Analysis of Effective Tax Rates on Assets and Sources of Finance in the Czech Republic in Years 2000 – 2005[#]

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The objective of this paper is to describe a study of **effective tax rates** on different types of capital assets and sources of financing in the Czech Republic using the King and Fullerton methodology (1984), which has become the most widely accepted approach adopted to calculating effective tax rates (**tax wedges)**.

The profit taxes in use in the developed market economies distort the types of investment which companies undertake, the way they finance those investments and the overall level of investment. All these problems get worse the higher is the level of inflation, because no corporate tax system adjusts fully for the effects of inflation (Heady – Pearson – Rajah – Smith, 1993, p. 35). Inflation, important as it can be, is only one issue. Other features of a corporation tax system, particularly its effect on corporate decisions as to **investments and sources of finance**, matter at any inflation rate (King – Wookey, 1987, p. 6).

The tax system that seeks to raise revenue in ways that avoid **distortionary substitution effects**, as regards decisions on investments or sources of finance, is considered a **neutral tax system**. This does not imply that the tax system has no impact upon behavior but instead suggests that there should be an avoidance of high marginal tax rates and that should not be different tax rates on essentially similar activities.

The appeal is to **tax neutrality**; that is, to a tax that leaves corporate decisions as to investments or sources of finance unchanged. This point is

[#] This paper was prepared in the framework of research plan *Development of Accounting and Financial Theory and its Application in Practice from Interdisciplinary Point of View* (registered number MSM 6138439903).

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of great importance, for it defines one aim of the current tax system and one criterion by which it may be assessed.

Taxes impose a real cost to the economy inasmuch as they create distortions in the market allocation of resources. However, not all tax systems are equally distorted, and one obviously attractive objective is **to minimize** as far as possible the impact of the tax structure on behavior. A corporation tax that achieves this regard decisions on investments or the sources of finance is described as a neutral tax.)

Suppose there were no corporation tax, and consider a company appraising an investment project. The company will assess the returns earned on the project after rewarding its suppliers of finance with the required return. To make a profit, the project has to generate at least this return for the company. Now we can measure the effect of introducing a corporation tax in terms of such an investment decision. For it may be that corporation tax raises the pre-tax required return the project needs to earn for the company to be worthwhile, above that needed in the absence of corporation tax. If it does this, the **tax drives a 'wedge'** between the pre-tax return and post-tax required rate of return, and will have a disincentive effect on corporate investment. In other words, it will not be neutral. For a fully neutral tax, this wedge will be zero.

The difference between the pre-corporate tax rate of return earned by companies and the post tax receipts an individual gets is a measure of the total distortion (total tax "wedge") caused by taxes. The size of the "wedge" can be rather good indication of the degree of neutrality in a corporation tax system.

The **tax wedge** provides an extremely useful tool to investigate this aspect of different tax regimes, and is used in the empirical analysis. Tax wedge is also one form how to calculate **effective tax rates.**

Effective tax rates are tax rates which take into account not only the statutory corporate tax rate, but also other aspects of the tax system which determine the amount of tax paid and profitability of investment, such as capital allowances and stock relief. Effective tax rates may also require a consideration of personal taxes and the manner (if any) in which the corporate and personal tax systems are integrated (classical, split rate or imputation). Inflation will also alter effective tax rates in various ways, de-

pending on how the tax system calculates taxable profits in the presence of inflation.

Effective tax rates (rather than statutory tax rates) can give us an idea of the level of distortion imposed on investment by the tax system. Therefore, it makes sense to consider the effective taxation of different **types of capital assets** and **means of financing** when evaluating the distortiveness of the tax system. Statutory tax rates measure the tax burden as imposed by the government on specified income (or expenditure) streams. These statutory tax rates do not take into account of depreciation or other deduction, nor do they consider the effects of inflation on the actual amount of tax paid relative to the value of the income stream. Effective tax rates are designed to correct for these facts.

As noted above, there are various factors that are of essential significance using the idea of the tax wedge:

- statutory corporate tax rate;
- system and rates of depreciation;
- capital structure;
- system of personal taxation;
- manner of the corporate and personal tax systems integration;
- rate of inflation;
- capital allowances.

There are three rates of return that is useful to focus on when discussing the effects of the tax system on investments decisions:

- real pre-corporate tax rate of return to companies (p),
- real interest rate which is the return that can be earned on a government bond or bank deposit before personal taxes are charged (r – usually 5 %, reflecting a typical real interest rate) and
- real post-personal tax rate of return received by the ultimate financiers of the investment (s).

The relation between the real interest rate r, and the post-tax real return s, can be simply stated:

$$S = \frac{1 + i \cdot (1 - t_i)}{1 + \pi} - 1, \qquad (1)$$

where π = rate of inflation,

i = nominal interest rate equals to $(1 + r) \cdot (1 + \pi) - 1$, and
t_i = personal tax rate on interest income.

Given the relationships specified between the pre-corporate tax return p, the interest rate r, and the post-personal tax return s, various effective tax rates or wedges can be calculated (on capital assets – as machinery, buildings, inventories or sources of finance – as new equity, retained earnings, debt). The difference between p (the pre-tax rate of return to companies) and s (the post-tax rate of return to individuals) reflects the overall size of the distortion in the market caused by **corporate and personal taxes**.

The importance of this tax wedge is that it gives some indication of whether taxation creates a disincentive to new investment. For example, suppose that investors will only finance investment if they receive a 5 % post-tax return (after any tax). If the pre-corporate tax rate of return necessary to give potential investors a 5 % post-tax return is 10 %, then all those projects which earn a return of between 5 % and 10 % and which would be viable in the absence of tax will not earn a sufficient return when income from capital is taxed, and such projects may therefore not be undertaken.

Suppose, for example, it is possible to earn a real post-tax rate of return of 5 % by depositing money in an interest-bearing account in a bank. For a company to persuade an investor to finance and investment by buying shares in that company, it must expect to be able to provide dividends and/or capital gains of sufficient size so that after tax the investor would get a rate of return of at least 5 % (if it is assumed that companies are risk neutral). To be able to give shareholders a return of 5 % the company may have to pay gross dividends of 7 %, the difference being paid to the authorities as personal tax. In order to be able to pay gross dividends of 7 %, the company may have to earn a pre-corporation tax return of 10 %, the difference being paid as corporation tax. Therefore tax has driven a wedge of 5 percentage points between the return to investors on the capital they originally invest in companies (5 %), and the return earned before tax by companies (10 %). **This wedge can be calculated if the provisions of the tax code are known.**

We then ask what minimum pre-tax real return p this investment must yield for the company to be able to reward the suppliers of finance with

the return require *r*. In other words, we find the corporate tax wedge (*p* – *r*) for different projects.

There are three relevant measures of the effective tax rates on business:

1. first is the p required to get a particular value of *r*,
2. secondly is the tax wedge – the percentage difference between p and *s*,
3. thirdly is the tax rate – the tax wedge divided *p*. The tax rate is not always a useful figure, because the tax wedge may be similar in two different cases, but p may vary, giving substantial differences in the tax rate.

The basic aim of the King and Fullerton approach is to derive the difference between the real rate of return required from an investment project pre-tax and post-tax. In the absence of tax these will, of course, be equal to each other and also equal, by assumption, to the prevailing real interest rate *r*. However, corporation taxes may cause the pre-tax required real rate of return, also termed the **cost of capital** *p* to diverge from the interest rate. In addition, personal taxes may reduce the post-tax real return to the individual investor *s* below the interest rate.

The methodology and calculations of tax wedges include the corporate tax rate, depreciation allowances, the valuation of dividends, personal tax rates on dividend income, interest income and capital gains, rate of inflation.

Three forms of financing the company are considered:

- retained earnings (*RE*),
- new equity (*NE*),
- debt (borrowings) (*D*).

Investment in three assets that are distinguished in the balance sheet:

- machinery (*M*),
- buildings (*B*),
- inventories (*I*).

The precise methodology used to calculate effective tax rates on investments in this paper is closely based on an approach developed by

King and Fullerton (1984) that enables complicated provisions of tax codes to be modeled in a rigorous manner.[1]

Analysis of the tax wedges in the Czech Republic

As noted above, there are various factors that are of essential significance using the idea of the tax wedge.

Tab. 1: Assumptions and parameters used in the calculation

Assumption	Parameter
Sector	manufacturing.
Sources of finance	retained earnings *RE*, new equity *NE*, debt *D*.
Types of assets	machinery *M*, buildings *B*, inventories *I*.
The weights used for finance	55 % *RE*, 10 %, *NE*, 35 % *D*.
The weights for assets	50 % *M*, 28 % *B*, 22 % *I*.
Length of life for tax purposes	machinery 6 years (tax rate 16.66 %), buildings 30 years (tax rate 3.33 %).
Economic depreciation rate	machinery 12.3 %, buildings 3.6 %.
Inventories	are assumed not to be depreciated.
The real interest rate	5 %.
The inflation rate	3 % in the year 2005.
Personal tax rates of individual investors	rate on interest (t_i = 15 %), rate on dividends (t_d = 15 %), rate on capital gains (z = 32 %).
Statutory corporate tax rate t	26 % (in the year 2005).

There is a number of steps in calculating tax wedges. They are as follows:

1. find the nominal rate of interest *i* given by the formula

$$i = (1+r)\cdot(1+\pi)-1, \tag{2}$$

[1] About problems with tax shield see Marek – Radová (2002).

$$i = (1 + 0{,}05) \cdot (1 + 0{,}03) - 1 = (1{,}05 \cdot 1{,}03) - 1 = 0{,}0815\,,$$

where i = nominal interest rate,
r = real interest rate (5 %, i.e. 0.05),
π = inflation rate.

2. find the discount rate for each type of finance *p'*

(a) retained earnings:

$$p'_{RE} = \frac{(1 - t_i) \cdot i - z \cdot \pi}{1 - z}, \tag{3}$$

where t_i = tax rate on interest,
t_d = tax rate on dividends,
z = tax rate on capital gains.

The capital gains tax rate, z, is the accrual equivalent rate applied to the nominal capital gain. To calculate this rate, it is necessary to make some assumption regarding the time at which the shareholder sells his shares, realizes the gain and hence faces a tax liability. The approach of King and Wookey (1987) is followed in assuming that the shareholder sells a constant proportion α, of his stock of assets in each period is normally taken to be 10 %. In this case, the accrual equivalent capital gain tax rate is simply the present value of taxes due on a capital gain of one period t, that is:

$$z = \frac{\alpha \cdot z_r \cdot (1 + j)}{\alpha + j}, \tag{4}$$

where j = $i \cdot (1 - t_i)$, tj. shareholders discount rate,
z_r = statutory tax rate on capital gains after sale,
α = proportion of stock of assets realized in each year,

$$z = \frac{0{,}032 \cdot (1 + 0{,}0815.0{,}85)}{0{,}1 + (0{,}0815.0{,}85)} = \frac{0{,}034217}{0{,}169275} = 0{,}202138\,,$$

$$p'_{RE} = \frac{(1 - 0{,}15) \cdot 0{,}0815 - 0{,}202138 \cdot 0{,}03}{1 - 0{,}202138} = 0{,}079225\,.$$

(b) new equity:

$$p'_{NE} = \frac{(1 - t_i) \cdot i - z \cdot \pi}{1 - t_d}, \tag{5}$$

$$p'_{NE} = \frac{(1 - 0{,}15) \cdot 0{,}0815 - 0{,}202138 \cdot 0{,}03}{1 - 0{,}15} = 0{,}074366 .$$

(c) debt:

$$p'_D = (1 - t) \cdot i , \tag{6}$$

where T = corporate tax rate,

$$p'_D = (1 - 0{,}26) \cdot 0{,}0815 = 0{,}06031 .$$

3. find the present value of depreciation allowances *A*.

The formula for the calculation of the present value of depreciation allowances can be used for declining balance and straight line (linear) depreciation schedules.

For straight line schedule is as follows:

$$A_S = \frac{o \cdot t \cdot (1 + p')}{p'} \cdot \left[1 - \frac{1}{(1 + p')^N} \right], \tag{7}$$

where N = number of years for ($N = 1 / o$),
o = tax depreciation rate,
o_m = 0.166666 for machinery (in the Czech Republic),
o_b = 0.033333 for buildings (in the Czech Republic),
p' = discount rate for each type of finance,
t = corporate tax rate.

For declining balance schedule is as follows:

$$A_D = \frac{o \cdot t \cdot (1 + p')}{p' + o} . \tag{8}$$

In this calculation the straight (linear) schedule (prevailing in the Czech Republic) will be considered according the formula (7):

This must be calculated for each of machinery and buildings (inventories do not receive any allowance). In each case, the present value depends on the company's discount rate, which, as we have seen in step 2, in turn depends on the source of finance.

Present value of depreciation for **machinery**:

There are three possible values of the discount rate *p*' corresponding to the values given above. We take each in turn:

$$A_{M,RE} = \frac{0{,}16666 \cdot 0{,}26 \cdot (1 + 0{,}079225)}{0{,}079225} \cdot \left(1 - \frac{1}{1{,}079225^6}\right) =$$
$$= 0{,}590296 \cdot 0{,}36711 = 0{,}216705 .$$

$$A_{M,NE} = \frac{0{,}16666 \cdot 0{,}26 \cdot (1 + 0{,}074366)}{0{,}074366} \cdot \left(1 - \frac{1}{1{,}074366^6}\right) =$$
$$= 0{,}6260367 \cdot 0{,}349741 = 0{,}218951 .$$

$$A_{M,D} = \frac{0{,}16666 \cdot 0{,}26 \cdot (1 + 0{,}06031)}{0{,}06031} \cdot \left(1 - \frac{1}{1{,}06031^6}\right) =$$
$$= 0{,}761840 \cdot 0{,}296276 = 0{,}225715 .$$

Present value of depreciation for **buildings**:

The buildings are depreciated over 30 years. Using (7) we again need to take each of the sources of finance in turn:

$$A_{B,RE} = \frac{0{,}0333333 \cdot 0{,}26 \cdot (1 + 0{,}079225)}{0{,}079225} \cdot \left(1 - \frac{1}{1{,}079225^{30}}\right) =$$
$$= \frac{0{,}009352}{0{,}079225} \cdot 0{,}898459 = 0{,}106072 .$$

$$A_{B.NE} = \frac{0{,}0333333 \cdot 0{,}26 \cdot (1 + 0{,}074366)}{0{,}074366} \cdot \left(1 - \frac{1}{1{,}074366^{30}}\right) =$$
$$= \frac{0{,}009311}{0{,}074366} \cdot 0{,}88374 = 0{,}110651 .$$

$$A_{B,D} = \frac{0{,}0333 \cdot 0{,}26 \cdot (1 + 0{,}06031)}{0{,}06031} \cdot \left(1 - \frac{1}{1{,}06031^{30}}\right) =$$

$$= \frac{0{,}009188}{0{,}06031} \cdot 0{,}827411 = 0{,}126071 .$$

Thus, in each case the present value of depreciation allowances rises as the discount rate falls, since future allowances are not discounted so heavily.

Present value of depreciation allowances depends except from the rate of depreciation on:

- Discount rate of the company for a particular type of finance.
- Source of finance

Because inventories are not depreciated the present value is not calculated.

4. find the real required pre-tax rate of return *p*

There are nine different rates of return to be calculated, corresponding to an investment in the three assets each funded from each of the three sources of finance. Again they are taken into turn.

This requires four additional parameters not already used: the economic depreciation rate *d* for machinery , for buildings and for inventories, which are assumed to be 12.25 % (i.e. 0.1225) and 3.61 % (i.e. 0.0361) and zero, respectively, and the proportion of inventories which are valued using the FIFO method, v, which in the Czech Republic is nearly 100 % (i.e. 1.0). LIFO is not allowed.

The calculation for machinery and buildings uses this formula:

$$p = \frac{1 - A}{(1 - t) \cdot (1 + \pi)} \cdot \left[p' - \pi + d \cdot (1 + \pi)\right] - d , \qquad (9)$$

where d_m = 0.1225 for machinery,
d_b = 0.0361 for buildings.

The formula for inventories is as follows:

$$p = \frac{1-A}{(1-t)\cdot(1+\pi)}\cdot\left[p'-\pi+d\cdot(1+\pi)\right]+\frac{v\cdot t\cdot\pi}{(1-t)\cdot(1+\pi)}-d\ . \qquad (10)$$

The expression (10) shows the calculation for the cost of capital when the inflationary increase in the value of inventories is taxed. With $v = 1$, the calculations are therefore as follows: If inflation rate is high then it implies the increase of tax wedge for inventories.

Now we can calculate the real required pre-tax rate of return p that also represents cost of capital.

Machinery (9):

Retained earnings:

$$p_{M,RE} = \frac{1-0{,}216705}{(1-0{,}26)\cdot(1+0{,}03)}\cdot \\ \cdot\left[0{,}079225-0{,}03+0{,}1225\cdot(1+0{,}03)\right]-0{,}1225 = \\ = 0{,}0578 = 5{,}78\ \%\ .$$

New equity:

$$p_{M,NE} = \frac{1-0{,}218951}{(1-0{,}26)\cdot(1+0{,}03)}\cdot \\ \cdot\left[0{,}074366-0{,}03+0{,}1225\cdot(1+0{,}03)\right]-0{,}1225 = \\ = 0{,}0523 = 5{,}23\ \%\ .$$

Debt:

$$p_{M,D} = \frac{1-0{,}225715}{(1-,26)\cdot(1+0{,}03)}\cdot \\ \cdot\left[0{,}06031-0{,}03+0{,}1225\cdot(1+0{,}03)\right]-0{,}1225 = \\ = 0{,}0365 = 3{,}65\ \%\ .$$

Buildings (9):

Retained earnings

$$p_{B,RE} = \frac{1-0{,}106072}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}079225-0{,}03+0{,}0361\cdot(1+0{,}03)\right]-0{,}0361=$$
$$=0{,}0652=6{,}52\ \%\ .$$

New equity

$$p_{B,NE} = \frac{1-0{,}110651}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}074366-0{,}03+0{,}0361\cdot(1+0{,}03)\right]-0{,}0361=$$
$$=0{,}0591=5{,}91\ \%\ .$$

Debt:

$$p_{B,D} = \frac{1-0{,}126071}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}06031-0{,}03+0{,}0361\cdot(1+0{,}03)\right]-0{,}0361=$$
$$=0{,}0413=4{,}13\ \%.$$

Inventories (10):

Retained earnings

$$p_{I,RE} = \frac{1-0}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}079225-0{,}03+0.(1+0{,}03)\right]+\frac{1.0{,}26.0{,}03}{(1-0{,}26)\cdot(1+0{,}03)}-0=$$
$$=0{,}0748=7{,}48\ \%\ .$$

New equity

$$p_{I,NE} = \frac{1-0}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}074366 - 0{,}03 + 0.(1+0{,}03)\right] + \frac{1.0{,}26.0{,}03}{(1-0{,}26)\cdot(1+0{,}03)} - 0 =$$
$$= 0{,}0684 = 6{,}84\ \%\ .$$

Debt

$$p_{I,D} = \frac{1-0}{(1-0{,}26)\cdot(1+0{,}03)}\cdot$$
$$\cdot\left[0{,}06031 - 0{,}03 + 0.(1+0{,}03)\right] + \frac{1.0{,}26.0{,}03}{(1-0{,}26)\cdot(1+0{,}03)} - 0 =$$
$$= 0{,}0500 = 5{,}00\ \%.$$

5. find the post-tax return to investors *s* (1)

$$s = \frac{1 + 0{,}0815\cdot(1-0{,}15)}{1+0{,}03} - 1 = 3{,}81\%\ .$$

6. find the average real required pre-tax rates of return *p*

Step 4 yielded nine different costs of capital. These are combined into the weighted averages in the table below. Weights for assets type of 50 % for machinery, 28 % for buildings and 22 % for inventories, and weights for source of finance of 55 % for retained earnings, 10 % for new equity and 35 % for debt. These weights yield the following table:

P	***RE***	***NE***	***D***	**Weighted average**
Buildings *B*	6.52 %	5.91 %	4.13 %	5.62 %
Machinery *M*	5.78 %	5.23 %	3.65 %	4.98 %
Inventories *I*	7.48 %	6.84 %	5.00 %	6.55 %
Weighted average	**6.36 %**	**5.77 %**	**4.08 %**	

7. find the weighted average effective tax wedge [*p – s*], *s* = 3.81

a) year 2005

p – s	***RE***	***NE***	***D***	**weighted average**
Buildings [*B*]	2.71%	2.09%	0.32%	1.81%
Machinery [*M*]	1.96%	1.41%	–0.17%	1.16%
Inventories [*I*]	3.67%	3.03%	1.19%	2.74%
Weighted average	2.55%	1.96%	0.27%	1.69%

Note: Model with calculations in Annex 1.

b) year 2000

p – s	***RE***	***NE***	***D***	**Weighted average**
Buildings [*B*]	3.10 %	2.57 %	–0.16 %	1.91 %
Machinery [*M*]	2.26 %	1.79 %	–0.60 %	1.21 %
Inventories [*I*]	4.90 %	4.34 %	1.46 %	3.64 %
Weighted average	3.07 %	2.57 %	–0.02 %	1.94 %

Note: Model with calculations in Annex 2.

If we make a comparison of values of tax wedges in the year 2005 with values calculated for the year 2000, that are indicated in the table above, we can interpret the results

The values of the tax wedges for 2005 can be interpreted as follows: e.g. Line 2 shows, that company which needs to guarantee investments into machinery financed from the combination of retained earnings, of new share and borrowings (debt), must ensure the rate of return of 1.16 percentage points higher than the investor really receives after taxation. The difference will be paid to the government in the form of the taxes. Tax wedge within buildings and other constructions is higher (by 1.81 percentage points) and investment into stocks is being taxed at the highest rate (by 2.74 percentage points).

If we look at the sources of financing, we can see that combined investment into machinery, buildings and stocks is taxed both in case of financing from retained earnings and new equity. The difference between these two methods is negligible. In both these case company has to ensure rate of return which is 2.55 %, or. 1.96 %, or. 0.27 % higher than the final post-tax rate that the investor actually gets. The data indicate that debt finance tends to be favored over retained earnings and equity.

How far governments should be concerned about these non-neutralities depends, inter alia, upon the view taken on the efficiency of capital markets in allocating funds and on risks attached to corporations placing a high reliance on debt financing.

On average, rate of return of the company before taxation is 1.69 percentage points higher than rate of return after tax actually received by the investor. This total tax wedge is lower than the OECD average, which is 2.4 or 2.1, as shown in the table below. Even partial tax wedges are similar the values in OECD countries (1991). There are even lower in some cases. Shortening the depreciation period has got a major influence on lowering the tax wedge within the category of machinery and buildings.

If we compare the values from 2005 and 2000, we can see improvements in the calculated values (decrease both in the values of partial tax wedges and the total average from 1.94 to 1.69 percent). This positive change has been mainly caused by the interaction of following factors:

Factor	Year 2000	Year 2005
Inflation	5 %	3 %
Tax rate on capital gains	40 %	32 %
Corporate tax rate	31 %	26 %
Number of year for machinery depreciations	8 let	6 let
Number of years for building depreciations	45 let	30 let

Tax wedges in particular countries might be interesting information for foreign investors because they indicate average taxation of investments. However, high tax wedge does not necessarily deter foreign investment as other important factor take place in the decision process.

The methodology allows the effect of different types of tax treatments to be compared systematically, both within countries (on different types of investment, financed in different ways) and across countries.

Tab. 2: Corporate and personal income tax wedges with country specific inflation rates

Country	1	2	3	4	5	6	Average
Australia	0.70	0.70	3.00	1.20	1.20	2.60	1.50
Austria	0.80	2.40	1.80	1.30	0.20	3.80	1.30
Belgium	1.60	4.90	–1.40	0.80	–0.30	3.80	0.90
Canada	3.80	5.60	3.30	3.60	3.10	5.70	3.80
Denmark	1.30	4.20	2.70	2.10	1.80	2.70	2.10
Finland	7.50	9.00	–1.40	4.30	3.50	7.30	4.50
France	2.70	6.40	–0.10	2.10	1.20	4.00	2.10
Germany	1.20	1.60	0.70	1.30	1.10	0.70	1.00
Greece	3.50	9.40	–7.80	0.10	0.60	–0.70	0.20
Iceland	5.10	11.60	–0.80	5.00	2.60	4.80	3.70
Ireland	0.50	2.50	3.80	1.70	1.80	2.20	1.90
Italy	4.50	2.90	–0.80	3.10	2.60	1.70	2.50
Japan	4.10	7.90	–0.80	3.30	2.20	3.60	2.80
Luxembourg	1.20	7.10	2.60	2.60	1.40	3.90	2.30
Netherlands	0.50	6.50	2.90	2.20	1.80	2.00	1.90
New Zealand	2.00	2.00	2.00	1.90	1.60	2.90	2.00
Norway	3.50	0.80	1.10	2.00	1.40	5.10	2.40
Portugal	1.90	7.00	–1.50	1.50	1.40	0.30	1.20
Spain	0.60	3.20	3.90	1.40	1.60	3.80	2.00
Sweden	3.60	3.50	0.60	2.10	1.70	5.10	2.60
Switzerland	0.60	5.90	2.20	1.80	1.60	1.60	1.70
Turkey	21.20	12.70	–16.10	–2.30	1.90	31.80	7.30
United Kingdom	1.90	1.30	2.40	1.60	1.50	3.80	2.00
USA	3.70	5.80	0.90	3.70	2.50	3.10	3.00
Average 1[1]	**3.30**	**5.20**	**0.10**	**2.00**	**1.70**	**4.40**	**2.40**
Average 2[2]	**2.50**	**4.90**	**0.80**	**2.20**	**1.70**	**3.20**	**2.10**
Czech Republic	**2.55**	**1.96**	**0.27**	**1.81**	**1.16**	**2.74**	**1.69**

Comments: [1] average including Turkey, [2] average apart Turkey.
Columns: 1. retained earnings, 2. new equity, 3. debt, 4. buildings, 5. machinery, 6. inventories, average = weighted average.

Conclusions

Effective tax rates are rates, which take into account not only the statutory corporate tax rate, but also other aspects of the tax system which determine the amount of tax paid and profitability of investment, such as capital allowances and stock relief. Effective tax rates also require a consideration of personal taxes, and manner (if any) in which the corporate and personal tax systems are integrated. Inflation will also alter effective tax rates in various ways, depending on how the tax system calculates taxable profits in the presence of inflation. The difference between the pre-corporate tax rate of return (also termed "the cost of capital") earned by companies (p) and the post-personal tax return earned by individual investor (s) – i.e. "tax wedge" is a measure of effective tax rate that reflects the overall size of the distortion in the market caused by corporate and personal taxes.

References

[1] Heady, C. – Pearson, M. – Rajah, N. – Smith, S. (1993): *Report on the Czechoslovakian Government's Tax Proposal*. London, Institute for Fiscal Studies 1993.

[2] King, M. A. – Fullerton, D. (1984): *The Taxation of Income from capital: a Comparative Study of the US, UK, Sweden and West Germany*. Chicago, Chicago University Press, 1984.

[3] King, J. – Wookey, C. (1987): *Inflation: The Achilles' Heel of Corporation Tax*. Report Series no. 26. London, Institute for Fiscal Studies, 1987.

[4] Marek, P. – Radová, J. (2002): *Skutečný okamžik realizace daňové úspory*. (*Real Moment of Tax Shield Realization*.) Acta Oeconomica Pragensia, 2002, vol. 10, no. 1, pp. 104-116.

[5] OECD (1991): *Taxing Profits in a Global Economy – Domestic and International Issues*. Paris, OECD, 1991.

Annex 1: Tax wedges – assumptions and variables of the model 2005

Real interest rate	r	5 %
Inflation rate	π	3 %
Tax rate on interest	*ti*	15 %
Tax rate on dividends	*td*	15 %
Tax rate on capital gains	*zr*	32 %
Corporate tax rate	*t*	26 %
Alfa	α	10 %
Tax depreciation rate on buildings	*ob*	3 %
Tax depreciation rate on machinery	*om*	16.7 %
Proportion of inventories valued by FIFO	*v*	100.0 %
Economic depreciation rate on buildings	*db*	3.61 %
Economic depreciation rate on machinery	*dm*	12.25 %
Weight for retained earnings	*RE*	55 %
Weight for new equity	*NE*	10 %
Weight for debt	*D*	35 %
Weight for buildings	*B*	28 %
Weight for machinery	*M*	50 %
Weight for inventories	*I*	22 %
Nominal interest rate	*i*	8 %
Shareholders' discount rate	*j*	7 %
Length of depreciation of buildings (years)	*Nb*	30
Length of depreciation of machinery (years)	*Nm*	6
Required post – tax return to investors	*s*	3.81 %

Discount rates

P'	***RE***	***NE***	***D***
p' (B, M, I)	0.079225	0.074366	0.06031

Present value of depreciation allowances

A	***RE***	***NE***	***D***
Buildings *B*	0.106072	0.110651	0.126071
Machinery *M*	0.216705	0.218951	0.225715

Required pre-tax rate of returns

P	***RE***	***NE***	***D***	*Weighted average*
Buildings *B*	6.52 %	5.91 %	4.13 %	5.62 %
Machinery *M*	5.78 %	5.23 %	3.65 %	4.98 %
Inventories *I*	7.48 %	6.84 %	5.00 %	6.55 %
Weighted average	6.36 %	5.77 %	4.08 %	

Tax wedges

Wedge (*p* – *s*)	***RE***	***NE***	***D***	*Weighted average*
Buildings *B*	2.71 %	2.09 %	0.32 %	1.81 %
Machinery *M*	1.96 %	1.41 %	–0.17 %	1.16 %
Inventories *I*	3.67 %	3.03 %	1.19 %	2.74 %
Weighted average	2.55 %	1.96 %	0.27 %	**1.69 %**

Annex 2: Tax wedges – assumptions and variables of the model 2000

Real interest rate	r	5 %
Inflation rate	π	5 %
Tax rate on interest	*ti*	15 %
Tax rate on dividends	*td*	15 %
Tax rate on capital gains	*zr*	32 %
Corporate tax rate	*t*	31 %
Alfa	α	10 %
Tax depreciation rate on buildings	*ob*	3 %
Tax depreciation rate on machinery	*om*	16.7 %
Proportion of inventories valued by FIFO	*v*	100.0 %
Economic depreciation rate on buildings	*db*	3.61 %
Economic depreciation rate on machinery	*dm*	12.25 %
Weight for retained earnings	*RE*	55 %
Weight for new equity	*NE*	10 %
Weight for debt	*D*	35 %
Weight for buildings	*B*	28 %
Weight for machinery	*M*	50 %
Weight for inventories	*I*	22 %
Nominal interest rate	*i*	10 %
Shareholders' discount rate	*j*	9 %
Length of depreciation of buildings (years)	*Nb*	30
Length of depreciation of machinery (years)	*Nm*	6
Required post – tax return to investors	*s*	3.54 %

Discount rates

P'	***RE***	***NE***	***D***
p' (B, M, I)	0.095603	0.091564	0.070725

Present value of depreciation allowances

A	***RE***	***NE***	***D***
Buildings *B*	0.110766	0.114293	0.136302
Machinery *M*	0.249744	0.251819	0.2631

Required pre-tax rate of returns

P	***RE***	***NE***	***D***	*Weighted average*
Buildings *B*	6.64 %	6.11 %	3.38 %	5.45 %
Machinery *M*	5.79 %	5.33 %	2.94 %	4.75 %
Inventories *I*	8.43 %	7.88 %	5.00 %	7.18 %
Weighted average	6.61 %	6.10 %	3.52 %	

Tax wedges

Wedge (*p* – *s*)	***RE***	***NE***	***D***	*Weighted average*
Buildings *B*	3.10 %	2.57 %	–0.16 %	1.81 %
Machinery *M*	2.26 %	1.79 %	–0.60 %	1.21 %
Inventories *I*	4.90 %	4.34 %	1.46 %	3.64 %
Weighted average	3.07 %	2.57 %	–0.02 %	**1.94 %**

European Financial and Accounting Journal, 2006, vol. 1, no. 2, pp. 8-29.

Analysis of Effective Tax Rates on Assets and Sources of Finance in the Czech Republic in Years 2000 – 2005

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ABSTRACT

The aim of this article has been to assess on the base of calculation of the tax wedges the degree to which taxation affects the incentive to undertake investment in the Czech Republic and make a comparison with OECD countries. The tax wedge will vary according to the type of asset: machinery, buildings, inventory (because of different capital allowance rates relative to the assumed true economic depreciation rates) and the type of finance sources: new equity, debt, retained earnings (because the tax treatment of debt, dividends and retained earnings differs). The precise methodology used to calculate effective tax rates on marginal investments is based on an approach developed by King and Fullerton in 1984.

Key words: Tax Wedge; Effective Tax Rate; Required Pre-Tax Rate of Return.

JEL classification: H21.