics, and observing the value of the residuals' mean. Also, there are the following steps in the analysis:

a. in the group of variables, the correlation relationships between y and x_1, and between y and x_2 are checked with the help of a correlation matrix.

Table 4. Results regarding the correlation between variables

	LNINCTAX	LNPRODTAX
LNGDPCAP	0.9586	0.9915

Source: Author contribution

The correlation coefficient is high in the case of the relationship between LNGDPCAP and LNINCTAX, and also between LNGDPCAP and LNPRODTAX, underlying strong positive relationships.

b. the parameters are estimated.

Table 5. Estimation of the regression model parameters

Dependent Variable: LNGDPCAP				
Method: Least Squares				
Sample: 1995 2014				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINCTAX	0.380561	0.064909	5.862992	0.0000
LNPRODTAX	0.685308	0.045146	15.17969	0.0000
C	-1.298284	0.231286	-5.613326	0.0000
R-squared	0.994431	Mean dependent var		8.095023
Adjusted R-squared	0.993776	S.D. dependent var		0.668669
S.E. of regression	0.052754	Akaike info criterion		-2.908868
Sum squared resid	0.047311	Schwarz criterion		-2.759508
Log likelihood	32.08868	F-statistic		1517.775
Durbin-Watson stat	1.163410	Prob(F-statistic)		0.000000

Source: Author contribution

The next step is to check the descriptive statistics of the residuals, to see if the mean tends towards zero or even is equal to zero.

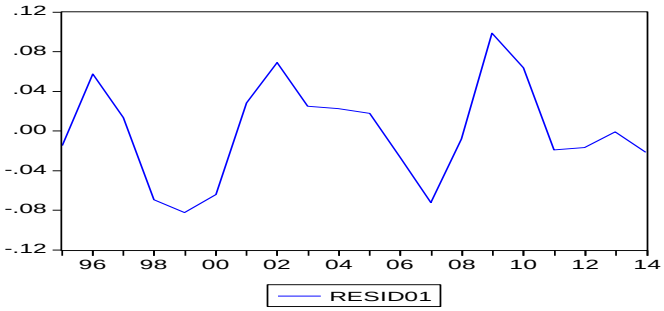


Figure 2. The variation of the residuals around zero mean
Source: Authors' contribution

Table 6. The residuals and the descriptive statistics of the residuals

Residuals						Descriptive statistics of the residuals			
1995	-0.014831	2002	0.068913	2009	0.098739	Mean	7.67E-16	Kurtosis	2.330246
1996	0.057666	2003	0.024912	2010	0.063896	Median	-0.004675	Jarque-Bera	0.405498
1997	0.013451	2004	0.022334	2011	-0.019060	Maximum	0.098739	Probability	0.816483
1998	-0.069459	2005	0.017855	2012	-0.016696	Minimum	-0.082316	Sum	1.53E-14
1999	-0.082316	2006	-0.026587	2013	-0.001021	Std. Dev.	0.049900	Sum Sq. Dev.	0.047311
2000	-0.063997	2007	-0.072180	2014	-0.021318	Skewness	0.097504	Observations	20
2001	0.028027	2008	-0.008329						

Source: Author contribution

According to the results, the mean clearly tends towards zero, being equal with $7.67x10^{-16}$.

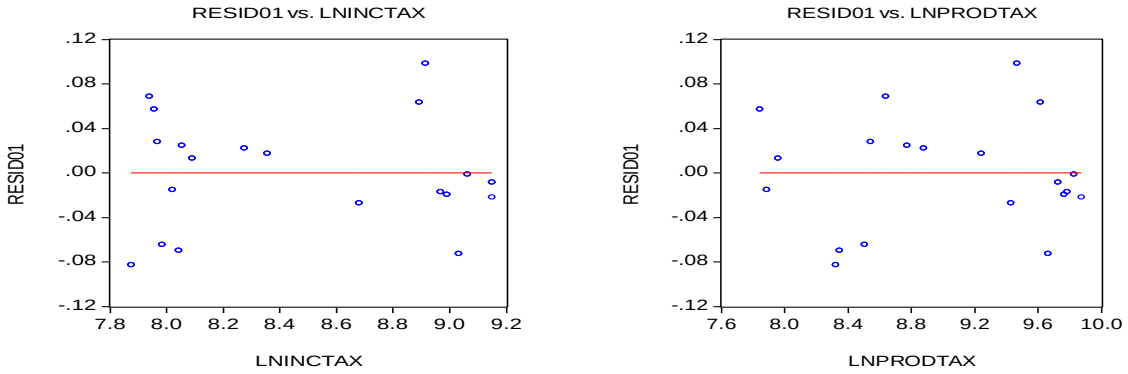
The following hypothesis is related to homoscedasticity of the model (constant variance of the residuals in relation with any value of *xi* variable). The homoscedasticity or heteroscedasticity can be identified with the White test. White test results show that the heteroscedasticity is not present (see Table 7).

Table 7. White Heteroskedasticity Test:

F-statistic	1.507423	Probability		0.249923
Obs*R-squared	5.734456	Probability		0.219876
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1995 2014				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.011625	0.411973	-0.028218	0.9779
LNINCTAX	-0.138725	0.099098	-1.399881	0.1819
LNINCTAX^2	0.008822	0.005901	1.495132	0.1556
LNPRODTAX	0.133150	0.058078	2.292634	0.0367
LNPRODTAX^2	-0.007907	0.003452	-2.290322	0.0369
R-squared	0.286723	Mean dependent var		0.002366
Adjusted R-squared	0.096516	S.D. dependent var		0.002799
S.E. of regression	0.002661	Akaike info criterion		-8.808134
Sum squared resid	0.000106	Schwarz criterion		-8.559201
Log likelihood	93.08134	F-statistic		1.507423
Durbin-Watson stat	2.494361	Prob(F-statistic)		0.249923

Source: Author contribution

For a significance threshold of 0.05 with a *value* from the *table* of the test $\chi^2_{0.05/4} = 9.49$, the White test statistics being 5.734456 (or n x R^2 = 20 x 0.286723), which points out that the model is not heteroscedastic (LM < $\chi^2_{0.05/4}$). The hypothesis of homoscedasticity is confirmed.



(a) (b)

Figure 3. The relationships between residuals and exogenous variables: (a) RESID vs. LNINCTAX; (b) RESID vs. LNPRODTAX

Source: Authors' contribution

The fourth hypothesis is related to the existence of independent residuals or uncorrelated errors. This aspect may be highlighted using the Durbin-Watson test. In our case, d = 1.163410, and the values for dL and dU, for n = 20, are 1.10 and 1.54, generating the situation $dL \leq d \leq dU$, meaning an indecision. The test is inconclusive for 0.05 threshold.

The fifth hypothesis is about independent residuals in relation to exogenous variables. For this analysis, the scatter charts with residuals and exogenous variables are used, showing that there is no relationship between them (see Figure 3).

Regarding the tax variables' influence on economic development and the obtained signs of the coefficients, the results are consistent with the hypotheses. Thus, a direct influence of tax revenues on economic development was expected, and the results underlined positive and statistically significant coefficients.

5. Conclusions

In this paper, the model developed for Romania, for 1995-2014 period, underlined the impact of taxation on economic development. The analysis identified statistically significant relationships between variables. The results suggested that both tax variables (current taxes on income, wealth, etc. and taxes on production and imports) have a statistically significant impact on development, as expected.

Tax policy is an important tool for governments, but there are opinions that a high tax rate could slow development, while a reduction in tax rates could boost it. In the literature, the effect of taxes on economic development is discussed, and the results of studies show that there are various factors of influence. Another goal of this paper is to underline the importance of checking the hypotheses for a regression model. Violations of the hypotheses for a regression model can lead to inaccurate results. Thus, some hypotheses that have substantial benefits for the developed research are presented and checked.

The importance of the topic requires further research and the use of various methodologies. The most difficult aspect of the approach refers to defining the relevant types of taxes to be analyzed in relationship with development.

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