COMPARISON OF THE TAX NEUTRALITY BY MEANS OF THE EFFECTIVE TAX RATES IN THE CZECH REPUBLIC IN THE YEARS 2000 - 2010[99]

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Abstract:

The objective of this paper is to examine **tax neutrality**; that is, to a tax that leaves corporate decisions as to investments or sources of financing unchanged. The tax system that seeks to raise revenue in ways that avoid distortion effects is considered **neutral tax system**. This point is of great importance, for it defines one aim of the current tax system and one criterion by which it may be assessed The use of **effective tax rates** on different types of capital assets and sources of financing and 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. The precise methodology used to calculate effective tax rates on marginal investments is based on an approach developed by the King and Fullerton methodology (1984), which has become the most widely accepted method adopted to calculating effective tax rates (**tax wedges)**. 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). **Effective tax rates** 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, a consideration of personal taxes.

Key Words: Effective tax rates, the tax wedges, tax neutrality, type of asset, type of finance sources, taxable profit

Introduction

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 behaviour 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 (Heady – Pearson – Rajah. – Smith, 1993, p. 25).

The appeal is to tax neutrality; that is, to a tax that leaves corporate decisions as to investments or sources of finance unchanged. (King – Wookey, 1987, p. 7).

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 distortive, 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 as regards decisions on investments or the sources of finance is described as a neutral tax (King – Wookey, 1987, p. 13).

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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 (King – Wookey, 1987, p. 7).

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 in this paper. 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, depending 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 sources 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:

$$s = \frac{1 + i\,(1 - t_i)}{1 + \pi} - 1$$

where:

π is the rate of inflation,

i is the nominal interest rate, equal to $(1+ r)(1+\pi) - 1$. and

t_i is the 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.

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 (*p* - *s*) 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.

Analysis of the tax neutrality (using 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.

Assumptions and parameters used in the calculation:

Sector	Manufacturing
Sources of finance	Retained earnings (RE), new equity (NE), debt (D)
Types of asset	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	5 % in the year 2000, 1,5 % in year 2010
Personal tax rates of individual investors	rate on interest (t_i = 15 %), rate on dividends (t_d = 25 %), rate on capital gains (z = 32 %).
Statutory corporate tax rate t	31 % in year 2000, 15 % in year 2010

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

$$i = (1 + r) \cdot (1 + \pi) - 1 \quad (1)$$

i = (1 + 0,05).(1 + 0,05) - 1 = (1,05 . 1,05) - 1 = **0,1025**

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:

$$p'_{RE} = \frac{(1 - t_i) \cdot i - z \cdot \pi}{1 - z} \quad (2)$$

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 (1997) 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:

$$z = \frac{\alpha \cdot z_r \cdot (1 + j)}{\alpha + j} \quad (3)$$

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

$$z = \frac{0{,}032 \cdot (1 + 0{,}1025.0{,}85)}{0{,}1 + (0{,}1025.0{,}85)} = \frac{0{,}04527}{0{,}187125} = 0{,}185908$$

$$p'_{RE} = \frac{(1 - 0{,}15) \cdot 0{,}1025 - 0{,}185908 \cdot 0{,}05}{1 - 0{,}185908} = 0{,}09560$$

(b) new equity:

$$p'_{NE} = \frac{(1 - t_i) \cdot i - z \cdot \pi}{1 - t_d} \quad (4)$$

$$p'_{NE} = \frac{(1 + 0{,}15) \cdot 0{,}1025 - 0{,}185908 \cdot 0{,}05}{1 - 0{,}25} = 0{,}10377$$

(c) debt:

$$p'_D = (1 - t) \cdot i \quad (5)$$

T = corporate tax rate.

$$p'_D = (1 - 0{,}31) \cdot 0{,}1025 = 0{,}07073$$

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:

$$A_S = \frac{o \cdot t \cdot (1 + p')}{p'} \cdot \left[1 - \frac{1}{(1 + p')^N} \right] \tag{6}$$

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

For declining balance schedule is as follows:

$$A_D = \frac{o \cdot t \cdot (1 + p')}{p' + o} \tag{7}$$

In this calculation the straight (linear) schedule (prevailing in the Czech Republic) will be considered according the formula (6).

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:

$$A_{M,\,RE} = \frac{0{,}16666 \cdot 0{,}31 \cdot (1 + 0{,}095603)}{0{,}095603} \cdot \left(1 - \frac{1}{1{,}095603^6}\right) = 0{,}592071 \cdot 0{,}42179 = 0{,}24974$$

$$A_{M,\,NE} = \frac{0{,}1666 \cdot 0{,}31 \cdot (1 + 0{,}103773)}{0{,}103773} \cdot \left(1 - \frac{1}{1{,}103773^6}\right) = 0{,}54954 \cdot 0{,}44701 = 0{,}24565$$

$$A_{M,\,D} = \frac{0{,}1666 \cdot 0{,}31 \cdot (1 + 0{,}070725)}{0{,}070725} \cdot \left(1 - \frac{1}{1{,}070725^6}\right) = 0{,}78219 \cdot 0{,}33636 = 0{,}26310$$

Present value of depreciation for **buildings**:

The buildings are depreciated over 30 years. Using (6) we again need to take each of the sources of finance in turn:

$$A_{B,\,RE} = \frac{0{,}3333 \cdot 0{,}31 \cdot (1 + 0{,}095603)}{0{,}095603} \cdot \left(1 - \frac{1}{1{,}095603^{30}}\right) = \frac{0{,}0113212}{0{,}095603} \cdot 0{,}935375 = 0{,}11077$$

$$A_{B,\,NE} = \frac{0{,}3333 \cdot 0{,}31 \cdot (1 + 0{,}103773)}{0{,}103773} \cdot \left(1 - \frac{1}{1{,}103773^{30}}\right) = \frac{0{,}011405}{0{,}103773} \cdot 0{,}948287 = 0{,}10423$$

$$A_{B,\,D} = \frac{0{,}3333 \cdot 0{,}31 \cdot (1 + 0{,}070725)}{0{,}070725} \cdot \left(1 - \frac{1}{1{,}070725^{30}}\right) = \frac{0{,}0110640}{0{,}070725} \cdot 0{,}871276 = 0{,}13630$$

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:

1) Discount rate of the company for a particular type of finance.
2) 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:

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

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 represent cost of capital.

Machinery (according to formula 9):

Retained earnings:

$$p_{M,RE} = \frac{1-0{,}2497430}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}095603-0{,}05+0{,}1225\cdot(1+0{,}05)\ ]-0{,}1225 = 0{,}0579 = 5{,}79\%$$

New equity:

$$p_{M,NE} = \frac{1-0{,}24565}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}103773-0{,}05+0{,}1225\cdot(1+0{,}05)\ ]-0{,}1225 = 0{,}0674 = 6{,}74\%$$

Debt:

$$p_{M,D} = \frac{1-0{,}263097}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}070725-0{,}05+0{,}1225\cdot(1+0{,}05)\ ]-0{,}1225 = 0{,}0294 = 2{,}94\%$$

Buildings (according to formula 9):

Retained earnings:

$$p_{B,RE} = \frac{1-0{,}110766}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}095603-0{,}05+0{,}0361\cdot(1+0{,}05)]-0{,}0361 = 0{,}0664 = 6{,}64\%$$

New equity:

$$p_{B,NE} = \frac{1-0{,}10423}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}103773-0{,}05+0{,}0361\cdot(1+0{,}05)]-0{,}0361 = 0{,}0774 = 7{,}74\%$$

Debt:

$$p_{B,D} = \frac{1-0{,}13630}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}070725-0{,}05+0{,}0361\cdot(1+0{,}05)]-0{,}0361 = 0{,}0338 = 3{,}38\%$$

Inventories (according to formula 10):

Retained earnings:

$$p_{I,\,RE} = \frac{1-0}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}095603-0{,}05+0.(1+0{,}05)]+\frac{1\cdot 0{,}31\cdot 0{,}05}{(1-0{,}31)\cdot(1+0{,}05)}-0=0{,}0843=8{,}43\%$$

New equity:

$$p_{I,\,NE} = \frac{1-0}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}103773-0{,}05+0.(1+0{,}05)]+\frac{1\cdot 0{,}31\cdot 0{,}05}{(1-0{,}31)\cdot(1+0{,}05)}-0=0{,}0956=9{,}56\%$$

Debt:

$$p_{I,\,D} = \frac{1-0}{(1-0{,}31)\cdot(1+0{,}05)}\cdot[0{,}070725-0{,}05+0.(1+0{,}05)]+\frac{1\cdot 0{,}31\cdot 0{,}05}{(1-0{,}31)\cdot(1+0{,}05)}-0=0{,}050=5\%$$

5. find the post-tax return to investors [*s*]

$$s=\frac{1+i\cdot(1-t_i)}{1+\pi}-1 \qquad (11)$$

$$s=\frac{1+0{,}1025\cdot(1-0{,}15)}{1+0{,}05}-1=3{,}54\%$$

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 in the following table:

Table 1: Weights yield

P	**RE**	**NE**	**D**	**weighted average**
Buildings [*B*]	6,64%	7,73%	3,38%	5,61%
Machinery [*M*]	5,79%	6,74%	2,94%	4,89%
Inventories [*I*]	8,43%	9,56%	5,00%	7,34%
1.1.1.2.1.1. Weighted average	6,61%	7,64%	3,52%	

7. find the weighted average tax wedge [*p – s*], *s = 3,54*

Table 2: Weighted average tax wedge year 2000

p – s	**RE**	**NE**	**D**	**weighted average**
Buildings [*B*]	3,10%	4,19%	-0,16%	2,07%
Machinery [*M*]	2,26%	3,21%	-0,60%	1,35%
Inventories [*I*]	4,90%	6,03%	1,46%	3,81%
Weighted average	3,07%	4,10%	-0,02%	**2,09%**

Note: Model with calculations in Annex 1.

Table 3: Weighted average tax wedge_year 2010

$p - s$	RE	NE	D	weighted average
Buildings [*B*]	1,19%	1,59%	0,67%	1,05%
Machinery [*M*]	0,85%	1,21%	0,35%	0,71%
Inventories [*I*]	1,51%	1,91%	0,97%	1,36%
Weighted average	1,09%	1,47%	0,58%	**0,95%**

Note: Model with calculations in Annex 2.

Conclusion

Calculation has been done for years 2000 and 2010. If making a comparison of tax wedges values in the year 2010 with values calculated for the year 2000 that are indicated in the tables above, we can interpret the results.

The values of the tax wedges for 2010 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 0,71 percentage points higher than the investor really receives after taxation, in 2000 it was 1,35 (twice more than in 2010) – positive change. The difference will be paid to the government in the form of the taxes. Tax wedge within buildings and other constructions is higher (by 1,05 percentage points, by 2,07 in 2000, also twice more than in 2010) and investments into stocks are being taxed at the highest rate (by 1,36 percentage points, by 3,81 in 2010), the decrease is also positive change.

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 cases, company has to ensure rate of return which is 1,09%, resp. 1,47%, resp. 0,58 % higher than the final post-tax rate that the investor actually gets. The analysis in this paper suggests that Czech tax system tends to favor investment in machinery in relation to buildings and, particularly, in relation to inventories. Tax system is also not neutral as between alternative sources of corporate finance. The data indicate that debt finance tends to be favored over equity and retained earnings.

On average, total rate of return (total tax wdge) of the company before taxation is 0,95 percentage points higher than rate of return after tax actually received by the investor. This total tax wedge is much lower than the OECD average, which is 2.4 resp. 2.1. as shown in the table below. Even partial tax wedges are similar the values in OECD countries. 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 comparing the values from 2010 and 2000 we can see improvements in the calculated values (decrease both in the values of partial tax wedges and the total average from 2,09 to 0,95 percent). This positive change has been mainly caused by the interaction of following factors (in the table), decreased corporate tax rate, inflation rate, tax rate on capital gains and dividends, as well, in particular bring the tax system nearer tax neutrality.

Factor	Year 2000	Year 2010
Inflation	5 %	1,5 %
Tax rate on capital gains	32 %	15%
Tax rate on dividends	25 %	15 %
Corporate tax rate	31 %	19 %
Number of year for machinery depreciations	6 years	6 years
Number of years for building depreciations	45 years	30 years

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Annex 1

TAX WEDGES 2000

Assumptions and variables of the model

Real interest rate	r	5%
Inflation rate	□	5%
Tax rate on interest	ti	15%
Tax rate on dividends	td	25%
Tax rate on capital gains	zr	32%

Corporate tax rate	t	31%
Alfa	□	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	0,103773	0,070725

Present value of depreciation allowances

A	RE	NE	D
Buildings (B)	0,110766	0,104226	0,136302
Machinery(M)	0,249744	0,245651	0,2631

Required pre – tax rate of returns

P	RE	NE	D	*Weighted average.*
Buildings (B)	6,64%	7,73%	3,38%	5,61%
Machinery(M)	5,79%	6,74%	2,94%	4,89%
Inventories (I)	8,43%	9,56%	5,00%	7,34%
Weighted	6,61%	7,64%	3,52%	

Tax wedges

average				
Wedge (p – s)	RE	NE	D	*Weighted average*
Buildings (B)	3,10%	4,19%	-0,16%	2,07%
Machinery(M)	2,26%	3,21%	-0,60%	1,35%
Inventories (I)	4,90%	6,03%	1,46%	3,81%
Weighted average	3,07%	4,10%	-0,02%	**2,09%**

Annex 2

TAX WEDGES 2010

Assumptions and variables of the model

Real interest rate	r	5%
Inflation rate	□	1,5%
Tax rate on interest	ti	15%
Tax rate on dividends	td	15%
Tax rate on capital gains	zr	15%
Corporate tax rate	t	19%
Alfa	□	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	7%
Shareholders´ discount rate	j	6%
Length of depreciation of buildings (years)	Nb	30
Length of depreciation of machinery (years)	Nm	6
Required post – tax return to investors	s	4,03%

Discount rates

P'	RE	NE	D
p' (B, M, I)	0,060512	0,063957	0,055888

Present value of depreciation allowances

A	RE	NE	D
Buildings (B)	0,072591	0,070227	0,075984
Machinery(M)	0,130163	0,129185	0,131498

Required pre – tax rate of returns

P	RE	NE	D	*Weighted average.*
Buildings (B)	5,22%	5,61%	4,69%	5,08%
Machinery(M)	4,87%	5,24%	4,38%	4,74%
Inventories (I)	5,54%	5,94%	5,00%	5,39%
Weighted average	5,12%	5,50%	4,61%	

Tax wedges

Wedge (p – s)	RE	NE	D	*Weighted average*
Buildings (B)	1,19%	1,59%	0,67%	1,05%
Machinery(M)	0,85%	1,21%	0,35%	0,71%
Inventories (I)	1,51%	1,91%	0,97%	1,36%
Weighted average	1,09%	1,47%	0,58%	**0,95%**