Imitation Model of Optimal Tax Rate for Company

Khatuna Bardavelidze[1], Avtandil Bardavelidze[2]
[1]Georgian Technical University, Tbilisi, Georgia
[2]Akaki Tsereteli State University, Kutaisi, Georgia
[1]*bardaveli_x@yahoo.com*, [2]*bardaveli@yandex.ru*

Abstract— **Presents the actual problems of definition optimal tax rate of company, for which solving is developed imitation mathematical model. On the bases of analyzing economical activities of company is worked out the structural scheme of definition optimal rate of tax payment. The computer model of the system taxation company of the optimal rate for profit is developed by form of block-scheme. With the using of that carried out computer experiment by corresponding program in MatLab. Investigation of results are presented by graphics form that confirms adequate of Laffer's curves. As shows performed research the higher of profitability company, the clearer expressed optimal tax rate. Increasing of profitability reduces optimal rate with 21% and accordingly state can reduce tax rate.**

Keywords— *tax rate; tax payments, profitability; state income; Laffer curves; business control; capital of company*

I. INTRODUCTION

The life each of us depends on the state activities, in which we live and performing social business. It is obvious that any state for realizing their functions needs funds and the sources of such financial resources are the meanings which the state collects from "citizens" in a physical and legal person form.

In the beginning of 80ty years, according to economical theory American scientists high taxation have negative influence on entrepreneurial and investment activities that eventually result is reduction the tax payments. Therefore, it is offering to reduce rate taxations and afford to companies all possible benefits.

According to objective laws A. Laffer's, the rising of taxation rates provide great size of tax proceeds barely to defined moment, but after that further rising of tax rate causes decreasing of business stimulus and thus sum total of tax proceeds from company reduces.

On the basis of Laffer method has been drawn curve that shows, the rate increasing not always rises state incomes. Therefore the government in its tax policy, first of all ought to take care not only about rate increase, but ought to grow producer interest in developing business [1].

II. PROBLEM DEFINITION

In spite of mass taxations, the source of developing business and source of filling taxation in budget in final instance is the profit of company. So we'll investigate only tax rate to the profit.

In real economics, it is impossible to change by law tax rate and to register earnings in the budget every month or year. Thus we will destroy economics. So we hold only modeling.

By computer modeling to investigate inpayments dependence in budget from tax rate to the profit.

The problem of task consists in defining optimal tax rate. Optimal value of rate is to be visually determined by form of graph.

III. MATEMATICAL MODEL

Today, optimal tax rate definition of business firm profit is problem question, for which resolving is largely actual to develop the mathematical model.

In modeling period the sum of tax proceeds from the company accumulates in the budget account and presents by following integral form [2]:

$$B\Delta(t) = \int_{t=tb}^{t=tf} PRF(t) * TXRT * dt ,$$

$B\Delta(t)$ is the sum of incoming funds in the budget from starting of modeling until to the t moment, dollar; t is the current time, year; tf is the final moment of modeling; tb is starting moment of modeling; $PRF(t)$ is received gain of company before paying tax while in t moment, dollar/year; $TXRT$ - the tax rate of profit.

The balance of profit of capitalized company in modeling period:

$$CP(t) = \int_{t=tb}^{t=tf} PRF(t) * (1 - TXRT) * dt .$$

The profit, while in t moment, is

$$PRF(t) = CP(t) * RN ,$$

RN is the return on invested capital that is given as starting data of company.

IV. COMPUTER MODELING

The optimal scheme of defining the optimal tax payment is worked out by us and it's presented at the fig.1, on the which the business block presents the accumulator of private capital. On the input of block displayed *CapF* that is the capital investment. It's the retained earnings after paying tax, which is accumulated by business and increases its private investment. Its computing value is *CapS* - business control. The block of

multiplier provides Prf*F*- the gain flow as the product of *CnpS*-capital of company and *Rntb* - profitability.
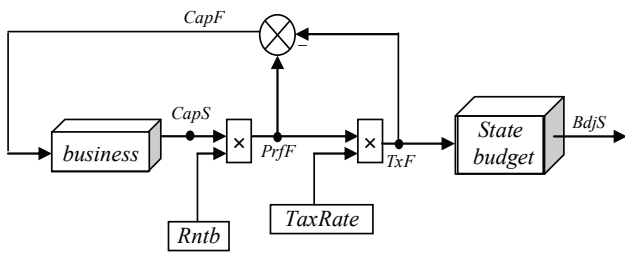

Figure 1.   The structural scheme of defining optimal tax rate

The profitability *Rntb* is given as a vector of experiment plan [0.2:0.2:0.8]. The constant of profitability for automatization of experiment, we can change by variables and control their value from program file. The next block of multiply outputs the product of gain flow to the tax rate, which deducts *FxF* - the profit of state budget. *TaxRate* is also given like the profitability *Rntb* as the vector of experiment [0:0.1:1.0]. In modeling period state budget accumulates *TxF* - tax incomes by form of the variable *Bdjs*. Business and state budget can be described by first order integral - (1/(Z-1)) [2].

From the figure 1, where presented functional scheme of tax rate and the mathematical model, it is possible to compose the system's computer model – SIMULINK as block-scheme, which contents the typical functional blocks of objects and system of control (figure 2). By forms of blocks are presented computer models of calculating mathematical functions. The signs in the blocks represent formulas of analytical expressions of transfer functions.
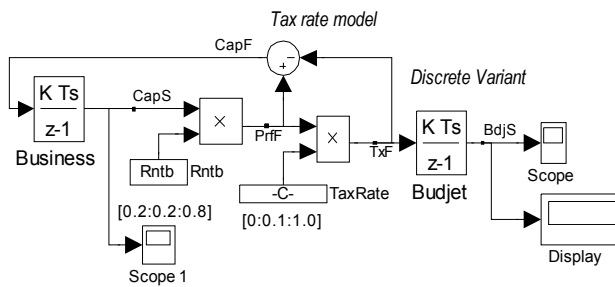

Figure 2.   Block scheme of the system defining of optimal tax rate for the company

The method of solution of stated problem represents to solve deferential equation system of optimal models for developing process of company and accumulating taxation means in budget, by using of standard means MatLab and Simulink [3].

On computer experiments indicates, the meanings of information description is presented *Scope* - graph plotter and *Display* – numbers of indicators, but the means of controlling experiments presents the dialog box of profitability and tax rate constants. Of the planning the experiment and for entirely automatization of developing results is composed the program in MatLab with form of m-file:

```
% Optimal profit tax rate simulation
open_system('TaxRate_Dsc')
TaxRate=[0:0.05:0.7]
for Rntb = 0.2:0.2:1
  sim('TaxRate_Dsc')
  plot(TaxRate, ScopeData(end,2:end))
  hold on
  grid
end
hold off
```

At the figure 3, is presented the graphs of accumulating funds in budget for different meanings of tax rate and at the figure 4 – the graphs of two-factor imitation experiments for different tax rates and profitability.
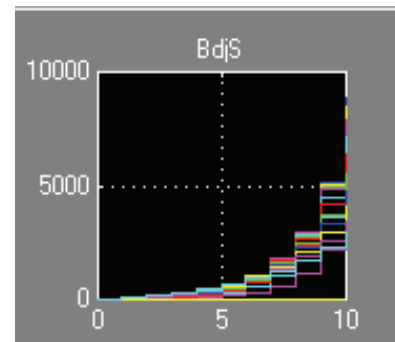
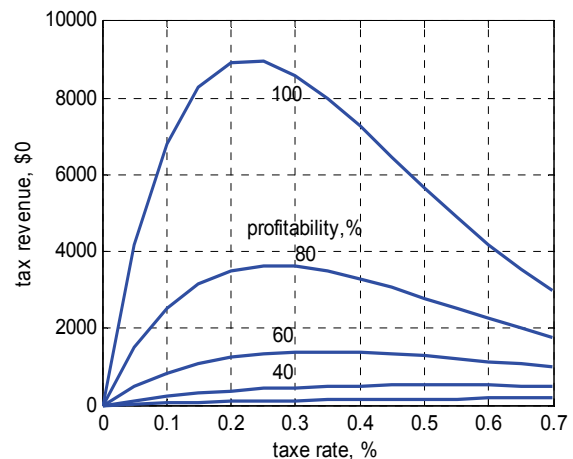

Figure 3.   Accumulating funds in budget

Figure 4.   The graphs of two-factor imitation experiments for different tax rates and profitability

From given curves at the figure 4, they obviously define Laffer curves and permit to fix more accurate relation between tax rate and amount means, which are collected in budget.

V.   Conclusion

As shows performed research the higher of profitability company, the clearer expressed optimal tax rate. Increasing of

Baku, Azerbaijan

profitability reduces optimal rate with 21% and accordingly state can reduce tax rate.

The analyze results of imitation will be unexpected for countries with progressive taxation of super-profit corporation: the higher economic efficiency the more profitable for budget to decrease tax rate. Company with low profitability reasonable to impose with more heavy taxes. It's understood, for young company necessary grace period.

The trouble is that, during taxes lowing can be required time lag. There is important to take in consideration that all related works of tax reduction conduct quickly and efficiently.

REFERENCES

[1] A.I. Dobrinin, L.C. Tarasevich, "Economics Theory," 3rd ed., Sankt-Peterburg: Piter, 2001, 544 p. (in Russian)

[2] N. Snetkov, "Simulation modeling of economical process", tutorial, Moscow: Center of European Public Institute, 2008, 228 p. (in Russian)

[3] O. Beucher and M. Weeks. Introduction to MATLAB & Simulink: A Project Approach, 3rd ed., Hingham, MA: Infinity Science Press LLC, 2008, 404 p.