THE PECULIARITIES OF DESIGNING THE FORECAST MODEL OF THE TAX BURDEN

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Abstract

The evaluation of the burden of taxation is a very important indicator influencing both the development of economy and the consumption peculiarities of the business subjects and individuals. However, this indicator is assessed for the past calendar year only. Forecasting methodologies are also not formulated yet. Therefore, this article characterises and distinguishes the gross domestic product which has an essential influence on structuring a forecasting model for the burden of taxation. Whereas, all country's macroeconomical indicators, according to the equation of regression, during the gross domestic product forecasting are evaluated, their influence on the forecasting of the burden of taxation is evaluated too. When the model of tax burden forecasting was created and applied in practice under the circumstances of Lithuanian Republic taxation system, it came to the open that this model allows to evaluate the burden of taxation for next calendar year with the accuracy of 1,66 percent.

Keywords: the burden of taxation, forecasting model, tax return, gross domestic product, evaluation.

Introduction

The current changes made in Lithuanian Republic tax system determine new surveys and discussions - many market experts state that even after fulfilling reform of taxation the economic efficiency will not be achieved. One of the essential aspects needed to be discussed while examining the economic efficiency of taxes is the burden of taxation. Whereas taxes are not associated with the benefit to payer and are judged as a kind of a burden, state has to distribute taxes among the households and business subjects, insomuch, that it could reduce widely spread wealth inequality and to overcome the business depression that strikes Lithuania, as quickly as possible.

Previous surveys conducted by the scholars give the basis to conclude that there is no unified methodology to calculate the burden of taxation yet, and various authors, like E.Buškevičiūtė, V.Meidūnas, D.Meškauskienė, G.M.Pajuodienė ir M.Tvaronavičienė calculate the burden of taxation on the grounds of different methodology, or, simply, give the intuitive evaluation with no reference to calculations. However, all local and foreign scholars agree that solely the budget tax return should be evaluated while calculating the burden of taxation. Though, according to these propositions, the burden of taxation is calculated already from the current budget income received, i. e. for the former or even the previous year. Since the burden of taxation is one of the methods to evaluate the tax system, while planning the efficiency of the tax system reforms it is necessary to evaluate the upcoming burden of taxation that falls both to households and business subjects. In foreign literature, some rudiments about the forecast of the burden of taxation may be found in the book „Empirical foundations of household taxation" by M. M. Feldstein and J.M.Poterba written in 1984. Unfortunately, this source of literature introduces forecasting methodology exclusively for households' tax burden. However, while forecasting the burden of taxation we cannot limit ourselves only to plan the tax return to the national state budget. Many other external factors influencing the burden of taxation must be evaluated. These are macro economical indicators and their particular influence on the extent of the burden of taxation.

The aim of the research is to form the forecasting model for the burden of taxation.

The object of the research – Lithuanian Republic taxing system.

To achieve the aim the following tasks were exercised:

- To examine the methodology to calculate the burden of taxation;
- To determine the factors influencing the burden of taxation;
- To design a forecasting model for the burden of taxation;
- To ground the designed model with statistical methods.

The analysis of the scientific works, economical literature, analytical works, laws of the Republic of Lithuania and other standard acts was carried out and the practice to design the forecasting model for the burden of taxation was performed. Methodology to evaluate the burden of taxation was analysed combining together monographic, logical, statistical analysis methods and comparative approach. To demonstrate the

validity of the designed model to forecast the burden of taxation statistical methods, like regression and correlation, were used.

Scientific research description and results

While creating a forecasting model for the burden of taxation a selection of methodology applied to calculate the burden of taxation is an essential condition. Taxation system is the environment where the infinite number of calculation methods exists, though, it is often forgotten that all the calculations should be provisory and with the exceptions available. These calculations provide the information about the conditional value of the existing taxes; they also reveal whether the burden of the latter is bearable or not.

Scientific literature distinguishes various methods to calculate and to evaluate the burden of taxation. The most widely spread method within the world practice is the tax burden indicator. Regardless the relevancy of the latter, there is no calculation methodology prepared and affirmed in our country. The scientists consider the methodology used by EUROSTAT as the best. With its help, during the calculation of the burden of taxation the taxes paid comprise only the state tax return and taxes paid to various funds:

$$\text{tax burden}, \% = \frac{x_1 - x_2 - x_3 + x_4 + x_5 - x_6 + x_7}{x_8} \times 100, \qquad (1)$$

where:
x_1 – national budget income;
x_2 – non-taxable income;
x_3 – European Union support for the country;
x_4 – compulsory health insurance fund income;
x_5 – state social security fund income;
x_6 – assignats;
x_7 – guarantee fund income;
x_8 – gross domestic product (Ekonomikos ir finansų..., 2007).

This calculation method evaluates exclusively national tax return of the budget and special funds. The value of the calculated tax burden would be even more accurate if various charges, unspecified by the legislation of the Republic of Lithuania, would be also included. However, EUROSTAT method to calculate the burden of taxation is approvingly judged by market reviewers; the principle of this method is applied to calculate the burden of taxation for all the countries in European Union. For this reason, the discussed calculation methodology and its principles will support the designed model of forecasting the burden of taxation.

While trying to apply the widely spread tax return forecasting methods in Lithuania, we meet such problems as continual changes in legislation and peculiarities of them, the phenomenon of tax concealment, the lack of information. These are the biggest handicaps influencing weak correlation (A.Budrytė&E.Mačiulaitytė, 2005). With the reference to Icelandic tax collection forecasting model (which, by the way, is applied in many other economically developed countries), the forecasting of the burden of taxation will be associated with the gross domestic product indicator. Whether it is worth to refer to the experience of the foreign countries, we will examine this using a correlation method. In fact, a very similar research pursuing to forecast the national budget income has already been accomplished, though, according to A.Budrytė and E. Mačiulaitytė, it can not be used in Lithuanian environment. However, the above-mentioned research was carried calculating the correlation between the quarterly gross domestic product and quarterly national budget income. Naturally, the relationship of correlation was low - 0,3 approximately. In my opinion, this happened because a part of the law regulated taxes is collected only during the last quarter of the year - a land tax, for example. Though, collection of these taxes seems not to be meaningful, it still distorts data used in further calculations. When a 10-year-period analysis was made, it emerged that if gross domestic product, national budget and special funds tax return are estimated not quarterly but every single year, the correlation would be very strong – even 0,95866. To validate and to prove the application of this model under the circumstances of Lithuania, the correlation of all the taxes, which comprise the basis of national budget tax return, has been calculated individually (see figure 1.).
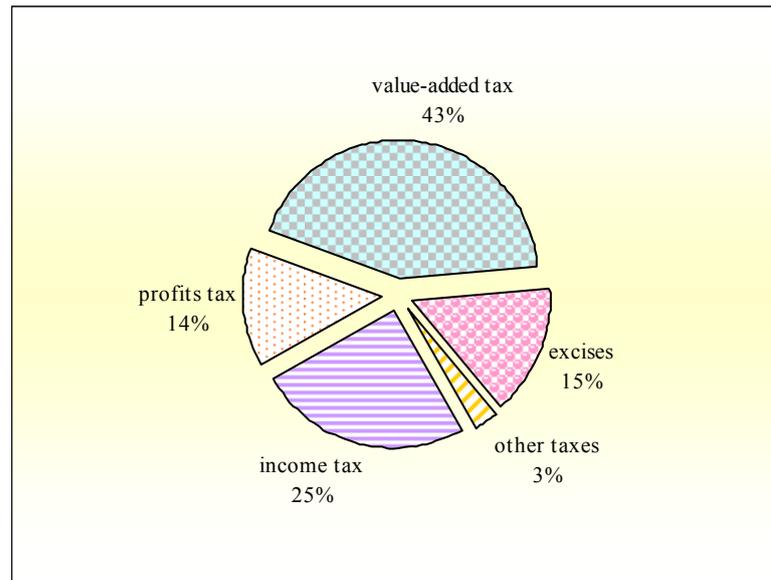
Figure 1. The structure of national budget tax return in 2007

The gross domestic product is not an equivalent combination in the different bases of the taxes paid, therefore, the correlation coefficient value for every tax differs (see table 1).

Table 1. Correlation matrix for the gross domestic product and the main taxes

	Income tax	Profits tax	Value-added tax	Excises	Other taxes	Gross domestic product
Income tax	1					
Profits tax	0,942203	1				
Value-added tax	0,953314	0,94022	1			
Excises	0,956976	0,931833	0,940539	1		
Other taxes	0,931028	0,801985	0,850072	0,89535	1	
Gross domestic product	0,982709	0,946511	0,955639	0,983669	0,900559	1

The correlation of excises in respect of the gross domestic product reaches 0,983669, profits tax - 0,946511, income tax - 0,982709, and the correlation of all other taxes paid is the lowest among the all correlations calculated - 0,900559. However, correlation coefficient of such an extent also proves the strength of the relationship. Thereby, Icelandic model can operate under Lithuanian circumstances, because high level of correlation shows that none of the main taxes raises a problem while forecasting the state budget tax return.

While designing the tax burden forecasting model we will refer to the gross domestic product, whose forecast is influenced by all macroeconomical indicators of the country. Hence, the designed model will evaluate what is the influence of all macroeconomical indicators of the country on the forecasting the burden of taxation.

Lithuanian Republic Ministry of Finance refers to the experience of other countries and uses a universally accepted forecasting model for the gross domestic product. However, the latter appeals more to preconditions than to specific calculations. On the other hand, actually, all forecasts refer to preconditions, except the fact that one forecasting models are more exact than the others. According to methodology used in Lithuanian experience, with the help of the empirical surveys it was determined that the use of consumer, export and import price indices while forecasting the value of state gross domestic product is trivial and they would be valued as zero coefficient in regression equation. For this reason, only the appropriate last year's information will be used for the calculation (not recalculated according to appropriate indices). With the reference to the most widely used and universally accepted in practice gross domestic product calculation model, the regression equation for the gross domestic product forecasting is designed (see formula 2).

$$y = 14228343 + x_1 + x_2 + x_3, \qquad (2)$$

where:

x_1 – balance of the last year export and import into the country, Lt

x_2 – the total of the last year direct foreign investments and gross equity formation, Lt

x_3 – last year consumption inside the country, Lt

In order to prove the validity of this regression equation the forecasted gross domestic product is compared with 10-year-period factual values of this indicator announced by Lithuanian Department of Statistics to the Government of the Republic of Lithuania. The calculated correlation coefficient is equal 0,988309. This proves, that according to the composed regression equation and using factual data from the last calendar year, the gross domestic product value can only be calculated with the accuracy of 3,53 percent.

A question arises – how do we relate the gross domestic product with the state tax return? J. R. King wrote about the tax return forecasting methods. He states, that tax forecasting methodologies are used for performance evaluation, projecting tax revenues and policy analysis. There are different methodologies to estimate and forecast tax revenue. Some of them are:

1. Extrapolation by forecasting revenue assemblage from particular tax by regressing the actual collections against time;
2. Conditional approach which uses the elasticities where the estimated potential tax revenue is based on a tax function where the relationship of the tax collection and the appropriate tax base (explanatory variable) for a particular tax is determined using a simple regression;
3. Macroeconomic models which use regression methods to estimate functional relation between the collection of a particular tax and certain macroeconomic variables;
4. Structure models (especially used for individual income taxes);
5. Integrated forecasting systems or microsimulation models.

Ana Ma.Sophia J.Gamboa states that the second and the third J. R. King's forecasting methodologies are regression procedures wherein the tax receipts are related to the tax base or proxy tax base (mostly the gross domestic product, which is a macroeconomic variable). According to this scientist, with the help of correlation it was proved that the fact of gross domestic product collection has a considerable correlation with the tax return. With the reference to these discoveries, a new regression equation is designed, which, using a forecasted gross domestic product indicator, helps to calculate and to forecast tax income, according to the 2 formula, not only for the national budget but also for special funds, i. e. compulsory health insurance fund, state social security fund and guarantee fund. Using a 10-year-period statistical data a new regression equation was designed (see formula 3).

$$y = -3027572 + 0{,}3x \qquad (3)$$

where:

x – a forecasted gross domestic product calculated using formula 2.

A designed regression equation was applied in practice with the evaluation of a 10-year-period statistical data; it is possible to forecast Lithuanian tax income with the accuracy of 7,25 percent. From the first sight, it may look that it is conditional average size accuracy. Though, we should take into account the fact, that while forecasting the state income the changes in the tax legislation base are absolutely ignored. Since the latter is being changed quite frequently, the calculated relational accuracy value is not as big as it may seem from the first sight. In order to evaluate changes in legislation base, a thorough empirical research in regard to every existing tax in the system of taxation in the Republic of Lithuania should be done.

The designed model allows us to do further research and to forecast the value of the burden of taxation. As it was mentioned at the beginning of the article, it will be evaluated using EUROSTAT calculation methodology. Since the model has forecasted only the state national budget tax income and special funds income, we will not need to subtract the subsidiary nontaxable income, European Union support and subsidies. So, we need to subdivide the forecasted Lithuanian Republic tax income value of the appropriate year from the forecasted value of the gross domestic product of the same year (see formula 4).

$$r = \frac{-3027572 + 0{,}3x}{14228343 + x_1 + x_2 + x_3}, \quad (4)$$

where:

x – forecasted gross domestic product calculated using the 2 formula.

x_1 – the balance of the last year's export and import in to the country, Lt

x_2 – the total of the last year's direct foreign investment and the formulation of the gross capital, Lt

x_3 – last year's consumption within the country, Lt

In order to prove the validity of the designed model, the last year's value of the burden of taxation was forecasted and later compared with the factual value of the burden of taxation (see figure 2)
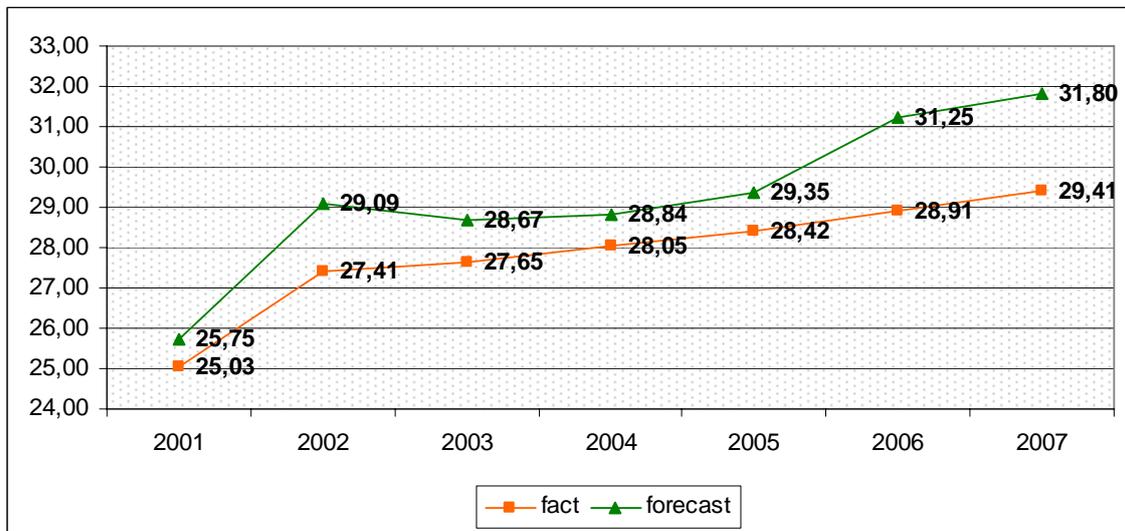

Figure 2. The movement of the burden of taxation and its forecast in Lithuania in 2001-2007

A considerable gap between the factual and the forecasted value of the burden of taxation is in 2002 and 2006. It was determined by many extensive changes in tax legislation base in 2002; and the year 2006 brought us a slump of shadow economy. A successful development of the movement against "the wages from the envelopes" arranged by the Inland Revenue to the Ministry of Finance conditioned a spurt of the income tax into the national budget – a 17 percent increase.

According to data presented in the 2 figure, the calculated correlation value is equal 0,922646. This shows that a strong correlation relationship exists between the value of the burden of taxation calculated with the help of the model and the real burden of taxation. Furthermore, standard accuracy value revealed that it is possible to calculate the value of the burden of taxation with the help of this model with the accuracy of 1,66 percent. Nonetheless, this also proves that the burden of taxation can be forecasted with the help of macroeconomical indicators.

Conclusions

1. The factors, influencing the value of the burden of taxation, both in Lithuania and other countries, may be grouped into: macroeconomical indicators and changes in the tax legislation base.
2. Global practice and research shows that while forecasting Lithuanian (other countries, too) tax return it is purposeful to use country's macroeconomical indicators, and, especially, gross domestic product, because the latter reflects almost all macroeconomical indicators of the country and their changes.
3. When the model of forecasting the burden of taxation was designed and applied practically under the conditions of legislation system of the Republic of Lithuania, it came out that this model allows to evaluate the burden of taxation for the next calendar year with the accuracy of 1,66 percent. Thereby, this model will allow to evaluate the efficiency of the tax system, its forthcoming changes and influence both on households and business subjects ensuring efficient realisation of Lithuanian Republic legislation system reforms.

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