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Determinants of the Capital Demand in Macedonia: Do Low Tax Rates Really Play an Important Role for Domestic Investment

Ilija Gruevski[a], Stevan Gaber[b*]

[a,b]*Associate Professor at Goce Delcev University, Faculty of Economics, Krste Misirkov St., 10-A, Stip 1200, Republic of Macedonia*

[a]*Email: ilija.gruevski@ugd.edu.mk*

[b]*Email: stevan.gaber@ugd.edu.mk*

Abstract

It is very hard to find strong arguments and dispute the distortionary essence of taxes. They built schools and hospitals but also disrupt the economic efficiency. Ever since the first independence days, the officials in the Republic of Macedonia have tried to solve this "dilemma" in tax policy, initially balancing from higher taxes during the 90-ties to "zero" taxes marking the last decade. Generally, in the focus of the biggest tax reform undertaken in 2006 was the economic efficiency and investment, analogically followed by a period with lower tax rates. Now that we are standing in front of another challenge, since the government announced the new course in tax policy in which higher and progressive taxes are the basic attributes, it is time to answer the question whether the previous "era" of low tax rates have earned the justification of its purpose. Intending to answer this and many other questions, as well as to explore and specify the mechanism of capital formation in the domestic economy, the goal of this paper is to identify and evaluate the factors of capital demand in the Republic of Macedonia, as well as to explore: if the low tax rate policy had any significant role for domestic investment? Based on the concept of the cost of capital from the methodological frame of *METR*, developed by Devereux & Griffith, the tax component was separately examined from the non-tax (economic) component of the cost of capital, in order to quantify their individual contribution on capital stock.

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* Corresponding author.

Considering the results from the analysis, a critical assessment is given on the current set of policy measures as well as recommendations for new investigations in the field of fiscal and tax policy. At the end, who knows to answer the question: are taxes "necessary evil" or "blessing in disguise"?

Keywords: corporate income tax; cost of capital; effective marginal tax rate; personal income tax, investment, capital demand, inflation.

JEL Classification Numbers: H25, H32, D92

1. Introduction

We wouldn't be surprised if we come across another report from the leading professional organizations in which we'll find that the Republic of Macedonia was being promoted as one of the top regional and European countries in the sphere of tax policy. Truly, ever since the independence days, the national tax system has been subject of continuous reforms, especially intensified during the last decade, which is the period when the country became a candidate for EU membership in 2005. If we analyze the reports, we'll notice that one distinguishing feature is the imposition of relatively low (if not the lowest) corporate income tax rate. As a matter of fact, since the accent of the reform was put on the economic efficiency, with intentions to create and sustain better investment environment, the corporate tax rate was primarily lowered from the initial 30%, on 15%, and then from 15% on the actual level of 10%. Motivated by the chronic deficit of capital, the next step of the reform was to create a "consumption-based" corporate income tax system, which is strategically known to be more developing oriented form of corporate taxation. Particularly, this strategic approach means that the corporate income tax burden is excessively targeted to its shares that are intended mostly for consumption, while the parts of income whose purpose is to be saved or reinvested are generally levied with lower burden or eventually exempted from taxation. With other words, the purpose was to effectively switch or redirect the tax wedge from the company (or the profit-investing entity), to the shareholder (the profit-consuming entity). The previous strategy was formally instrumented with the implementation of the Split Rate Corporate Tax System (SRCT), a model of separate taxation of corporate profit, which predicts taxation of the profit distributions and simultaneous exemption of the profit retentions. From all the European countries, this form of corporate tax has only been used in practice in Estonia and Macedonia so far. Another *differentia specifica* of the Macedonian tax system is the application of the proportional "flat" tax rate (until 2019), which was used for adjustment of the corporate and personal income tax base. The income brackets have been removed and only a single (proportional) compulsory tax rate of 10% has been established instead, although the effective tax rate on the various forms of personal income were quite different. As it can be seen, all these transitory measures in the tax policy were aimed to create more efficient business conditions, reduce the cost of investment and boost investment demand. On the other side, government spending registered only gradual increase in its level for most of the observed period, remaining relatively unchanged over the course of time. Significant increase is evident from 2006 until present day, as the previous government introduced and the actual government continued to support the same route of the fiscal policy, which was obviously more expansionary oriented, as the enlarged deficit and public debt were its typical attributions. As a result, public expenditures tripled in size

in a time span of nearly a decade, sharing a major contribution to the expansion of the aggregate demand.[1] Given a preliminary evaluation, the set of programs and measures as described above must be given a preliminary grade, if we follow the guiding steps of any economic textbook. In general, the measures were carefully designed and coordinated and most importantly, aimed to support the investment demand. But what is their individual contribution, their individual impact and relative importance to the capital stock. Intending to answer these and many other questions, as well as to explore and specify the mechanism of capital formation in the domestic economy, the purpose of this paper is to identify and evaluate the factors of capital demand in the Republic of Macedonia. Based on the concept of the cost of capital from the methodological frame of *METR*, developed by Devereux & Griffith, the tax component was separately examined from the non-tax (economic) component of the cost of capital, in order to quantify their individual contribution on investment. Particularly, a special attention is granted to the effect of corporate (business) taxes as they are known as a form of tax with great influence on private investment. Relying on the results from the analysis, a critical opinion is given on the popular set of domestic measures and the urge of new investigations was also apostrophized in the sphere of fiscal and tax policy.

2. Review of the theoretical and empirical literature

The economic theory suggests that there are, in general, two fundamental types of models used to explain investment behavior and the response on changes in tax policy. The roots of the first one lie in the Jorgenson's neoclassical theory of investment [1], which is otherwise known as the user cost theory (or the cost of capital theory). As explained in the next section, this theory predicts that under the condition of a perfect capital market, a profit-maximizing firm will continue to invest in capital up to the point where the marginal product from the employed last unit of capital is equal to the users cost of capital. So, the elements that reduce the cost of capital should in theory stimulate investment and thus capital formation. For example, if the government lowers the tax rates, increases the tax depreciation rates, introduces new tax credit or another tax deduction, or simply if the market conditions lower the interest rate. Right after the popularization of the theory, economists have intended to incorporate the impact of the different liquidity (cash-flow) constraints on investment with introduction of an appropriate variables to the original equation. It was an attempt to overcame the limitation of the user cost theory imposed by the assumption of perfect capital markets, according to which firms can borrow and lend freely in order to reach their optimal capital stock. Practical evidence provided by Schaller [2], prove that in reality asymmetric information and market inefficiencies could indeed create financial constraints problems, „forcing" the firms to rely more on the internal sources of capital, and as a consequence, interrupt the process of capital optimization. The second approach is the q-theory of investment which was originally developed by Tobin [3]. Differently from the user cost theory, the q-theory suggests that an investment should depend on the market value of capital, based on the future streams of profits, relative to its replacement cost. In the focus of this theory is the so-called Tobin's marginal *q*, or the „shadow" to replacement value ratio, which should serve

[1] In the following years the government's support was realized in a form of direct investments in the strategic sectors. For instance, construction was and still is considered as one of the sectors with the highest priorities for the Macedonian government. As an example, we refer to the government's project "Skopje 2014" which was developed for revitalization of the Macedonian capital. The other priorities are the capital investments in infrastructure and energy facilities, which are considered as much more productive investment options. For example, the three highways, couple of regional express roads, and dozens of wind and hydroelectric turbines represent some of the government's actual ongoing investment projects at the moment.

in theory, as an informational indicator for the investment firm. Here, serious disadvantage is the inability for empirical observation of the outlined indicator, upon which the investment decision is made. Considering the previous limitation of the *q*-theory, new empirical investigations were majorly focused on the field of user cost theory, although both of the theoretical foundations were already empirically exploited. Researches on the empirical application of the user cost theory demonstrated mixed results, some of them confirming a strong response, but some of them finding a week insignificant relation between the cost of capital and the capital formation. For example, Chirinko [4] discovered very small connection among investment and the user cost in his study based on macro-investment data with estimates from 0 to -0,3. In an attempt to overcame the aggregation problem which was commonly present within the macro-data time series, Chirinko & Fazzari & Meyer [5] once again found relatively weak response coefficient estimate of -0,25, but this time using firm level micro-data. In their next empirical micro-data-based study, Chirinko & Fazzari & Meyer [6] improved the result of the estimate on -0,4, by extending the horizon and the number of observational units. On the other side, the literature offers many researches with economically significant responsiveness of capital demand relative to cost of capital, regardless the nature of data used. For instance, Iorwerth & Danforth [7] estimated a coefficient of elasticity of -0,97, and Schaller [8] confirmed a similar response estimate of -0,9, based on the use of macro-data time series. Earlier, Cummins & Hasset [9] determined relatively high level of responsiveness of investment to user cost measured -1,15 and Caballero & Engel & Haltiwanger [10] estimated a coefficient of -0,72, this time with application of firm level micro-data. Using the neoclassical model of investment and a difference-in-differences approach, the impact of the tax component of user cost on industry-level investment was separately examined by Parsons [11]. The study discovered that corporate tax reductions led to higher investment with estimates from -0,3 to -0,7. We must notice that many different variations of the user cost model have emerged soon after the Jorgenson's theory, with capacity to capture the impact of corporate taxes on investment, despite the fact that they can be used for other alternative purposes. For example, the theory of the effective marginal tax rates *(EMTR),* which is primarily used to measure and compare the effective marginal tax burden on real investment in fixed capital assets. It was developed by King & Fullerton [12], based on the papers of Jorgenson [13], Hall & Jorgenson [14], and King [15], and essentially, represents a natural extension of the cost of capital approach. According to them, the *EMTR* captures the share of return on a marginal unit of investment which is cut by taxation, and actually, serves as a relevant indicator for the extent of the available tax instruments built in the system. The most important component of the *EMTR* is the "tax wedge" $(\tilde{p} - s)$. Defined as a difference between the investor's rate of return before taxes (the cost of capital) and the saver's rate of return after taxes, it reveals the difference between the preference to invest and the preference to save. Evolving furtherly, the total tax wedge was divided into 2 parts: a) the savings tax wedge and b) the investment tax wedge, according to Leibfritz & Thornton & Bibbie [16]. The first is measured as $(r - s)$ and it represents the effective tax burden on the saver's income. The other is defined as a difference between the investor's rate of return before taxes and the real interest rate $(\tilde{p} - r)$ and it's an expression for the effective tax burden on the investor's capital income. As we can see, in the specter of this measure is the element $\tilde{p}$, which could be used as an alternative definition of the cost of capital also. The point of this paper, although modest and humble, could be viewed as three-dimensional. First, it's the effort to measure the cost of capital with different methodological approach. As previously mentioned, the majority of articles rely on the „overexploited" user cost methodology originated from the Neoclassical Theory of Investment. Here, we attempt to follow a different

pattern and take advantage from one of the available methodologies of METR. Precisely, the cost of capital variable is measured according to the methodological approach from Michael Devereux and Rachel Griffith. With this we remind on the versatile possibilities of this method. Second, this article represents the first research of its kind in the Republic of Macedonia. It discovers the major determinants of the capital stock in Macedonia, and provides economical assessment of the domestic investment policy. It will finally unveil the true economics behind the robustly defended policy of low tax rates, based on scientifically objective evidence. And third, the paper could represent a primer of classical misconception that empirics should blindly follow theory. We have just referred the part of the macro-based studies that failed to detect strong relation between investment and the cost of capital. The main difference is that those cases come from the leading and the most developed countries such as the USA and Canada, both of them with already established strong and mature economies. Our research might present similar results and unusual pathways of the capital stock, but also provides good economic sense and logical explanation. Empirical investigations not always generate uniform results, they could differ from case to case depending on the specific circumstances that occur in the observed country. And these exceptions does not deny the general rule they simply confirm it, according to the old archaic statement *„exceptio probat regulam in casibus non exceptis".*

2. The elements of the cost of capital

First, we would like to determine, identify and explain the elements of the cost of capital $\tilde{p}$. The literature provides many available formulas of the cost of capital, but we choose the construction from Michael Devereux & Rachel Griffith. The methodological frame developed by Devereux & Griffith [17], was proposed in the work: *"The taxation of discrete investment choices",* and it extended the existing concept proposed by King & Fullerton [18]. During the following years [19,20], they refined their approach resulting in a standardized methodology accepted by most of the economic organizations and institutions such as the OECD. They propose the cost of capital $\tilde{p}$ as:

$$\tilde{p} = \frac{[\rho + \delta(1+\pi) - \pi](1-A) + (1+\rho)e}{(1+\pi)(1-t)} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)} - \delta \quad (1)$$

According to it, initially and observed on a pre-tax basis, the user cost of capital includes the opportunity cost of financing capital ρ, the inflation rate π and the rate of depreciation δ:

$$\tilde{p} = [\rho + \delta(1+\pi) - \pi] \quad (2)$$

This term above, which is mainly consisted of economic parameters, demonstrates the fact that the firm will carry out an additional investment up to the level where it is compensated for the opportunity cost of funds (the discount rate ρ) and the cost of replacing depreciated capital δ. The opportunity cost ρ is also known as the shareholders discount rate. Under the conditions of a perfect economy, without inflation and taxes, the opportunity cost is equal to the real interest rate *($\rho = r$),* while with inflation it is identical to the nominal interest rate *($\rho = i$).* Investment in fixed capital assets also requires that the undertaken project generates sufficient revenues to cover the cost of replacing depreciated capital δ. The value of δ, formally known as the true

economic depreciation rate, generally depends on the life expectancy of the investment project i.e. the fixed capital asset. The existence of taxes also affects the cost of capital, and ultimately investment. For example, the corporate tax *t* lowers the after-tax rate of return by factor of *(1 – t)*, therefore the pre-tax rate of return must be compensated for the effect of the corporate income tax and increased by factor *1/(1 – t)*. Concerning the last, and taking the inflation rate into account, the value of the cost of capital becomes:

$$\widetilde{p} = \frac{[\rho + \delta(1+\pi) - \pi]}{(1+\pi)(1-t)} \quad (3)$$

There is widely accepted practice to apply different depreciation rates and methods for tax purposes. Generally, the categorization of an investment project could be determined from the tax depreciation allowances for each different group of assets. It reflects the level of incentives incorporated in the domestic depreciation system. The intensity of the available incentives depends from the relation between the established depreciation rate for tax purposes and the real economic depreciation rate. Usually, when a certain group of assets is tax preferred, the applied depreciation rate is higher than the real economic depreciation rate, thus generating higher net-present value of the tax depreciation allowances. The method of depreciation is also important since different methods result with different net-present values. For example, there are several methods of depreciation frequently used in practice such as the declining-balance method, the inclining-balance method or the straight-line depreciation method. The value of *A* decreases the cost of capital by factor *(1 – A)*, so we may write:

$$\widetilde{p} = \frac{[\rho + \delta(1+\pi) - \pi](1-A)}{(1+\pi)(1-t)} \quad (4)$$

Sometimes, the companies are levied with other forms of taxes such as the real estate tax, especially if the investment is carried out in some kind form of immovable property (buildings, structures, facilities etc.). Although it is not very common, the real estate tax which is also known as the property tax, could be applied even in some specific cases of investments in movable property, particularly when the market value of the certain asset is considered very high (trucks, vessels etc.). Actually, the real estate tax e represents an additional cost for the company, and eventually should increase the firm's pre-tax rate of return. If we integrate to the value of the cost of capital, it will become:

$$\widetilde{p} = \frac{[\rho + \delta(1+\pi) - \pi](1-A) + (1+\rho)e}{(1+\pi)(1-t)} \quad (5)$$

We must notice that the process of corporate taxation does not finish here since the corporate income tax base (i.e. the corporate income) cannot be limited only at the corporation observed as a form of a legal entity. Usually, after the initial taxation at corporate level, corporate profits are distributed to the shareholders in a form of dividends, capital gains or interest payments, and are subject to additional taxation at personal level. Consequently, the effects from corporate taxation, very often depend on the cross-effects from the personal taxation. Besides the previous, there is another problem involved here also, and that is the choice of the sources of finance. Specifically, the value of the cost of capital could be affected if different forms of capital are used to

finance the investment project. For example, it is commonly accepted that debt has privileged treatment as a source of finance, as a result of the usual and widely accepted treatment of interest expenses as a deductible item on the corporate income tax base. As a result of that, debt is considered as tax preferred as compared to equity. There is a difference even between the two alternative forms of equities such as the newly issued shares and the retentions. For example, because capital gains are usually taxed upon realization or eventually exempted from taxation when reinvested, it is often thought that equity accumulations are superior source of finance over the external sources of equities from the taxpayer's point of view. There is a fine solution for these problems concerning the value of the cost of capital within the Devereux & Griffith approach. First, in order to express the effect from the personal taxes (i.e. the double taxation effect), the authors introduce the so-called tax discrimination variable γ. Second, for the purpose to evaluate the effect from the different sources of finance, they exploit the so-called financial constraints variable F. By adding them in expression (5), the cost of capital becomes:

$$\tilde{p} = \frac{[\rho + \delta(1+\pi) - \pi](1-A) + (1+\rho)e}{(1+\pi)(1-t)} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)} \quad (6)$$

One of the most important variables introduced in this methodology is the tax discrimination variable γ, which is used to measure tax discrimination between the alternative forms of equity. If we consider m^d to be the personal tax rate on dividend income, z the effective personal tax rate on capital gains and c the tax credit rate allowed for dividends paid, then the value of γ is measured as:

$$\gamma = \frac{(1-m^d)}{(1-z)(1-c)} \quad (7)$$

It is interesting to note that in absence of personal taxes, since $z = m^d = 0$, this expression automatically yields for $\gamma = 1$. But, in presence of personal taxes it could generate value lower than *1* ($\gamma < 1$) thus making the new equity more tax discriminated as compared to the retentions, or a value higher than *1* ($\gamma > 1$), with the meaning of *vice versa*. Personal taxes also affect the value of the shareholders discount rate. If we consider m^i as the personal tax rate on interest income, the opportunity cost of finance becomes:

$$\rho = \left(\frac{1-m^i}{1-z}\right) i \quad (8)$$

One caution should be taken in consideration here. The term in the equation z, is known as the effective personal capital gains tax rate or with other words, accruals-equivalent capital gains tax rate, which is different from the statutory capital gains tax rate z^*. It is defined as:

$$z = \frac{\lambda z^*}{\lambda + (1-m^i)i} \quad (9)$$

The expression explains that the value of effective capital gains tax rate depends from the personal tax rate on

interest income m^i, the statutory capital gains tax rate z^* and the proportion of accruals-equivalent capital gains income λ. As it is already introduced above, the financial constraints of investment F depend largely on the source of finance [21]. For example, in the case of reinvestment of retained earnings, the project is financed by a reduction in dividend payments in the current period n, hence debt and equity issues are unaffected. This implies F_{RE} to be zero. When there is a case of new equity finance, then the firm issues new equity in the current period n of $1-\varphi t$. This means that a physical investment of 1 can be covered since an immediate tax allowance of φt can be claimed. The financial constraints for the new equity issues F_{NE} are expressed as:

$$F^{NE} = -\frac{\rho(1-\gamma)(1+e)}{(1+\rho)} \quad (10)$$

where the negative prefix indicates that the company repurchases the new equity in the following period $n+1$ at the original price. In the case of debt financed investment, the company borrows $1-\varphi t$ in the current period n, and must repay the debt including the interest i in the next period $n+1$, hence the financial constraints F_{DE} of the project are calculated as:

$$F^{DE} = \frac{\gamma(1+e)(\rho - i(1-t))}{1+\rho} \quad (11)$$

There is only one more thing to include in the expression for the cost of capital. According to the relevant methodology, the cost of capital (or the pre-tax rate of return on the marginal investment project) is defined as net of depreciation, so we may extend the expression to its final form accordingly to term (1). At the end of this section, we would like to recapitulate the reasons of the choice of the Devereux & Griffith methodology. *First*, it is an internationally acknowledged method for measuring of the effective tax burden on company's income. Although its primary use is for comparative purposes, it could be applied for the purpose of this research as well. *Second*, its extensive nature allows for the user to capture every aspect of the tax reform within a single rate of the cost of capital: the corporate tax rates, the personal tax rates, tax cuts and tax credit rates, the tax allowances etc. Therefore, it could serve as an excellent mean for an integral analysis for the impact of taxes on the investment behavior of the firm. *Third*, it has the properties to effectively evaluate the impact from the different sources of capital and their financial constraints on the value of the cost of capital (for example, some of the available methodologies, have a serious handicap concerning this issue). And *fourth*, and most important, it employs the methodological advantage for the researcher to separate the effects on the investment and capital accumulation that arise from changes in the tax policy aside from the effects generated by changes in the economic parameters.

3. The regression model

We already presented our intention to examine the impact of taxes on investment demand in Macedonia, based on the theoretical concept of the cost of capital. According to its logic, the demand of capital is expressed as a function of the user cost of capital, suggesting that a company with a single type of capital will maximize profits by choosing the value of capital in the observed period K_t, up until the marginal product of capital equals the

cost of capital at the same period $p_t^{\sim}$:

$$f^{1}(K_t) = \widetilde{p}_t \quad (12)$$

The Cobb-Douglas production function with the capital as a single factor of production is defined as:

$$Y_t = A_t K_t^{\alpha} \quad (13)$$

where Y_t is the total output in period t, A_t is the capital productivity factor in period t, K_t is the value of capital input in period t, while α is the output elasticity of capital. Assuming that the productivity factor is determined by the cost of capital in the current period and that the coefficient of elasticity equals one, gives:

$$K_t = \frac{Y_t}{\widetilde{p}_t} \quad (14)$$

And applying the natural log equation in (14) results in:

$$ln(K_t) = ln(Y_t) - ln(\widetilde{p}_t) \quad (15)$$

indicating on the inverse relationship between the capital stock and the cost of capital. We must notify that it wouldn't be straightforward possible from this equation to examine whether the investment demand reacts to changes in tax policy, changes in the economic parameters or a combination of both. In order to identify and separate the impact of taxes on investment, our equation is decomposed into its tax and non-tax (economic) components. For that purpose let $[\rho + \delta(1 + \pi) - \pi] = E$, so that the equation of the cost of capital is rewritten and decomposed to:

$$\widetilde{p} = \frac{E(1-A)}{(1+\pi)(1-t)} + \frac{(1+\rho)e}{(1+\pi)(1-t)} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)} - \delta \quad (16)$$

Next, if the right-hand side of the expression above is multiplied by factor E/E, it will result in:

$$\begin{aligned} \widetilde{p} &= \frac{E(1-A)}{(1+\pi)(1-t)} + \frac{(1+\rho)e}{(1+\pi)(1-t)}\frac{E}{E} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)}\frac{E}{E} - \delta\frac{E}{E} \\ \widetilde{p} &= E\left[\frac{(1-A)}{(1+\pi)(1-t)} + \frac{(1+\rho)e}{(1+\pi)(1-t)E} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)E} - \frac{\delta}{E}\right] \end{aligned} \quad (17)$$

Taking the natural *log*, and transforming back the value of E we have:

$$ln(\tilde{p}) = ln(E) + ln\left[\frac{(1-A)}{(1+\pi)(1-t)} + \frac{(1+\rho)e}{(1+\pi)(1-t)E} - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)E} - \frac{\delta}{E}\right]$$

$$ln(\tilde{p}) = ln[\rho + \delta(1+\pi) - \pi] + ln\left[\begin{array}{l}\frac{(1-A)}{(1+\pi)(1-t)} + \frac{(1+\rho)e}{(1+\pi)(1-t)[\rho + \delta(1+\pi) - \pi]} \\ - \frac{F(1+\rho)}{\gamma(1+\pi)(1-t)[\rho + \delta(1+\pi) - \pi]} - \frac{\delta}{[\rho + \delta(1+\pi) - \pi]}\end{array}\right] \quad (18)$$

The first term of the right-hand-side in the equation above gives the *log* of the cost of capital without taxes. This is the "non-tax" component of the cost of capital $NTCp^{\sim}$, which is mainly determined from the basic economic parameters. On the other hand, the second term gives the *log* of the investment tax wedge, or the *log* difference between $p^{\sim}$ and $NTCp^{\sim}$. This element is the "tax" component of the cost of capital $TCp^{\sim}$, generally composed of the various tax parameters, although the economic parameters are still present with much smaller interference within the tax variable. So, we may write:

$$ln(\tilde{p}) = ln(NTC\tilde{p}_t) + ln(TC\tilde{p}_t) \quad (19)$$

To illustrate the effect, we take the first differences of the previous equation and add time subscripts:

$$ln(\tilde{p}_t) - ln(\tilde{p}_{t-1}) = [ln(NTC\tilde{p}_t) - ln(NTC\tilde{p}_{t-1})] + [ln(TC\tilde{p}_t) - ln(TC\tilde{p}_{t-1})] \quad (20)$$

Which is approximately:

$$\frac{\Delta\tilde{p}_t}{p_{t-1}} = \frac{\Delta NTC\tilde{p}_t}{NTC\tilde{p}_{t-1}} + \frac{\Delta TC\tilde{p}_t}{TC\tilde{p}_{t-1}} \quad (21)$$

Equation (21) clearly illustrates that the percent change in the component of $TCp^{\sim}$, is equal to the percent change in $p^{\sim}$ predominantly influenced by the changes in the various tax variables.

If we integrate (19) in (15), the proposed econometrical model finally becomes:

$$ln(K_t) = \alpha + \alpha_1 ln(Y_t) + \alpha_2 ln(NTC\tilde{p}_t) + \alpha_3 ln(TC\tilde{p}_t) + \alpha_4 Tinf_t + \alpha_5 Tcr_t + \varepsilon_t \quad (22)$$

where $Tinf_t$ represents the inflation time specific dummy variable, while Tcr_t the financial crisis time specific dummy variable respectively. These exogenous variables are added to the system's model to capture the effect from the external shocks, such as the inflation and the crises on the flows of capital stock. Their justification is due to the fact that before two decades the country was hit by massive inflation and also was not overpassed by the latest international financial crisis. In this model, $Tinf_t$ is defined 1 if the average inflation rate of the particular year exceeds 8% (1993, 1994, 1995 and 2008), otherwise 0, and Tcr_t has value of 1 only for the period when the financial crisis was most influential in the country (2008, 2009, 2010), otherwise 0.

4. The time series data

For the purpose to construct the required data for the time series analysis, a substantial amount of information was acquired. In this particular case, the data set consists of the Macedonian nominal *GDP*, gross fixed capital formation (expressed at nominal values), real net capital stock, and the cost of capital. The official macro-data was collected on a yearly basis, generally from the State Statistical Office, the Ministry of Finance and the Central Bank of the Republic of Macedonia. Additional calculations were conducted as well, in order to measure the true factual value of the cost of capital. The observed time horizon is from 1993 to 2018, which means from the point when the first tax code was introduced after the independence, trough the period of transition (1993-1999), the conflict year (2001), the period of macroeconomic stability and growth (2002-2007), the period of the financial crisis (2008-2010), and finishes at the point of year 2018. In this section we elaborate in brief the choice, collection and derivation of the different time series data elements, presented in annex from below. The values of the ***nominal GDP***, or the output Y_t is the first independent variable in the regression model as shown in Table 5. The nominal data for the ***gross fixed capital formation*** I_t is presented in Table 7. According to the National Investment Expenditure Accounts, gross fixed capital formation is divided into three principal types of investment expenditures: structures (or buildings), machinery and equipment and other (which is mainly formed by investment in intangible assets). Investment in industrial structures[2] is a key variable in the macroeconomic system. It tends to be cyclical, as business investment in structures tends to lag the business cycle, largely because of its long-term nature involving major contractual commitments. Investment in machinery and equipment[3] is also a key component of the gross fixed capital formation, known to be highly responsive to tax changes. It enhances productivity and potential output and contributes to the economic growth. It is also one of the more cyclical components of *GDP*. Namely, in expansions and strong profit generating periods, the business sector considers to modernize or increase its capacity either by purchasing new equipment or by improving the existing machinery to meet the growing demand. In addition, since a large proportion of the investment goods are imported, machinery and equipment have a substantial impact on the merchandise trade balance. The third component generally consists of the capital expenditures in intangible assets, such as patents and capital expenditures in R&D. The method used to construct the ***capital stock*** K_t from the available investment flow data is described as the perpetual inventory equation:

$$K_t = (1-\delta)K_{t-1} + I_t \qquad (23)$$

According to Hall & Scobie [22], the perpetual inventory method takes into account the continual additions to and subtractions from the stock of capital as new investment and retirement of old capital take place. The problem with this method is the absence of relevant data for the initial capital stock value, which is usually solved with estimation. One available approach that could be used for the purpose is proposed by Caselli [23]:

$$K_0 = \frac{I_0}{g+\delta} \qquad (24)$$

[2] Government expenditures in structures are also included here.
[3] Government expenditures in weaponry are excluded here, since they are considered as government consumption expenditure.

where I_0 is the value of the investment in the first year of the time series available, δ is the depreciation rate and g is the growth rate for the investment series. In our case, the depreciation rate δ is the arithmetic mean of the weighted average economic depreciation rate estimeted at 9,28% or 0,0928. One available approach to estimate the growth rate g is through the annual geometric growth rate measured as:

$$g = \sqrt[n]{g_1 \times g_2 \times ..... \times g_n} - 1 \quad (25)$$

where the annual time specific growth rate g_t is defined as:

$$g_t = 1 + \frac{I_t - I_{t-1}}{I_{t-1}} \quad (26)$$

The values of g_t produce an average annual value for g of 0,1257. According to this, the initial value of the capital stock at the starting point of the observed period is estimated at 50.316 million of denars. The series of the capital stock data, which will serve as the dependent variable in the multiple regression analysis is presented in Table 5 from the annex below.**The cost of capital data.** Many informations had to be assembled about the parameters concerning the cost of capital. They include: the rate of inflation, nominal interest rate, true economic depreciation rate, shareholders discount rate, net-present value of tax depreciation allowances, corporate income tax rate, real estate tax rate, personal income tax rate on dividend income, personal income tax rate on interest income, statutory capital gains tax rate, effective capital gains tax rate, tax credit rate on dividend income (the imputation rate), tax discrimination variable and the financial constraints variable. The data for the ***annual average rate of inflation*** π_t and the ***nominal interest rate*** i_t is available in Table 8. It is interesting to note that during the transition period, the Macedonian economy suffered from hyperinflation especially in 1993 and 1994 when the annual inflation rate was registered at 349,8%, and 121,8% respectively. The nominal interest rates are actually the average annual bank interest rates paid on deposits, which determine the discount rate and play the role of the investor's opportunity cost. High inflation left its marks on nominal interests also, launching them at the level of 483,8% in 1993 and 118,5% in 1994. The ***real economic depreciation rate*** δ_t is defined as a constant exponential rate of depreciation of a single fixed capital asset, approximately measured as 2/L [24]. The purpose is to express the normal productive consumption of the capital asset over its normal economic life. Here, we would not use the described approach for the purpose, but in the spirit of the Devereux & Griffith methodology we'll assume that the economic rate of depreciation for the buildings is 3,1%, for the machinery and equipment 17,5% and for the intangibles 15,35. Next, **the relevant tax parameters** are referred from the following Table 1. Symbol *t*, represents the ***nominal (statutory) corporate income tax rate*** and *e* the ***real estate tax rate***, both payable in the period in which the investment is undertaken. The *CIT* rate at the beginning of the observed period was established at 30% and in 1996 was reduced at 15% which was in force until 2006. Then, a rate of 12% was implemented in January 2007, in 2008 the rate was additionally reduced at 10% and in 2009 a *split corporate income tax rate*[4] was implemented, which was in force until the end of 2014. The purpose of this reform, influenced by the chronic deficit of capital, was to develop a consumption-based corporate tax system needed to support the economic growth in future. The real estate tax rate (or the property

[4] See Paragraph 01 from the annex below.

tax rate) in Macedonia, is usually applied for the legal entities only in case of acquiring building structures with a rate of 0,1%. This rule in the Macedonian tax legislative was not familiar until 2008. The data for ***the personal income tax rates*** shows that the *tax rate on interest income* m^i was 0 during the whole period. *Mandatory capital gains tax rates* were 23% in the period 1993-2000, 15% in the period 2001-2006, 12% in 2007 and 10% in the period 2008 to 2012. Until the year of 2000, the code allowed 50% deduction on the capital gains tax base, effectively decreasing the mandatory capital gains tax rate at 11,5%. After that, this deduction was reduced to 30%, resulting with effective mandatory rates of 10,5% in 2001-2006, 8,4% in 2007 and 7% in the period 2008-2012. In 2013, the rate was abolished ($z^* = 0$). The proportion of *accruals-equivalent capital gains income* λ assumes constant value of 10% (0,1), meaning that corporate shares have a mean holding period of ten years [25]. The *effective capital gains tax rate* and the *shareholders discount rate* measured according to (8) and (9) are presented in Table 8. In Macedonia, the *statutory personal tax rate on dividend income* m^d was 23% in the period 1993-2000 and 15% in the period 2001-2006. After that, the rate was established at 12% in 2007 and at 10% in the period 2008 to 2014. From 1996 up until 2006, the *imputation corporate tax system*[5] was in force allowing a tax credit or alternatively, an imputation rate on dividend distributions in amount of 50% from the personal income tax liability. Considering that the adequate mandatory liability rate from 1996-2000 was established at 23%, the effective tax credit rate c was equal to 0,115 (0,23 * 0,50 = 0,115), and the rate of 15% in the period 2001-2006 produced value for c of 0,075 (0,15 * 0,50 = 0,075). It is worth to mention that the new government has increased the mandatory personal income tax rates on capital income from 10% to 15% in 2019. Also, a progressive tax brackets on personal income has been introduced: one from 10% on the income from 0 to 1.500 euros, and the other from 18% on the difference above 1.500 euros. The newest tax code derogations are not included in the calculations because they overlap the observed time horizon.

Table 1: Relevant domestic tax parameters in period 1993-2014

Tax parameter:		**Rate**
Capital allowances (straight-line method):	φ	
- industrial buildings (L=28,57 years)		3,5%
- equipment (machinery) (L=6,66years)		15%
- intangibles (L=5 years)		20%
Corporate tax rate (mandatory)	t	
(1993-1995, 1996-2006, 2007, 2008, 2009-2014, 2014-2018)		30%, 15%, 12%, 10%, 0%,10%
Split corporate tax rate on distributions (2009-2014)	t^d	10%
Personal tax rates (mandatory):		
- interest income (1993-2014)	m^i	0%
- dividends (1993-2000, 2001-2006, 2007, 2008-2018)	m^d	23%, 15%, 12%, 10%
- capital gains	-	
(1993-2000, 2001-2006, 2007, 2008-2012, 2013-2018)		23%, 15%, 12%, 10%, 0%
Deduction on capital gains tax base (1993-2000, 2001-2012)	-	50%, 30%
Effective mandatory capital gains tax rate	z^*	
(1993-2000, 2001-2006, 2007, 2008-2012, 2013-2018)		11,5%,10,5%, 8,4%, 7%, 0%
Proportion of accruals-equivalent capital gains income	λ	10%
Tax credit rate on dividends paid (1996-2000, 2001-2006)	c	11,5% 7,5%,
Real estate tax rate (property tax rate) (2008-2018)	e	0,1%

[5] See Paragraph 02 from the annex below.

Source: Ministry of finance.

In column Table 9, the values of ***tax discrimination variable*** γ are measured from equation (9). In column 6 the values of γ are additionally adjusted for the effect of the split rate system according to the rule:

$$\gamma_{SR(2009-2014)} = \frac{(1-t_d)}{(1-t)}\gamma = \frac{(1-0{,}10)}{(1-0)}\gamma = 0{,}90\gamma$$

A few words about the ***tax depreciation allowances*** *(parameter A)* calculated from equation (27) or (28). The capital allowance rates (depreciation rates for tax purposes) are determined from the Nomenclature of depreciation of capital assets issed by the Ministry of Finance. The rate for the buildings is 3,5%, for the equipment (machinery) 15% and for the intangibles 20%, expressed as equally weighted average rates. Although the tax code recognizes all of the standard depreciation methods and gives an opportunity for the specific functional method, the Ministry of finance recommends only the straight-line method. In addition, we present the general expression for the straight-line depreciation method:

$$A = t\phi\left\{\left(\frac{1}{1+\rho}\right)+\left(\frac{1}{1+\rho}\right)^2+\ldots+\left(\frac{1}{1+\rho}\right)^L\right\} \quad (27)$$

or alternatively:

$$A = t\phi\frac{(1+\rho)^L-1}{\rho(1+\rho)^L} \quad (28)$$

where L is the length of the depreciation period (expressed in years), t is the CIT rate, ρ is the discount rate and φ is the depreciation rate for the particular capital asset allowed for tax purposes. In Devereux-Griffith methodology, the ***financial constraints variable*** *(parameter F)* is especially designed to capture the influence of different varieties of finance. It is irrelevant only for the retentions ($F_{RE} = 0$). The other values, for external debt (F_D) and new equity issues (F_{NE}) are measured according to (10) and (11). The ***non-tax (economic) component of the cost of capital*** $NTCp_t^{\sim}$, presents the second independent variable in our regression model. It is calculated according to the equation (2). First, this parameter is evaluated separately for each group of assets and after it is integrally assembled, as shown in Table 10, according to the average participation of the individual group. The ***tax component of the cost of capital*** $TCp_t^{\sim}$ is calculated separately for the buildings in Table 11, for the machinery and equipment in Table 12 and for the intangibles in Table 13. It was assumed for that purpose, in the spirit of the referred methodology, that the hypothetical investment project follows a financing strategy of 3 (three) different alternative sources of finance, all of them weighted equally (1.debt from external lenders; 2.new equity capital; and 3.retained earnings.). The overall values of the variable $TCp_t^{\sim}$, which represents the third independent parameter in the regression model, are measured in Table 14, according to the average structure of

investment during the observed period.[6] The formula used to calculate the variable of $TCp_t^{\sim}$ comes from term (18).

5. Interpretation of the results from the empirical research

Before we disclose the results from the empirical research, all the statistically relevant tests were performed in order to confirm the econometrical validity of the chosen multiple regression model. As already mentioned, the model is based upon the traditional concept of the "cost of capital" approach, which was recently modified and adopted by Devereux & Griffith. Indeed, the statistical analysis of the presented model confirms its formal validity, since all the formal assumptions are generally satisfied. Specifically, the time series residuals manifested zero mean value and normal distribution, they proved not to be autocorrelated nor heteroscedastic, while the residuals by themselves were not also correlated with the independent variable from the main equation. A unit root test determined that the data set was stationary, on the other hand, the instrument variables test confirmed that all the elements in the systematic equation were endogenous. The joint significance of the only two exogenous dummy variables was also detected appropriately.

Table 2 presents the OLS regression results using the annual macrodata over the period 1993 to 2018, accodring to equation (22). As we can see, all of the coeficients are statistically signifficant.

Table 2: OLS regression results

SUMMARY OUTPUT								
			ANOVA					
Regression Statistics				*df*	*SS*	*MS*	*F*	*Significance F*
Multiple R	0.997143		Regressio	5	17.71868	3.543736	697.068	1.029E-21
R Square	0.994294		Residual	20	0.101675	0.005084		
Adjusted R	0.992868		Total	25	17.82035			
Standard E	0.071301							
Observatic	26							
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	-5.80688	0.404476	-14.3565	5.39E-12	-6.65061	-4.96316	-6.65061	-4.96316146
Y	1.846741	0.050659	36.45405	9.11E-20	1.741068	1.952415	1.741068	1.95241494
NTCp	0.571486	0.04895	11.67483	2.21E-10	0.469378	0.673595	0.469378	0.67359471
TCp	-0.11396	0.023703	-4.80773	0.000107	-0.1634	-0.06451	-0.1634	-0.0645132
Tinf	-0.26388	0.062484	-4.22319	0.000417	-0.39422	-0.13354	-0.39422	-0.13354222
Tcr	-0.17866	0.05369	-3.32758	0.003357	-0.29065	-0.06666	-0.29065	-0.06666165

Source: Author's calculations.

[6] The problem with the transformation of the negative values of $TCp^{\sim}$ was solved by adding a constant to the originally measured values of the tax wedge. This approach is practical since it doesn't affect the linear relationship between the regressor and the dependent variable. The constant *c* was defined as: $c = 1 - TCp^{\sim}_{lowest}$.

The biggest contribution for the process of capital accumulation in Maceodnia comes from the ***output.*** Interpreted with numbers, *1% increase in GDP (Y), results with 1,84% increase in capital stock (K)*, indicating on the presence of high and positive correlation. In transitional economies such as the Macedonian, the expansion of income (the aggregate demand) still remains the main driver of the investment process, suggesting on *the strong influence of the income accelerator*. From this point of view, the expansion of goverment's spending policy (especially in the terms of capital expenditures) seems quite sensible. On the other side, the causal relationship between the capital stock and the ***tax component of cost of capital*** is marginal: *1% decrease of the investment tax wedge leads to only 0,11% increase in capital accumulation!* This finding points to the fact that the curve of domestic capital demand is trully inelastic to changes in tax policy and therefore, elusive in nature. Compared to the countries, where the level of tax rates is an issue of a higher relevance for private investment, we can not generalise the same for Macedonia. One reason for that might be the diffrence in the average level of taxation. In the countries with high tax burden, where taxes represent a signifficant share of the price of capital, tax cuts and other tax releifs could indeed lower the the cost of future investment. Percieving the eased conditions of the investment environment, business entities react much stronger on tax derogations. Quite oposite from this is the situation in the RM. The average level of business taxation in the country was relatively low during the transitional period, so the tax related factor was not concidered as obstacle for the investment decision. The fact that *capital accumulations are inelastic to taxes*, raises the question if the government's extreemly low tax rate policy is economically justified. Further reaserch is inevitable, focusing on the tax policy cost-benefit analysis, in a sence of what are the investment increments against the tax revenue loss. If the investigation finds insufficient incremantals of investment and signifficant loss on the tax revenue account, than the actual tax policy may be not longer sustainable. In this case, the policy of higher tax rates might be much plausible option for the authorities to consider, having in mind the small level of responsiveness of the investment demand. We must calculate with the possibility that the *economic parameters imbedded in the tax component variable* are influencing the elasticity estimates. To ensure this, all economic parameters used in calculation of the investment tax wedge were fixed for the entire sample period and the regression was re-estimated. The economic parameters were held at the level in accordance with the Devereux-Griffith assumptions: real interest rate of 5%, inflation rate of 2% and nominal interest rate of 7,1%. Since the inflation rate was established at very low level, the inflation time specific variable *Tinf* was excluded from the model this time:

$$ln(K_t) = \alpha_0 + \alpha_1 ln(Y_t) + \alpha_2 ln(NTCp_t^{\sim}) + \alpha_3 ln(TCp_t^{\sim}) + \alpha_4 Tc_t + \varepsilon_t \qquad (29)$$

Not surprisingly, the impact from the $TCp^{\sim}$ estimate was quite severe: *1% decrease in tax wedge was associated with 1,01% increase in capital stock*. The estimated coefficient of elasticity of unity indicates that the level of reaction of capital demand on tax changes is 10 times stronger when the economic parameters are *held constant*. This gives a clear picture of the turbulence and the level of instability in the economic environment of the near past in Macedonia, and how intense was its influence over the true observational values.

Table 3: OLS regression results with fixed economic parameters in the tax component variable

	Coefficients	tandard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95,0%	pper 95,0%
Intercept	-2.75506	1.49786	-1.83933	0.083398	-5.91526	0.405151	-5.91526	0.405151
Y	1.877561	0.078123	24.03337	1.46E-14	1.712736	2.042386	1.712736	2.042386
NTCp	0.544985	0.061528	8.85744	8.88E-08	0.415171	0.674798	0.415171	0.674798
TCp	-1.01078	0.336591	-3.00298	0.008004	-1.72092	-0.30063	-1.72092	-0.30063
Tcr	-0.14016	0.06053	-2.31548	0.03334	-0.26786	-0.01245	-0.26786	-0.01245

Source: Author's calculations.

As far the coefficient of ***the non-tax component*** is concerned, we my say that there's some „unexpected" level of economical controversy conected to it. As we can see from the Table 2 the sign is positive contrary on the economic theory: *1% increase in the level of the NTCp˜ yields with 0,57% increase in capital stock!* It is logical to ask the qusetion, how it is possible that higher costs could lead to higher investment. One technical explanation could be the fact that we actually separated the cost of capital into two parts applying the *log* equations. To confirm if the estimate of overal „undivided" cost of capital variable is more theoretically consistent, a separate regression was run, where the observations of the cost of capital were expresed integrally. The result presented in Table 4, supports the previous explanation: *1% decrease of the cost of capital, produces an insignifficant 0,045% increase in capital stock* - which is near the simple product of the two separate coefficients (-0,11 x 0,57 = -0,063). Another more logical explanation is simply the fact that the theory of the cost of capital *does not find any empirical evidence* in the case of Macedonia i.a. the capital demand curve is trully elusive. In transitional countries, whose economies suffered devastating consequences from the transitional process in which hyperinflation and „insider" privatization reduced the national output below it's historically projected long-term line, investment and capital accumulation were guided by different rules. With other words, the domestic capital market persisted in a state of „structural disequilibrium" for longer period of time, with constant „hunger" on the demand side and very „shallow" capital supply. As a result of that, the interest rates grew disproportionally high, unable to play their signaling and informational role of a real price of capital.

Table 4: OLS regression results with integrated observations of the cost of capital

	Coefficients	tandard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	-3.2203	0.313624	-10.268	2.02E-09	-3.87451	-2.56609	-3.87451	-2.566095
Y	1.587544	0.041538	38.21946	3.58E-20	1.500898	1.67419	1.500898	1.6741896
Cost	-0.04541	0.036089	-1.25826	0.22279	-0.12069	0.029871	-0.12069	0.0298708
Tinf	-0.31414	0.06484	-4.84492	9.83E-05	-0.4494	-0.17889	-0.4494	-0.17889
Tcr	-0.02262	0.04454	-0.50792	0.617065	-0.11553	0.070287	-0.11553	0.0702866

Source: Author's calculations.

In addition we reffer to some ***economically sustainable reasons*** supporting the previous constatation: *First*, the existence of high inflation rates, which „build-up" the nominal interest rates. This was especially obvious at the begining of the observed period. *Second*, asymetric information in the financial market generated a substantial amount of risky „unsecure" loans in the banking industry. Comercial banks were forced to raise the interes rates to compensate for the risk-exposed portfolios. *Third*, the Macedonian financial market (especially the capital market) is still underdeveloped and not regionally integrated, with limited number of participants. In apsence of other available and reliable sources of capital, banking sector remains the dominant supplyer of long-term capital, with tendencies for monopolization of the financial market. *Fourth*, the actual monetary strategy of fixed currency rate could also limit the capital market and result in higher interest rates. The Central Bank had to raise the reference interest rate to stop the outflow of the foreign-currency (forex) reserves, which usually happens when the currency exchange rate is overrated. Even during a recession, when it is normally to follow expansionary monetary policy with low interest rates, the Reserve Bank was forced to deffend the denar's inter-currency value with higher interest rates. And *fifth*, the starting (initial) level of the capital stock was uncommonly low, loosing the connection with its long-term projection line from the previous period (the same holds to the output also). Disinvestments during the constitutional and the period of inflation reprisent a major cause for the proces, and „grey" economy atributed to this condition as well. Because the initial level of investment was very low, the perpetuation of capital stock took more dynamic pace at the begining of the observed period, regardless that the price of capital (primarlly the interest rate) at the same time was abnormally high. To ***generalise***, we may say that appropriate testing of the relationship between the capital stock and the non-tax component *would require existence of much balanced market conditions* for a sufficient period of time. So, although the results from the analysis are relevant and statistically signifficant, it is advisible to be taken with caution. A few words about the estimates of the ***dummy variables*** before the finishing line. Because the dependend variable is expressed in natural logarithm values (which is case in the *log-log* or *log-linear* models) and the time specific dummy variables are dichotomous by nature, in order to capture the presence (or the apsence) of certain circumstances at some point of time, the coefficient estimates of the included dummies could not be taken as a true (unbiased) representatives of the effects of those circumstances on the dependent variable *Y*. To express and interpret the effects more accuaretelly, we can use an approximative dummy variable estimation approach [26]. According to it, if *b* is the estimated coefficient on a dummy variable and *V(b)* is the estimated variance of *b*, then *g* gives an estimate of the percentage impact of the dummy variable on the variable being explained:

$$g = 100 \cdot \left(exp(b - \frac{1}{2} V(b)) - 1 \right) \quad (30)$$

If we apply this equation, then the results will be for the *Tinf* coefficient -23,34 and for the *Tcr* coefficient -16,48. The interpretation is that the presence of a circumstance of inflation (with annual average rates above 8%), reduces the capital stock by 23,24%, and that the presence of the financial crisis had similar effect on capital accumulation, with a reduction of 16,48% .

6. Conclusion

Applying the methodological advantage of *METR* we've managed to segregate the effects on investment demand from the taxes and economic variables independently. The OLS regression confirms that the GDP has greatest influence on the investment process, indicating on the presence of a strong income accelerator. On the other side, taxes do not represent a major determinant of the capital demand, contributing only a marginal portion to the capital stock. The fact that capital accumulations are inelastic to taxes, questions the justification of government's tax policy. Conversely, the estimated coefficient of capital demand on tax changes is multiple times stronger when the economic parameters are held constant. The results for the non-tax component are much surprising, as the coefficient estimate manifests a positive correlation with the dependent variable. This fact explains the elusive nature of the capital demand curve and the state of persistent „disequilibrium" in the capital market as the interest rates grew disproportionally high, unable to play their signaling role of a real price of capital. Some of the reasonable explanations for this condition might be: high inflation rates, asymmetric information on capital market, rudimental and nonintegrated financial market, implementation of a strategy of fixed currency rate and a very low starting level of the capital stock. Two additional exogenous variables were added the system's equation in order to capture the influence of circumstances such as financial crises and high inflation. The joint significance of these dummy variables was tested and they proved to have negative influence on the capital demand. To conclude, for a more accurate investigation, we must assume balanced market conditions or extend the observed horizon beyond the period of independence.

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Annex

Table 5: Basic regression variables

Year	*Nominal GDP* (Y_t) *(billions of denars)*	*Net capital stock* (K_t) *(billions of denars)* $K_0 = 1993;$ $\delta = 0,0928;$ $g = 0,1257$	*Tax wedge variable* $(TCp^{\sim})$ *(%)*	*Tax wedge variable transformed* $(TCp_t+95,48)$	*Non-tax variable* $(NTCp_t^{\sim})$ *(%)*
1993	59,164	50,316	26,35	121,83	176,87
1994	146,409	68,108	-2,13	93,35	18,37
1995	169,521	89,815	62,68	158,16	17,69
1996	176,444	112,134	61,90	157,38	18,91
1997	186,018	133,960	60,94	156,42	18,97
1998	194,979	155,510	69,98	165,46	21,73
1999	209,010	175,787	72,89	168,37	22,43
2000	236,389	197,806	50,17	145,65	15,87
2001	233,841	214,166	44,09	139,57	14,75
2002	243,970	234,739	58,55	154,03	17,80
2003	258,369	255,065	55,63	151,11	16,69
2004	272,462	278,681	56,69	152,17	16,59
2005	295,052	301,687	47,27	142,75	14,42
2006	320,059	330,175	24,78	120,26	11,43
2007	364,989	371,092	34,78	130,26	12,39
2008	411,728	423,058	-94,48	1,00	7,93
2009	410,734	465,670	58,22	153,70	17,31
2010	434,112	523,307	49,77	145,25	15,13
2011	459,789	583,963	31,56	127,04	11,92
2012	458,621	638,842	29,68	125,16	11,64
2013	499,559	696,939	27,74	123,22	11,15
2014	525,843	764,402	43,89	139,37	13,26
2015	558,954	826,719	39,32	134,80	12,47
2016	594,795	895,399	34,64	130,12	11,96
2017	618,053	951,324	15,31	110,79	10,21
2018	658,053	993,283	10,81	106,29	9,91

Source: State Statistical Office; Ministry of finance; Author's calculations.

Table 6: Basic regression variables (natural logarithm values)

Year	*Nominal GDP* $ln(Y_t)$	*Net capital stock* $ln(K_t)$	*Tax wedge variable* $ln(TCp_t^{\sim})$ *(from transformed values)*	*Non-tax variable* $ln(NTCp_t^{\sim})$
1993	4,0803	3,9183	4,8026	5,1754
1994	4,9864	4,2211	4,5364	2,9107
1995	5,1330	4,4977	5,0636	2,8730
1996	5,1730	4,7197	5,0587	2,9397
1997	5,2258	4,8975	5,0525	2,9428
1998	5,2729	5,0467	5,1087	3,0787
1999	5,3424	5,1693	5,1262	3,1104
2000	5,4655	5,2873	4,9812	2,7644
2001	5,4546	5,3667	4,9386	2,6912
2002	5,4970	5,4585	5,0371	2,8792
2003	5,5544	5,5415	5,0180	2,8148
2004	5,6075	5,6301	5,0250	2,8088
2005	5,6871	5,7094	4,9611	2,6686
2006	5,7685	5,7996	4,7897	2,4362
2007	5,8999	5,9164	4,8695	2,5169
2008	6,0204	6,0475	0	2,0706
2009	6,0179	6,1435	5,0350	2,8513
2010	6,0733	6,2602	4,9784	2,7167
2011	6,1308	6,3698	4,8445	2,4782
2012	6,1282	6,4597	4,8296	2,4544
2013	6,2137	6,5467	4,8140	2,4114
2014	6,2650	6,6473	4,9371	2,5847
2015	6,3261	6,7175	4,9038	2,5233
2016	6,3882	6,7973	4,8685	2,4816
2017	6,4267	6,8578	4,7076	2,3234
2018	6,4893	6,9010	4,6662	2,2935

Source: Author's calculations.

Table 7: Gross fixed capital formation and capital stock in period (billions of denars)

Year	***Net capital stock*** (K_t) $K_0 = 1993;$ $\delta = 0,0928;$ $g = 0,1257;$	***Gross fixed capital formation (nominal value)*** (I_t)			
		In total value	***Construction works (buildings)***	***Machinery and equipment***	***Other (intangibles)***
1993	50,316	10,994	6,338	4,262	0,393
1994	68,108	22,461	12,158	9,881	0,422
1995	89,815	28,027	16,893	10,540	0,594
1996	112,134	30,654	17,622	12,054	0,978
1997	133,960	32,232	18,242	13,086	0,904
1998	155,510	33,982	18,836	14,553	0,593
1999	175,787	34,710	18,754	15,000	0,955
2000	197,806	38,332	19,333	18,122	0,877
2001	214,166	34,716	16,653	15,390	2,673
2002	234,739	40,448	20,802	17,917	1,729
2003	255,065	42,110	23,389	16,536	2,185
2004	278,681	47,286	27,556	17,347	2,383
2005	301,687	48,868	28,637	18,200	2,031
2006	330,175	56,485	33,247	21,476	1,762
2007	371,092	71,557	39,088	28,912	3,557
2008	423,058	86,403	44,104	37,805	4,494
2009	465,670	81,872	43,732	34,391	3,749
2010	523,307	100,851	64,069	30,231	6,551
2011	583,963	109,219	71,048	32,070	6,102
2012	638,842	109,071	70,619	32,498	5,955
2013	696,939	117,382	66,203	46,248	4,931
2014	764,402	132,139	74,526	52,063	5,550
2015	826,719	133,254	85,481	40,195	7,578
2016	895,399	145,040	92,016	43,772	9,253
2017	951,324	139,018	85,971	43,468	9,579
2018	993,283	130,242	74,806	45,053	10,383

Source: State Statistical Office; Author's calculations.

Table 8: The rate of inflation, nominal interest rate, effective capital gains tax rate and shareholders discount rate

Year	π	i	m^i	z^*	λ	z	P
1993	3,498	4,838	0,00	0,115	0,1	0,0023	4,8491
1994	1,218	1,185	0,00	0,115	0,1	0,0089	1,1956
1995	0,159	0,220	0,00	0,115	0,1	0,0359	0,2282
1996	0,030	0,117	0,00	0,115	0,1	0,0530	0,1235
1997	0,044	0,130	0,00	0,115	0,1	0,0500	0,1368
1998	0,008	0,125	0,00	0,115	0,1	0,0511	0,1317
1999	-0,011	0,115	0,00	0,115	0,1	0,0535	0,1215
2000	0,058	0,112	0,00	0,115	0,1	0,0542	0,1184
2001	0,055	0,099	0,00	0,105	0,1	0,0528	0,1045
2002	0,018	0,096	0,00	0,105	0,1	0,0536	0,1014
2003	0,012	0,080	0,00	0,105	0,1	0,0583	0,0849
2004	-0,004	0,065	0,00	0,105	0,1	0,0636	0,0694
2005	0,005	0,052	0,00	0,105	0,1	0,0691	0,0559
2006	0,032	0,047	0,00	0,105	0,1	0,0714	0,0506
2007	0,023	0,049	0,00	0,084	0,1	0,0564	0,0519
2008	0,083	0,059	0,00	0,07	0,1	0,0440	0,0617
2009	-0,008	0,070	0,00	0,07	0,1	0,0412	0,0730
2010	0,016	0,070	0,00	0,07	0,1	0,0412	0,0730
2011	0,039	0,059	0,00	0,07	0,1	0,0440	0,0617
2012	0,033	0,051	0,00	0,07	0,1	0,0464	0,0535
2013	0,028	0,044	0,00	0,00	0,1	0,0000	0,0440
2014	-0,003	0,037	0,00	0,00	0,1	0,0000	0,0370
2015	-0,003	0,029	0,00	0,00	0,1	0,0000	0,0290
2016	-0,002	0,025	0,00	0,00	0,1	0,0000	0,0250
2017	0,014	0,022	0,00	0,00	0,1	0,0000	0,0220
2018	0,015	0,020	0,00	0,00	0,1	0,0000	0,0200

Source: *Ministry of finance of the RM; Central Bank of the RM; Author's calculations*.

Table 9: Tax discrimination variable

Year	m^d	*z*	*c*	*γ*	*From 2009 to 2014* $\gamma_{SR} = \gamma$ *x 0,90*	
1993	0,23	0,0023	0,000	0,7718	-	
1994	0,23	0,0089	0,000	0,7769	-	
1995	0,23	0,0359	0,000	0,7987	-	
1996	0,23	0,0530	0,115	0,9187	-	
1997	0,23	0,0500	0,115	0,9158	-	
1998	0,23	0,0511	0,115	0,9169	-	
1999	0,23	0,0535	0,115	0,9192	-	
2000	0,23	0,0542	0,115	0,9199	-	
2001	0,15	0,0528	0,075	0,9701	-	
2002	0,15	0,0536	0,075	0,9709	-	
2003	0,15	0,0583	0,075	0,9758	-	
2004	0,15	0,0636	0,075	0,9813	-	
2005	0,15	0,0691	0,075	0,9871	-	
2006	0,15	0,0714	0,075	0,9896	-	
2007	0,12	0,0564	0,000	0,9326	-	
2008	0,10	0,0440	0,000	0,9414	-	
2009	0,10	0,0412	0,000	0,9387	0,8448	γ x 0,90 = 0,9387x0,90 = 0,8448
2010	0,10	0,0412	0,000	0,9387	0,8448	γ x 0,90 = 0,9387x0,90 = 0,8448
2011	0,10	0,0440	0,000	0,9414	0,8473	γ x 0,90 = 0,9414x0,90 = 0,8473
2012	0,10	0,0464	0,000	0,9438	0,8494	γ x 0,90 = 0,9438x0,90 = 0,8494
2013	0,10	0,0000	0,000	0,9000	0,8100	γ x 0,90 = 0,9000x0,90 = 0,8100
2014	0,10	0,0000	0,000	0,9000	0,8100	γ x 0,90 = 0,9000x0,90 = 0,8100
2015	0,10	0,0000	0,000	0,9000		
2016	0,10	0,0000	0,000	0,9000		
2017	0,10	0,0000	0,000	0,9000		
2018	0,10	0,0000	0,000	0,9000		

Source: Ministry of finance of the RM; Author's calculations.

Table 10: Non-tax component of the cost of capital

	Buildings			***Machinery & Equipment***			***Intangibles***			***Non-tax variable***
Year	$NTCp_t^{\sim}$	W_t	$NTCp^{\sim} x W_t$	$NTCp_t^{\sim}$	W_t	$NTCp^{\sim} x W_t$	$NTCp_t^{\sim}$	W_t	$NTCp^{\sim} x W_t$	$NTCp_t^{\sim}$
1993	1,4905	0,564	0,8406	2,1382	0,394	0,8424	2,0415	0,042	0,0857	1,7687
1994	0,0464	0,564	0,0262	0,3657	0,394	0,1441	0,3181	0,042	0,0134	0,1837
1995	0,1051	0,564	0,0593	0,2720	0,394	0,1072	0,2471	0,042	0,0104	0,1769
1996	0,1254	0,564	0,0707	0,2737	0,394	0,1078	0,2516	0,042	0,0106	0,1891
1997	0,1252	0,564	0,0706	0,2755	0,394	0,1085	0,2530	0,042	0,0106	0,1897
1998	0,1549	0,564	0,0874	0,3001	0,394	0,1182	0,2784	0,042	0,0117	0,2173
1999	0,1632	0,564	0,0920	0,3056	0,394	0,1204	0,2843	0,042	0,0119	0,2243
2000	0,0932	0,564	0,0526	0,2455	0,394	0,0967	0,2228	0,042	0,0094	0,1587
2001	0,0822	0,564	0,0464	0,2341	0,394	0,0922	0,2114	0,042	0,0089	0,1475
2002	0,1150	0,564	0,0649	0,2615	0,394	0,1030	0,2397	0,042	0,0101	0,1780
2003	0,1043	0,564	0,0588	0,2500	0,394	0,0985	0,2282	0,042	0,0096	0,1669
2004	0,1043	0,564	0,0588	0,2477	0,394	0,0976	0,2263	0,042	0,0095	0,1659
2005	0,0820	0,564	0,0462	0,2268	0,394	0,0894	0,2052	0,042	0,0086	0,1442
2006	0,0506	0,564	0,0285	0,1992	0,394	0,0784	0,1770	0,042	0,0074	0,1143
2007	0,0606	0,564	0,0342	0,2079	0,394	0,0819	0,1859	0,042	0,0078	0,1239
2008	0,0123	0,564	0,0069	0,1682	0,394	0,0663	0,1449	0,042	0,0061	0,0793
2009	0,1117	0,564	0,0630	0,2546	0,394	0,1003	0,2333	0,042	0,0098	0,1731
2010	0,0885	0,564	0,0499	0,2348	0,394	0,0925	0,2129	0,042	0,0089	0,1513
2011	0,0549	0,564	0,0310	0,2045	0,394	0,0806	0,1822	0,042	0,0076	0,1192
2012	0,0525	0,564	0,0296	0,2013	0,394	0,0793	0,1791	0,042	0,0075	0,1164
2013	0,0479	0,564	0,0270	0,1959	0,394	0,0772	0,1738	0,042	0,0073	0,1115
2014	0,0709	0,564	0,0400	0,2145	0,394	0,0845	0,1930	0,042	0,0081	0,1326
2015	0,0629	0,564	0,0355	0,2065	0,394	0,0813	0,1850	0,042	0,0077	0,1247
2016	0,0579	0,564	0,0326	0,2016	0,394	0,0794	0,1802	0,042	0,0076	0,1196
2017	0,0394	0,564	0,0222	0,1854	0,394	0,0730	0,1637	0,042	0,0069	0,1021
2018	0,0364	0,564	0,0205	0,1826	0,394	0,0719	0,1608	0,042	0,0067	0,0991

Source: Author's calculations.

Table 11: Tax component of the cost of capital (buildings: δ=0,031, φ=0,035 L=28,57)

Year	*Allowances (A)*	F_{RE}	F_{NE}	F_{DE}	$TCp^{\sim}$			
					Retained earnings	*New equity issues*	*Debt*	*MEAN*
1993	0,00216	0,00	-0,18919	0,19298	0,2961	0,6016	-0,0155	0,2941
1994	0,00878	0,00	-0,12149	0,12954	-0,0303	4,7400	-5,1166	-0,1356
1995	0,04588	0,00	-0,03740	0,04825	0,8812	1,5555	0,0112	0,8160
1996	0,04098	0,00	-0,00894	0,01967	0,8482	0,9478	0,6292	0,8084
1997	0,03739	0,00	-0,01013	0,02119	0,8371	0,9503	0,6003	0,7959
1998	0,03870	0,00	-0,00967	0,02062	0,9219	1,0118	0,7302	0,8880
1999	0,04158	0,00	-0,00875	0,01947	0,9501	1,0273	0,7769	0,9181
2000	0,04253	0,00	-0,00848	0,01908	0,7321	0,8551	0,4553	0,6808
2001	0,04730	0,00	-0,00283	0,01787	0,6853	0,7290	0,4093	0,6079
2002	0,04850	0,00	-0,00268	0,01745	0,8300	0,8605	0,6309	0,7738
2003	0,05581	0,00	-0,00189	0,01520	0,8003	0,8238	0,6110	0,7453
2004	0,06452	0,00	-0,00121	0,01298	0,8077	0,8226	0,6475	0,7593
2005	0,07406	0,00	-0,00068	0,01094	0,7061	0,7165	0,5392	0,6539
2006	0,07843	0,00	-0,00050	0,01003	0,4378	0,4498	0,1979	0,3618
2007	0,06186	0,00	-0,00333	0,00778	0,5307	0,5995	0,3698	0,5000
2008	0,04647	0,00	-0,00341	0,00763	-1,4588	-1,1373	-2,1782	-1,5914
2009	0,00000	0,00	-0,01057	0,00236	0,7403	0,8614	0,7133	0,7717
2010	0,00000	0,00	-0,01057	0,00236	0,6459	0,7952	0,6125	0,6845
2011	0,00000	0,00	-0,00888	0,00216	0,4165	0,6115	0,3691	0,4657
2012	0,00000	0,00	-0,00766	0,00202	0,3972	0,5724	0,3511	0,4402
2013	0,00000	0,00	-0,00802	0,00000	0,3464	0,5564	0,3464	0,4164
2014	0,00000	0,00	-0,00679	0,00000	0,5805	0,7035	0,5805	0,6215
2015	0,06740	0,00	-0,00282	0,00254	0,5647	0,6219	0,5133	0,5667
2016	0,07080	0,00	-0,00244	0,00219	0,4995	0,5528	0,4515	0,5013
2017	0,07360	0,00	-0,00215	0,00193	0,2290	0,2968	0,1681	0,2313
2018	0,07560	0,00	-0,00196	0,00176	0,1618	0,2284	0,1019	0,1640

Source: Author's calculations.

Table 12: Tax component of the cost of capital (machinery & equipment: δ=0,175, φ=0,15 L=6,66)

Year	***A***	F_{RE}	F_{NE}	F_{DE}	$TCp^{\sim}$			
					Retained earnings	***New equity issues***	***Debt***	***MEAN***
1993	0,00928	0,00	-0,18919	0,19298	0,2063	0,4458	0,0156	0,2226
1994	0,03744	0,00	-0,12149	0,12954	0,1415	0,7461	-0,5032	0,1281
1995	0,14703	0,00	-0,03740	0,04825	0,4080	0,6686	0,0718	0,3828
1996	0,09830	0,00	-0,00894	0,01967	0,3906	0,4363	0,2903	0,3724
1997	0,09445	0,00	-0,01013	0,02119	0,3852	0,4367	0,2776	0,3665
1998	0,09589	0,00	-0,00967	0,02062	0,4721	0,5185	0,3731	0,4546
1999	0,09890	0,00	-0,00875	0,01947	0,4992	0,5408	0,4067	0,4822
2000	0,09984	0,00	-0,00848	0,01908	0,2883	0,3349	0,1832	0,2688
2001	0,10424	0,00	-0,00283	0,01787	0,2514	0,2668	0,1545	0,2242
2002	0,10527	0,00	-0,00268	0,01745	0,3649	0,3784	0,2775	0,3403
2003	0,11100	0,00	-0,00189	0,01520	0,3335	0,3432	0,2549	0,3105
2004	0,11684	0,00	-0,00121	0,01298	0,3367	0,3430	0,2692	0,3163
2005	0,12232	0,00	-0,00068	0,01094	0,2557	0,2595	0,1953	0,2368
2006	0,12458	0,00	-0,00050	0,01003	0,1195	0,1225	0,0585	0,1002
2007	0,09922	0,00	-0,00333	0,00778	0,1589	0,1790	0,1121	0,1500
2008	0,07994	0,00	-0,00341	0,00763	-0,0963	-0,0729	-0,1488	-0,1060
2009	0,00000	0,00	-0,01056	0,00236	0,3207	0,3738	0,3088	0,3344
2010	0,00000	0,00	-0,01056	0,00236	0,2389	0,2952	0,2264	0,2535
2011	0,00000	0,00	-0,00887	0,00215	0,1068	0,1591	0,0941	0,1200
2012	0,00000	0,00	-0,00765	0,00201	0,0986	0,1442	0,0867	0,1098
2013	0,00000	0,00	-0,00801	0,00000	0,0794	0,1307	0,0794	0,0965
2014	0,00000	0,00	-0,00678	0,00000	0,1871	0,2276	0,1871	0,2006
2015	0,08960	0,00	-0,00282	0,00254	0,1669	0,1843	0,1512	0,1675
2016	0,09090	0,00	-0,00244	0,00219	0,1443	0,1596	0,1305	0,1448
2017	0,09190	0,00	-0,00215	0,00193	0,0514	0,0658	0,0385	0,0519
2018	0,09270	0,00	-0,00196	0,00176	0,0350	0,0483	0,0230	0,0354

Source: Author's calculations.

Table 13: Tax component of the cost of capital (intangibles: δ=0,1535, φ=0,20, L=5)

Year	*A*	F_{RE}	F_{NE}	F_{DE}	$TCp^{\sim}$			
					Retained earnings	***New equity issues***	***Debt***	***MEAN***
1993	0,01237	0,00	-0,18919	0,19298	0,2385	0,4615	0,0110	0,2370
1994	0,04920	0,00	-0,12149	0,12954	0,1298	0,8251	-0,6116	0,1144
1995	0,16885	0,00	-0,03740	0,04825	0,4033	0,6901	0,0332	0,3755
1996	0,10721	0,00	-0,00894	0,01967	0,4097	0,4593	0,3005	0,3898
1997	0,10379	0,00	-0,01013	0,02119	0,4033	0,4593	0,2862	0,3829
1998	0,10508	0,00	-0,00967	0,02062	0,4932	0,5432	0,3865	0,4743
1999	0,10774	0,00	-0,00875	0,01947	0,5215	0,5662	0,4221	0,5033
2000	0,10857	0,00	-0,00848	0,01908	0,3023	0,3537	0,1865	0,2808
2001	0,11243	0,00	-0,00283	0,01787	0,2638	0,2808	0,1565	0,2337
2002	0,11332	0,00	-0,00268	0,01745	0,3842	0,3989	0,2888	0,3573
2003	0,11825	0,00	-0,00189	0,01520	0,3525	0,3632	0,2664	0,3274
2004	0,12320	0,00	-0,00121	0,01298	0,3573	0,3642	0,2835	0,3350
2005	0,12779	0,00	-0,00068	0,01094	0,2728	0,2770	0,2061	0,2520
2006	0,12967	0,00	-0,00050	0,01003	0,1250	0,1284	0,0564	0,1033
2007	0,10336	0,00	-0,00333	0,00778	0,1704	0,1929	0,1180	0,1604
2008	0,08386	0,00	-0,00341	0,00763	-0,1191	-0,0919	-0,1800	-0,1303
2009	0,00000	0,00	-0,01056	0,00236	0,3500	0,4080	0,3371	0,3650
2010	0,00000	0,00	-0,01056	0,00236	0,2634	0,3254	0,2496	0,2795
2011	0,00000	0,00	-0,00887	0,00215	0,1200	0,1786	0,1057	0,1348
2012	0,00000	0,00	-0,00765	0,00201	0,1108	0,1621	0,0973	0,1234
2013	0,00000	0,00	-0,00801	0,00000	0,0895	0,1473	0,0895	0,1088
2014	0,00000	0,00	-0,00678	0,00000	0,2078	0,2529	0,2078	0,2228
2015	0,09180	0,00	-0,00282	0,00254	0,1826	0,2020	0,1651	0,1832
2016	0,09290	0,00	-0,00244	0,00219	0,1580	0,1752	0,1426	0,1586
2017	0,09370	0,00	-0,00215	0,00193	0,0551	0,0715	0,0404	0,0557
2018	0,09430	0,00	-0,00196	0,00176	0,0369	0,0520	0,0233	0,0374

Source: Author's calculations.

Table 14: Tax component of the cost of capital (tax-wedge variable)

Year	Buildings			Machinery & Equipment			Intangibles			Tax wedge variable
	$TCp^{\sim}$	W_t	$TCp^{\sim} x W_t$	$TCp^{\sim}$	W_t	$TCp^{\sim} x W_t$	$TCp^{\sim}$	W_t	$TCp^{\sim} x W_t$	$TCp^{\sim}$
1993	0,2941	0,564	0,1659	0,2226	0,394	0,0877	0,2370	0,042	0,0099	0,2635
1994	-0,1356	0,564	-0,0765	0,1281	0,394	0,0504	0,1144	0,042	0,0048	-0,0213
1995	0,8160	0,564	0,4602	0,3828	0,394	0,1508	0,3755	0,042	0,0158	0,6268
1996	0,8084	0,564	0,4559	0,3724	0,394	0,1467	0,3898	0,042	0,0164	0,6190
1997	0,7959	0,564	0,4489	0,3665	0,394	0,1444	0,3829	0,042	0,0161	0,6094
1998	0,8880	0,564	0,5008	0,4546	0,394	0,1791	0,4743	0,042	0,0199	0,6998
1999	0,9181	0,564	0,5178	0,4822	0,394	0,1900	0,5033	0,042	0,0211	0,7289
2000	0,6808	0,564	0,3840	0,2688	0,394	0,1059	0,2808	0,042	0,0118	0,5017
2001	0,6079	0,564	0,3428	0,2242	0,394	0,0883	0,2337	0,042	0,0098	0,4409
2002	0,7738	0,564	0,4364	0,3403	0,394	0,1341	0,3573	0,042	0,0150	0,5855
2003	0,7453	0,564	0,4203	0,3105	0,394	0,1223	0,3274	0,042	0,0137	0,5563
2004	0,7593	0,564	0,4282	0,3163	0,394	0,1246	0,3350	0,042	0,0141	0,5669
2005	0,6539	0,564	0,3688	0,2368	0,394	0,0933	0,2520	0,042	0,0106	0,4727
2006	0,3618	0,564	0,2040	0,1002	0,394	0,0395	0,1033	0,042	0,0043	0,2478
2007	0,5000	0,564	0,2820	0,1500	0,394	0,0591	0,1604	0,042	0,0067	0,3478
2008	-1,5914	0,564	-0,8975	-0,1060	0,394	-0,0418	-0,1303	0,042	-0,0055	-0,9448
2009	0,7717	0,564	0,4352	0,3344	0,394	0,1317	0,3650	0,042	0,0153	0,5822
2010	0,6845	0,564	0,3861	0,2535	0,394	0,0999	0,2795	0,042	0,0117	0,4977
2011	0,4657	0,564	0,2626	0,1200	0,394	0,0473	0,1348	0,042	0,0057	0,3156
2012	0,4402	0,564	0,2483	0,1098	0,394	0,0433	0,1234	0,042	0,0052	0,2968
2013	0,4164	0,564	0,2348	0,0965	0,394	0,0380	0,1088	0,042	0,0046	0,2774
2014	0,6215	0,564	0,3505	0,2006	0,394	0,0790	0,2228	0,042	0,0094	0,4389
2015	0,5667	0,564	0,3196	0,1675	0,394	0,0660	0,1832	0,042	0,0077	0,3932
2016	0,5013	0,564	0,2827	0,1448	0,394	0,0570	0,1586	0,042	0,0067	0,3464
2017	0,2313	0,564	0,1304	0,0519	0,394	0,0205	0,0557	0,042	0,0023	0,1531
2018	0,1640	0,564	0,0925	0,0354	0,394	0,0139	0,0374	0,042	0,0016	0,1081

Source: Author's calculations.

Paragraph 01.

What is the split corporate income tax system - SRCT?

"Under a *split rate corporate system – SRCT*, there are 2 different statutory tax rates, one that applies to retained earnings, the other to distributed earnings" [27] Tax authorities might choose between the 2 different strategies concerning the split rate system. The **first option** is the strategy of taxation of distributed profits while retained profits are exempt from taxation at the same time, which implies the condition of (t_d, t = 0), It generates a positive tax burden on the investment financed with external equity which depends generally from the corporate tax rate applied on distributed profits t_d. With this approach in tax policy, the authorities try to "convince" the investor not to distribute the profit, but to reinvest it, since the burden for the second alternative is significantly lower. Also, this approach in the policy restores the neutrality between debt and retained earnings. In practice, Macedonia and Estonia are examples for countries that have already implemented the split corporate tax, which is basically intended to create strong reinvestment incentives therefore supporting the growth. Originally, in Macedonia the measure is called "Tax exemption on undistributed earnings" and it was designed as a temporary measure in 2009, with the purpose to help the business after the post-crisis period. The rule was supposed to last until the beginning of 2011, but on demand of the business community, it was extended until the beginning of 2015. According to it, all the retentions are exempted from the corporate income tax, while the distributions of the profit are taxed with the regular corporate income tax rate of 10% ($t = 0$; $t_d = 0{,}1$).The **second option** is the strategy to tax retentions (retained profits) while profit distributions are exempt from taxation, which in this case implies the condition of ($t_d = 0$, t). The authorities apply a lower rate (alternatively zero rate) on distributed profits which will serve to compensate for the personal tax paid on dividend income. As a result, this variant generates a positive tax burden on the investment financed with retentions. With this approach in tax policy, the authorities actually equalize the treatment between debt and new equity with intention to deliver a certain compensation for the excessive burden levied on dividend distributions [28]. Many of the developed countries, especially the ones with excessively high tax burden, such as Germany and Japan, extensively exploit this model of taxation as a mean of compensation for the personal tax levied on dividend income.

Paragraph 02.

The imputation corporate tax system – ICT

In practice, Macedonia experienced this model of corporate taxation until the end of 2006, when the stock market development was pointed with higher grade of priority. In fact, the initial phase of the development

process had to be supported with adequate tax measures such as the declared deduction on the capital gains tax base and *the imputation corporate tax system - ICT*. Actually, with the ICT a tax credit on dividend distributions was allowed aiming for an effective reduction of the corporate tax burden on new equity issues. As a result, the companies were "encouraged" to participate in the capital market frequently and therefore, stimulate the market expansion. Generally, "with an imputation system of corporation tax, part of the company's tax bill is imputed to the stockholders" [29]. But if the rate of imputation is at the level of corporate income tax liability ($c = t$), then this system is known as the *full imputation corporate tax system – FICT*[7]. This system treats the corporation as a pass-through entity and allocates all the corporate profits at shareholder level, where they become subject of taxation under the personal income tax. Actually, with this approach *the effect from the corporate income tax is being neutralized in whole*. It's a specially designed measure to relieve the CIT burden on the investment projects that require external sources of equities. Also, it creates preferences that depend in general only from the personal taxes involved in this particular model of taxation.

[7] "Under full integration (full imputation), all corporate earnings – distributed dividends, retained profits and interest payments – are allocated to shareholders and bondholders and are taxed at the personal level at the personal income tax rate" [30].