УДК 336.221

O. Y. Goncharenko,
Luhansk Taras Shevchenko National University

MARGINAL EFFECTIVE TAX RATES: THE CALCULATION FOR UKRAINE

The tendency of forming a single-function approach to the system of corporate taxation is clearly seen in the industrialized countries as the instrument of regulation and encouragement of investment processes in the economy, which confirms the convergence of tax rates on corporate income, the use of similar forms of preferential tax credit for investors and development of the processes of harmonization of corporate taxation.

Tax system in Ukraine is coming into being at the moment, the fact greatly complicates the analysis. In practice, the apparent discrepancy is seen between the high quality regulatory and legislative support of the tax system at the highest level with its lower level of management methodical materials (especially in terms of determining the taxable base of the main taxes) and critically low tax discipline, which, in fact, invalidates the entire system.

Economic (regulatory) function of the Ukrainian tax system as a whole has been implemented rather poorly, in practice the tax mechanism of the stimulation of economy has been almost never used, although the definite possibilities for this are certainly available.

The domestic tax system investment potential includes such elements as: the use of accelerated depreciation, income tax incentives, aimed at promoting the economic entity. However, these instruments of investment incentive in practice find difficulty in their use, firstly, due to the overly complex administrative procedures of their usage and, secondly, due to the general trend of overestimation of costs for tax avoidance. The attention to the industry characteristics size and structure of the tax burden, which could be considered optimal and fair hasn't been paid. Therefore the question of estimate the impact of taxation on investment activities is the urgent one.

The impact of taxation on investment is traditionally studied with the help of measure of effective tax rates. The marginal effective tax rates (METR) and average effective tax rates (AETR) are distinguished. It is easy to become entangled the AETR and the METR in analyzing the effects of tax, since the difference between the two appears to be a minor matter of arithmetic [1].

Chen notes: "The AETR is a numeric ratio of total taxes to pre-tax return for a set of one or more investment projects; it is a number often featured in income statement analysis, but one with limited use in decision making. While the METR is a well-founded economic concept, the AETR lacks ex ante meaning since it is marginal, not average, factors that drive investment decisions" [2].

In other words, the METR measures the expected effective tax rate produced by the formal tax structure, assuming profit-maximizing behavior by investors. In contrast, the AETR is a realized tax rate that is sensitive to the business performance of a specific taxpayer or group of taxpayers and that therefore reflects past tax planning choices; the AETR is not suitable for evaluating tax impacts across assets sectors or jurisdictions.

To determine the effect that tax system creates for new investment is important to consider the taxes impact on marginal or incremental investment decisions (the decision to use more than one unit of capital, etc.). Marginal effective tax rates affect the volume and the nature of investment in real assets.

The calculation methods of marginal effective tax rates differ in the works of different researchers. But they are stultified to the micro-economic simulation model, developed by M. King and D. Fullerton in the mid 1980-th. This model is generally used to determine the tax burden on investment in many countries.

METR is defined as the tax wedge for a pre-tax rate of return (1). The tax wedge is the difference between the pre-tax rate of return on the marginal investment and the after-tax rate of return on savings used to finance the investment [3].

$$METR = \frac{(p - s)}{p} \,, \qquad (1)$$

p — pre-tax rate of return;
s — after-tax rate of return.

In the absence of after-tax real rate of return is equal to the pre-tax real rate of return. On the other hand, taking into account tax and incentive rates of return will vary.

The size of the tax wedge depends on a number of factors. They are corporate taxation, inflation, the tax treatment of depreciation and inventories, different legal forms of income tax (capital gains, interest, dividends) and other nicety [see more 3; 4; 5; 6]. The METR on investment depends upon the industry where investment is located, the specific asset, the type of the financed investment.

For computations the tax burden on investments in tangible fixed assets will be used a fixed-p version, due to peculiarities of transition economies in Ukraine the weak competition in some markets (monopolistic tendencies), asymmetric information, the arbitration mechanism is poorly developed and the process equalization of the rate of profit finds difficulties. While comparing the tax burdens on projects for the same value of p is shown of

incentives and disincentives, which tax system for different investments creates.

We assume that all marginal investment projects have the equal pre-tax rate of return (all investment projects earn 10% real pre-tax rate of return). The real after-tax rate of return on capital is calculated, s. Then the METR is calculated as the deference between p and s in percentage terms, which shows what part of the real pre-tax rate of return should be withdrawn according to tax legislation at both corporate and personal levels of taxation.

To compute the METR for the investment we calculate the firm's subjective discount rate (r) at which the company discounts cash flows. The amount of a discount rate depends on the economic parameters and the details of the tax laws.

Let M done the gross marginal real rate of return for one unit of investment in tangible assets, it will be assumed that capital depreciation at an exponential rate (s), the rate of inflation (p) and the tax rate (t). The equation for calculating the discount rate (r):

$$1 - A = \frac{(1-t)}{r+s-p} M \ , \qquad (2)$$

A — present value of standard tax deprecation allowances.

We will not describe all the marginal effective tax rates models in this article, thoroughly discuss the features of depreciation of assets. To calculate the METR we should determine the cost of depreciation allowances [7]. The present value of depreciation will depend on the details of tax law, in particular from the depreciation rates for tax purposes.

Before the adoption of the Tax Code, Article 8 of the Law of Ukraine «Company income taxation» the depreciation rates were set at the percentage to the balance-sheet for each group of capital assets at the beginning of the reporting period by sizes: group 1 — 2%, group 2 — 10%, group 3 — 6%, group 4 — 15% [9]. The straight-line method of depreciation was used for group 1 while for groups 2,3,4 the declining balance method was used.

After the adoption of the Tax Code the fixed assets were classified into 16 groups with the establishment of permissible duration of their useful life (par.145.1) [8]. Also in the Tax Code it is allowed the depreciation using the methods: 1) straight-line; 2) declining balance; 3) accelerated; 4) cumulative; 5) production.

According to the Tax Code par.145.1.9 "Tax depreciation realization of the enterprise is realized with the help of the method specified by the order of accounting policies with the objective of financial reporting, and may be revised in case of change of the expected method of obtaining benefits from its usage" [8].

These changes indicate that using depreciation has made it possible to accumulate money, and the question of which method of depreciation in the modern tax leads to less distortion to investment decisions has arisen naturally enough.

Taking into account the domestic practice of depreciation before the adoption of the Tax Code, the declining balance method was used to tangible assets, and the revaluation of assets to the rate of inflation was allowed , we evaluate A as:

$$A = \int_0^L tn(1-n)^u e^{-(r-p)u} du =$$

$$= tn \frac{1-(1-n)^L e^{-(r-p)L}}{r-p-\ln(1-n)} \ , \qquad (3)$$

n — tax depreciation rate;
L — useful life of the asset;
t — income tax rate;
p — rate of inflation.

According to the regulations of the Tax Code let's define the formula for calculating the present value of depreciation, taking into consideration the rules and norms of depreciation.

In the case of application the straight-line method of depreciation (for objects group 9; 12; 13; 14) the present value of accrued depreciation is expressed by:

$$A = \int_0^\infty t \frac{1}{N} e^{-(r-p)u} du = \frac{t(1-e^{-(r-p)L})}{(r-p)N} \ , \quad (4)$$

N — number of operation periods fixed assets.

In the case of application the declining balance method the present value of depreciation is calculated by the formula (3), and the depreciation rate is given by Matheson:

$$n = 1 - \sqrt[N]{\frac{B_{ликв}}{B_0}} \ , \qquad (5)$$

N — the total number of periods of depreciation of an asset;

B_0 — the historical cost of fixed assets;

$B_{ликв}$ — liquidation value of fixed assets.

In the case of application of the accelerated method the present value of depreciation will be calculated by the formula (3), but the depreciation rate becomes:

$$n = \frac{2}{N} \qquad (6)$$

Marginal effective tax rates (financed from retained earnings)

Rate of inflation	Buildings		Machinery and equipment		
	Manufacturing, construction	Commerce	Manufacturing	Commerce	Construction
Old Law					
income tax rate 25%					
0%	0,2814	0,2599	0,3406	0,41321	0,4288
10%	0,3467	0,3272	0,4005	0,4666	0,4807
13%	0,3641	0,3451	0,4165	0,4809	0,4945
the income tax rate 16%					
0%	0,16942	0,1562	0,20714	0,255707	0,26283
10%	0,244927	0,232909	0,279218	0,32337	0,329845
13%	0,264973	0,253274	0,298354	0,341334	0,347637
Tax Code					
income tax rate 23%					
0%	0,2044	0,1891	0,2662	0,3251	0,3251
10%	0,2767	0,2628	0,3329	0,3864	0,3864
13%	0,2959	0,2823	0,3506	0,4027	0,4027
income tax rate 16% (since 01.01.14)					
0%	0,1416	0,1307	0,1851	0,2284	0,2284
10%	0,2196	0,2097	0,2592	0,2986	0,2986
13%	0,2403	0,2307	0,2789	0,3172	0,3172

In the case of the cumulative method present value of depreciation is calculated as:

$$A = \int_0^L tne^{-(r-p)u}du = \int_0^L t\frac{N+1-u}{\Sigma}e^{-(r-p)u}du =$$
$$= \frac{t}{\Sigma}\frac{e^{-(r-p)L}((p-r)(L-N-1)+1)+(r-p)(N+1)-1}{(r-p)^2} , (7)$$

$\Sigma = \sum_{i=1}^{N}i$ — total number of periods the useful life asset

The after-tax rate of return (s) depends on the source of financing (corporate bonds, retained earnings, share issue) and can be defined as the weighted average:

$$s = bi(1-m^i) + (1-b)\left[a(1-m^d+t)r+(1-a)r\right]-p \quad (8)$$

i — market interest rate;

m^i и m^d — tax rate on interest income and dividend income respectively;

b — proportion of debt the firm's assets;

a — proportion of new shares in the total share capital;

r — value of equity.

Accordingly, when investment financing by debt funds, after-tax rate of return is equal $i(1-m^i)$, after-tax rate of return for stock issue of the form $(1-m^d+t)r$, with funding from the retained earnings after-tax rate of return is because no capital gains tax.

The given approach for Ukraine will allow to estimate the marginal tax burden, taking into account the variety of tax laws in the values that simple to interpret, which reflects the impact of taxation on investment decisions.

With the given method for calculating marginal effective tax rates, the tax burden on investments in certain types of tangible assets at the nominal tax rate on profit before and after the adoption of the Tax Code were calculated. In order to define the inflation, the experimental calculations with changes in rate inflation have been held (table 1).

The analysis has showed that in nominal interest rates the tax burdens on investment are high. Since the financing of investments from retained earnings in the current legislation are ranged from 18.9% till 40.3%, whereas before the adoption of the Tax Code the tax burden was somewhat higher — from 26% till 49.5%. The marginal effective tax rates while reducing the nominal tax rate to 16% (as provided for in the tax code) has been also calculated. It should be noted that

reducing of the income tax rate till 16% before the tax code METR was adopted had ranged from 15.6% to 34.7%, while after the adoption of the tax code METR will range from 13% to 31.7%.

In conclusion, although the gradual reduction in the income tax rate to 16% has been planed in the tax code, but even such the measure significantly reduces the tax burden on investment and an ineffective measure to attract investment. The Ukrainian legislation creates unfavorable conditions for reinvestment tax profits, often promotes its excretion in the offshore. As the price of credit is lower (in particular in Western stock markets), so it's advantageous for investors to withdraw the profits in offshore accounts, replacing the source of funding onto the debt funds.

The tax burden when debt financing is lower, but long-term shortage of resources in the capital market and the unavailability of loans due to their high cost do not allow to use these sources of most enterprises. Scantiness of "non-taxable resources" in the form of depreciation, which are insufficient even for the simple reproduction, also humpers the investment. In Ukraine the share of income to be sent for the replacement of fixed assets allowed by the state is not sufficient even for simple reproduction.

The increase of the importance of profits as the source of income of investment may be achieved by improving the arrangements of tax regulation. For example, the transition from the advance of providing tax benefits in investment of some profits to the tax exemption on profits taking into account the efficiency of productive investment. In practice, the mechanism of preferential tax return should be based on the comparison of actual results achieved by the investment project envisaged in the business plan beforehand. It is also necessary to develop and inculcate the effective mechanism of providing targeted incentives for industrial enterprises which take root of investments and innovations in the priority areas and convert into cash the competitive products.

References

1. **Fullerton D.** The Indexation of Interest, Depreciation, and Capital Gains and Tax Reform in the United States / D. Fullerton / Journal of Public Economics. — № 32. — 1987. — P. 25 — 51. 2. **Chen D.** The Marginal Effective Tax Rate: The Only Tax Rate that Matters in Capital / D. Chen. — Ontario : C. D. Howe Institute, 2000. — 20 p. 3. **King M.** The Taxation of Income from Capital: A Comparative Study of the United States, United Kingdom, Sweden, and West Germany / M. King, D. Fullerton. — Chicago : University of Chicago Press, 1984. — 346 p. 4. **McKenzie K. J.** The Calculation of Marginal Effective Tax Rates / K. J. McKenzie, M. Mansour, A. Brule // Working paper 97-15. — Canada : Technical Committee on Business Taxation, 1998. — 125 p. 5. **Giannini S.** The effective tax rates in the EU Commission study on corporate taxation: methodological aspects, main results and policy implications / S. Giannini, C. Maggiulli. — CESifo Working Paper No. 666 (1), 2002. — 21 p. 6. **Karzanova I.** Estimation of effect of taxation on real sector investment in Russia: Calculation of marginal effective tax rates / I. Karzanova // HSE Economic Journal. — 2002. — 6(2). — P. 225 — 249. 7. **Козуб О. Ю.** Методика визначення впливу оподаткування на інвестиційну діяльність / О. Ю. Козуб // Вісник Східноукраїнського національного університету ім. В. Даля. — 2009. — №1 (131). — Ч. 2. — С. 352 — 357. 8. **Податковий** кодекс України: Чинне законодавство зі змінами та допов. станом на 24.01.2011р. — К. : ПАЛИВОДА А. В., 2011. — 512 с. 9. **Закон** України „Про оподаткування прибутку підприємств" [Електроний ресурс]. — Режим доступу : http://zakon.rada.gov.ua/cgi-bin/laws/

Goncharenko O. Y. Marginal effective tax rates: the calculation for Ukraine

The method of determining the impact of taxation on investment processes with marginal effective tax rates has been considered in article.The model of calculation of marginal effective tax rates for the Ukraine is offered. The tax burden on investments in tangible assets has been defined.

Key words: marginal effective tax rate, investment, deprecation, income taxation, discount rate, inflation.

Гончаренко О. Ю. Граничні ефективні податкові ставки: розрахунок для України

У статті розглянуто методику визначення впливу оподаткування на інвестиційні процеси за допомогою граничних ефективних податкових ставок. Побудовано модель розрахунку граничних ефективних податкових ставок для України. Визначено податкові навантаження на інвестиції в матеріальні активи.

Ключові слова: гранична ефективна податкова ставка, інвестиції, амортизація, оподаткування прибутку, норма дисконтування, інфляція.

Гончаренко О. Ю. Предельные эффективные налоговые ставки: расчет для Украины

В статье рассмотрена методика определения влияния налогообложения на инвестиционные процессы с помощью предельных эффективных налоговых ставок. Построена модель расчета предельных эффективных налоговых ставок для Украины. Определены налоговые нагрузки на инвестиции в материальные активы.

Ключевые слова: предельная эффективная налоговая ставка, инвестиции, амортизация, налогообложение прибыли, норма дисконтирования, инфляция.