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EFFECTS OF TAX DEPRECIATION RULES ON FIRMS' INVESTMENT DECISIONS IN AN INFLATIONARY PHASE: COMPARISON OF NET PRESENT VALUES IN SELECTED OECD COUNTRIES*

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Abstract

This study compares incentive effects of various tax depreciation methods which are currently employed in selected OECD countries. Their generosity is determined on the basis of Samuelson's true economic depreciation. For this purpose, the present value model is applied. The central issue is that the so-called historical cost accounting method, which is adopted in practice when calculating the corporate tax base, causes fictitious profits in inflationary phases that should also be taxed. Therefore, in periods with inflation generous tax depreciation provisions do not adequately promote private investment as designed, but partly compensate such losses caused by inflation.

KEYWORDS: true economic depreciation, tax depreciation rules, corporate tax, investment decision, net present value model, inflation, OECD

JEL Classification: H25, H32, M21, G31.

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I. Introduction

Depreciation is one of the important factors affecting firms' investment decisions, as it is deducted from a gross stream of return generated from an asset when calculating tax profits. Apart from straight-line depreciation, various types of tax depreciation are allowed in many countries at present, which generally aim to encourage firms' investment activity (Sinn, 1987; King, 1977; King and Fullerton, 1984; Sandmo, 1974; Jacobs and Spengel, 1996; Alvarez, Kanniainen and Södersten, 1999). For example, accelerated depreciation has been applied in Finland to stimulate private investment. Besides, geometric-degressive depreciation has been popular in EU countries like France, Spain and Sweden. In Austria, investment tax allowance (*Investitionsfreibetrag*) can be adopted as an 'indirect' investment promotion scheme at present. In assessing their relative generosity, a useful benchmark is that of Samuelson's true economic depreciation (TED). This depreciation provision is neutral with respect to investment decisions (Samuelson, 1964; Atkinson and Stiglitz, 1980).

The incentive effects of different tax depreciation rules combined with the corporate tax rate on firms' investment decisions can be compared on the basis of the so-called net present value model (Wagner and Dirrigl, 1980; Schaden, 1994). Without taxation, the net present value (NPV) is equal to the present value of future gross return, discounted at an appropriate interest rate which corresponds to an expected minimum acceptable rate of return less the present value of the cost of investment. An investment project is therefore considered to be profitable when the NPV is positive.[2] After the introduction of corporate tax, the present value of an asset generated from an investment amounts to the sum of present value of net return (gross return less taxes) and tax savings led by an incentive depreciation provision. If the investment is self-financed, the interest rate directly corresponds to the investor's opportunity cost. Under the assumption of a perfect competitive market structure, there exists only an interest rate in the financial market.

In addition, anticipated effects of inflation on firms' investment decisions are examined in the context of corporate income taxation. The central issue is that the so-called historical cost accounting method, which is applied in practice when calculating the (corporate or income) tax base, causes fictitious profits in inflationary phases that are also

[2] According to Pindyck (1991), the net present value criterion for investment no longer holds when: a) future cash flows and interest rates are uncertain, b) investment expenditures are costly to reverse (because, for example, many types of capital goods are specialised, indivisible, and it is often costly to separate them from the production process) and c) firms have the latitude to delay investment expenditures. "Under these conditions, an investment project undertaken today must compete with itself [which will be carried out] at some future date and, as a result, the expected present value of profit from a project must exceed the costs of the project plus the option value associated with more information. Furthermore, the value of waiting rises when uncertainty rises so that increased uncertainty causes agents to postpone irreversible investment expenditures" (Ferderer, 1993, p. 20).

subject to tax. This type of increased tax burden is generally called inflation losses (Aaron, 1976; Feldstein, 1979; Streißler, 1982; Gonedes, 1984; Kay, 1977; Kopcke, 1981). Therefore, in periods with inflation generous tax depreciation provisions do not adequately promote private investment as designed, but only (or partly) compensate the losses caused by inflation. To be sure, annual inflation rates have recently been quite low in advanced OECD countries. Yet this study aims to suggest that the low inflation rate still matters.

II. Samuelson's Tax Neutrality of True Economic Depreciation Revisited

Under the assumption that

- a (self-financed) investment costing C generates an infinite stream of future gross return,
- this return exponentially declines at the rate α $(0 < \alpha < 1)$[3] and
- all prices are constant over time ($\pi = 0$),

the present value of the asset before taxation at time u* is:

$$(1) \qquad PV_{u^*} = \int_{u^*}^{\infty} A_0 \, e^{-\alpha u} \, e^{-r(u-u^*)} \, du = \frac{A_0 e^{-\alpha u^*}}{\alpha + r}$$

where A_u means gross return at time u and r is the real interest rate $(0 < r < 1)$.

On the basis of such a simple net present value model, Samuelson (1964) showed in his fundamental theorem of tax-rate invariance that corporate income taxation does not affect firms' investment decisions at all when the true economic depreciation (TED) is deducted from an expected gross stream of return generated from an asset when calculating tax profits.

Taxation does not affect firms' investment decisions if

$$(2) \qquad PV_{u^*} = PV(t)_{u^*},$$

where $PV(t)_{u^*}$ is the present value of asset after the introduction of corporate tax rate t at time u*, discounted at r(1–t).

When equation (2) is applied, one can derive

3 The assumption of declining gross return in the course of time is often made in practice, because it is hardly possible to forecast the development of future profit. This type of assumption is more plausible than the one with constant annual profit (Wagner and Dirrigl, 1980).

$$(3)\qquad \frac{dPV_{u*}}{du*} = \frac{dPV(t)_{u*}}{du*}.$$

Differentiating (1) with respect to u*

$$(4)\qquad \frac{dPV_{u*}}{du*} = \frac{-\alpha A_0 e^{-\alpha u*}}{\alpha + r} = -\alpha\, PV_{u*}\ .$$

Consequently, tax neutrality is guaranteed when

$$(5)\qquad \frac{dPV(t)_{u*}}{du*} = -\alpha PV_{u*}\ .$$

True economic depreciation (TED) is defined as the negative change in value of the asset in the course of time. Therefore, the TED rate can be calculated as follows:

$$(6)\qquad \frac{TED_{u*}}{PV_{u*}} = \alpha,$$

which is the same as the rate with which the gross return declines in the course of time.[4]

Furthermore, if we have a TED function with respect to u, which also declines at the rate α, then

$$(7)\qquad TED_u = \alpha PV_0 e^{-\alpha u}\ .$$

In the case that TED is permitted as a tax-deductible depreciation expense,

$$(8)\qquad PV(t)_{u*} = (1-t)\int_{u*}^{\infty} A_0 e^{-\alpha u} e^{-r(1-t)(u-u*)}\, du$$

$$+\ t\int_{u*}^{\infty} \alpha\, PV_0\, e^{-\alpha u}\, e^{-r(1-t)(u-u*)}\, du$$

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4 In the case of assuming a constant gross return function ($\alpha = 0$) with regard to time u, this model automatically leads to the ‘unusual’ conclusion that the TED rate is zero. Furthermore, with an exponentially ascending gross return function, the TED rate is unrealistically negative, which is interpreted by Samuelson (1964) as the appreciation of asset value in the course of time.

$$= \frac{(1-t)A_0\,e^{-\alpha u^*}}{\alpha+r(1-t)} + \frac{t\alpha PV_{u^*}}{\alpha+r(1-t)} = PV_{u^*}$$

Thus, the condition shown in the equation (5) is also satisfied.

III. Effects of Various Tax Depreciation Rules on Investment Decision Revealed in Present Value Model

In the practice of tax policy, different types of tax depreciation rules are employed which do not typically ensure TED; furthermore, their generosity has been extended in order to stimulate private investment. These tax depreciation measures are:

- straight-line depreciation
- geometric-degressive depreciation
- accelerated depreciation
- free depreciation
- investment tax allowance.

In the absence of taxation an investment project is on the margin of acceptance at the year of investment when

$$(9) \qquad C = PV_0 = \int_0^{\infty} A_0 e^{-(\alpha+r)u}\,du = \frac{A_0}{\alpha+r.} .$$

In this case, the NPV is zero.

In the case of straight-line depreciation over Γ years the amount of depreciation expense of the period u is calculated

$$(10) \qquad D_u^{sld} = \frac{C}{\Gamma}$$

where u = 1, 2, ... Γ.

As shown in (8), the introduction of a corporate tax rate t, with the discount rate becoming r(1–t), does not affect PV_0 if TED is deducted when calculating tax profits. However, with straight-line depreciation

$$(11) \qquad PV(t)_0^{sld} = (1-t)\int_0^{\infty} A_0 e^{-\{\alpha+r(1-t)\}u}\,du + t\int_0^{\Gamma} (C/\Gamma)e^{-r(1-t)u}\,du$$

$$= \frac{A_0}{\alpha+r} + tC\left\{\frac{1-e^{-r(1-t)\Gamma}}{r(1-t)\,\Gamma} - \frac{\alpha}{\alpha+r(1-t)}\right\}$$

$$= PV_0 + tC\left\{(DA) - \frac{\alpha}{\alpha+r(1-t)}\right\} .$$

DA denotes the value of straight-line depreciation allowances per monetary unit like the D-Mark or dollar (Atkinson and Stiglitz, 1980).

Consequently, the application of straight-line depreciation is advantageous when

$$(12) \qquad DA > \frac{\alpha}{\alpha+r(1-t)} .$$

When $DA = \dfrac{\alpha}{\alpha+r(1-t)}$ there exists a critical Γ^*.

For shorter tax-lives than Γ^* straight-line depreciation gives more generous allowances.

The amount of geometric-degressive depreciation expense in the period u is measured

$$(13) \qquad D_u^{gdd} = \delta C e^{-\delta u}$$

where δ is the geometric-degressive depreciation rate ($0 < \delta < 1$) and $Ce^{-\delta u}$ shows the net book value of capital good in the period u.

With geometric-degressive depreciation the present value of asset at time 0 is

$$(14) \qquad PV(t)_0^{gdd} = \int_0^{\infty} A_0(1-t)e^{-\{\alpha+r(1-t)\}u}\,du + tC\int_0^{\infty} \delta e^{-\{\delta+r(1-t)\}u}\,du$$

$$= PV_0 + tC\left\{\frac{\delta}{\delta+r(1-t)} - \frac{\alpha}{\alpha+r(1-t)}\right\} .$$

If $\delta = \alpha$, $PV(t)_0^{gdd} = PV_0$ just as in the case with TED. If $\delta > \alpha$, geometric-degressive depreciation has incentive effects, which, in turn, means that $PV(t)_0^{gdd} > PV_0$.

Accelerated depreciation is used in practice as an investment promotion scheme only in combination with straight-line depreciation method. Accelerated depreciation expense (as a certain percentage share of investment cost) is tax-deductible in the first year of the tax-life of a capital good.[5] Consequently, total depreciation expense in the first year reaches

$$(15) \qquad D_1^{ad+sld} = \sigma C + \frac{C}{\Gamma}$$

where σ indicates the accelerated depreciation rate ($0 < \sigma < 1$).

Because an extra amount of expense can be deducted in the first year, the total tax-life of a capital good is reduced correspondingly from Γ to Ω. And

$$(16) \qquad \Omega = (1-\sigma)\Gamma \ .$$

With accelerated depreciation the present value of an asset at time 0 is

$$(17) \qquad PV(t)_0^{ad} = (1\text{–}t)\int_0^\infty A_0 e^{-\{\alpha+r(1-t)\}u}\,du + t\int_0^1 \sigma C e^{-r(1-t)u}\,du$$

$$+ t\int_0^\Omega (C/\Gamma)e^{-r(1-t)u}\,du$$

$$= PV_0 + tC\Big[\frac{\sigma\{1-e^{-r(1-t)}\}}{r(1-t)} + \frac{1-e^{-r(1-t)\Omega}}{r(1-t)\Gamma} - \frac{\alpha}{\alpha+r(1-t)}\Big] \ .$$

$PV(t)_0^{ad}$ increases in accordance to the increase in σ. $PV(t)_0^{ad}$ reaches its maximum with σ = 100%, namely in the case of applying free depreciation (Nam, 1995).[6]

Investment tax allowance is also generally used in combination with straight-line depreciation. Unlike the case with accelerated depreciation, the total tax-life of a capital

[5] Apart from the extra financial resources released in the beginning of an asset life (the so-called liquidity advantage), which can again be used for an additional investment in the future (Nam, 1995), accelerated depreciation reduces uncertainties and risks linked to the investment, since the total tax-life of a capital good is significantly shortened (Tichy, 1980).

[6] At present the free depreciation method is allowed, for example, in Austria, Denmark and the Netherlands only for the so-called low-value equipment which costs less than 5,000 schilling, 8,400 krone and 2,000 guilder, respectively.

good remains unchanged. As a consequence, this type of tax incentive provides possibilities of depreciating the value, which is significantly higher than the original investment cost of a capital good.

With investment tax allowance the present value of asset at time 0 is

$$(18) \qquad PV_0^{ita} = (1-t)\int_0^{\infty} A_0 e^{-\{\alpha+r(1-t)\}u}\,du + t\int_0^{1} (\beta C)e^{-r(1-t)u}\,du + t\int_0^{\Gamma} (C/\Gamma)e^{-r(1-t)u}\,du$$

$$= PV_0 + tC\{\frac{\beta\{1-e^{-r(1-t)}\}}{r(1-t)} + (DA) - \frac{\alpha}{\alpha+r(1-t)}\}$$

where β indicates the rate of investment tax allowance ($0 < \beta < 1$).

IV. Consideration of the Fictitious Profit and the Inflation Losses in Present Value Model

The size of fictitious profits and the additional corporate tax burden, which are caused by the application of the historical accounting method in the inflationary phase, can also be measured on the basis of the net present value model.[7] Such inflation losses lead to the reduction of nominal net present value. More precisely, the amount of increased tax burden caused by inflation can be described as the difference between the two nominal PVs, one with depreciation measured on the basis of current value of a capital good and the other with that determined on the basis of the historical accounting method.

In an economy with the constant inflation rate π, the stream of gross return which is generated by an investment costing C at time u is

$$(19) \qquad A_u = A_0 e^{-\alpha u} e^{\pi u} = A_0 e^{-(\alpha-\pi)u} \quad .$$

In this case, the sum of annual gross return exponentially decreases at the rate α ($0 < \alpha < 1$) but increases at the rate π in the course of time.

In the case of employing the historical accounting method, the nominal present value of an asset with straight-line depreciation at time 0 is

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[7] There have been a number of attempts to estimate the current value of a capital good on the basis of indexation. “Such a method would provide for equitable accounting whether inflation rates were high or low. [But] many agree that it would be too complicated to compute the rate of inflation for the multitude of different assets. The idea of using an overall index was rejected on the grounds that some assets such as computers actually [decline] in price over time and this method would bias investment towards those

$$(20)\qquad nPV(t)_0^{sld} = (1-t)\int_0^{\infty} A_0 e^{-\{\alpha-\pi+\mu(1-t)\}u}\,du + t\int_0^{\Gamma} (C/\Gamma)e^{-\{\mu(1-t)\}u}\,du$$

$$= \frac{(1-t)A_0}{\alpha-\pi+\mu(1-t)} + \frac{tC\{1-e^{-\mu(1-t)\Gamma}\}}{\mu(1-t)\Gamma}$$

where μ is the nominal interest rate ($\mu = r+\pi$).

On the other hand, when depreciation expense is determined on the basis of current investment cost, the nominal value of asset with the same depreciation method at time 0 is

$$(21)\qquad nPV(t)_0^{sld}* = (1-t)\int_0^{\infty} A_0 e^{-\{\alpha-\pi+\mu(1-t)\}u}\,du + t\int_0^{\Gamma} (C/\Gamma)e^{-\{\mu(1-t)-\pi\}u}\,du$$

$$= \frac{(1-t)A_0}{\alpha-\pi+\mu(1-t)} + \frac{tC\{1-e^{-\{\mu(1-t)-\pi\}\Gamma}\}}{\{\mu(1-t)-\pi\}\Gamma}$$

where the current investment cost at time u is $Ce^{\pi u}$.

The difference between $nPV(t)_0^{sld}$ and $nPV(t)_0^{sld}*$ is defined as the present value of additional corporate tax burden (inflation losses) at time 0 (ATB_0^{sld}), which is caused by the fictitious profit. With the critical tax-life of a capital good Γ^*, therefore

$$(22)\qquad ATB(\Gamma^*)_0^{sld} = tC\left[\frac{1-e^{-\{\mu(1-t)-\pi\}\Gamma^*}}{\{\mu(1-t)-\pi\}\Gamma^*} - \frac{1-e^{-\mu(1-t)\Gamma^*}}{\mu(1-t)\Gamma^*}\right] = tC(FP_0^{sld})$$

where FP_0^{sld} indicates the present value of fictitious profit per monetary unit at time 0 in the case of adopting straight-line depreciation.

In order to examine whether and to what extent generous tax depreciation provisions promote private investments in inflationary situations, the value FP_0^{sld} (with Γ^*) can be adopted as the benchmark. When the amount of annual depreciation expense is calculated on the basis of historical cost as is the case in practice, the incentive effect of geometric-degressive depreciation on private investment in an inflationary phase can be measured

$$(23)\qquad nPV(t)_0^{gdd} - nPV(t, \Gamma^*)_0^{sld}$$

assets that increased in price" (Evans, 1983, p.150).

$$= tC\left[\frac{\delta}{\delta+\mu(1-t)} - \frac{1-e^{-\mu(1-t)\Gamma^*}}{\mu(1-t)\Gamma^*}\right] = tC(IE_0^{gdd})$$

where $nPV(t)_0^{gdd}$ is the nominal present value of asset with geometric-degressive depreciation at time 0.

With accelerated depreciation,

(24) $nPV(t)_0^{ad} - nPV(t, \Gamma^*)_0^{sld}$

$$= tC\left[\frac{\sigma\{1-e^{-\mu(1-t)}\}}{\mu(1-t)} + \frac{e^{-\mu(1-t)\Gamma^*} - e^{-\mu(1-t)\Omega^*}}{\mu(1-t)\Gamma^*}\right] = tC(IE_0^{ad})$$

where $nPV(t)_0^{ad}$ is the nominal present value of asset with accelerated depreciation at time 0 and Ω^* denotes the reduced tax-life of a capital good, when $\Gamma = \Gamma^*$.

When investment tax allowance is adopted and the tax-life of a capital good is Γ^*,

(25) $nPV(t)_0^{ita} - nPV(t, \Gamma^*)_0^{sld}$

$$= tC\left[\frac{\beta\{1-e^{-\mu(1-t)}\}}{\mu(1-t)}\right] = tC(IE_0^{ita})$$

where $nPV(t)_0^{ita}$ is the nominal present value of asset with investment tax allowance at time 0.

Subsequently, generous tax depreciation measures simply compensate the inflation losses in full-scale, when

(26) $IE_0^{gdd} = FP_0^{sld}$

(27) $IE_0^{ad} = FP_0^{sld}$

(28) $IE_0^{ita} = FP_0^{sld}$.

In spite of inflation, tax depreciation rules shown above guarantee investment promotion effects, when the individual IE values (IE_0^{gdd}, IE_0^{ad} and IE_0^{ita}) are greater than FP_0^{sld}.

V. International Comparison of Effects of Tax Incentive System on Equipment Investment

Table 1 compares the highest corporate tax rate (for retained earnings), tax depreciation methods and the extent of their generosity, which are presently allowed in the context of tax law in seven selected OECD countries. In the international ranking of the statutory corporate tax rate, Spain ranks first at 35%, followed by Austria (34%) and France (33.33%). The corporate tax rate is the lowest in Germany (25%). In Japan only the straight-line depreciation method can be adopted for equipment. As mentioned above, in countries like France, Spain and Sweden geometric-degressive depreciation is primarily applied as the investment incentive scheme for equipment, of which, however, the rate ranges from 20% (Germany[8]) to 35% (France). Furthermore, accelerated depreciation can be combined with straight-line depreciation in Finland, while Austrian tax law provides a possibility of adopting investment tax allowance together with straight-line depreciation. The normal tax-life for equipment amounts to 10 years in these selected countries. According to the net present value calculated under the standard assumptions for the case of investing in equipment (i.e. $A_0 = 100$, $r = 4\%$, $\alpha = 20\%$, $C = 416.7$), the Austrian tax incentives guarantee the most favourable conditions for the investors in the case of ignoring the impact of anticipated inflation (see also Table 1). In descending order, Finland, France, Spain and Sweden also provide investment incentives, of which the extent, however, does not reach the NPV level in Austria. On the other hand, Japan and German corporate tax systems remain more or less tax-neutral, since NPV reaches approximately zero in these countries. In this case one can presume that the adopted 10-year tax life largely corresponds to the critical asset life.[9]

In spite of inflation, investment incentive effects can be guaranteed in Austria (under the given assumptions for other relevant parameters), when IE_0^{ita} (the difference between nominal present value per monetary unit at the year of investment with investment tax allowance and that with straight-line depreciation) exceeds FP_0^{sld} (the nominal present value of fictitious profit per monetary unit at the same year in the case of adopting straight-line depreciation). According to the model simulation summarised in Table 2, the current Austrian tax incentive system no longer stimulates private investment in equipment and remains neutral when, ceteris paribus, the inflation rate reaches slightly over 2% in this

8 A movement to the straight-line depreciation is allowed in Germany.

9 Under the given assumptions made for the calculation, the net present value with $\Gamma = 10$ changes marginally from –0.6 to –0.3, when the corporate tax rate increases from 25% to 70%. In many other similar studies the critical asset-life (Γ^*) is (sometimes implicitly) assumed to be around 10 years for equipment (see also Sinn, Leibfritz and Weichenrieder, 1999, Leibfritz and Meuerer, 1985; Bordignon, Giannini and Panteghini, 1999).

country. With this so-called critical inflation rate, the incentive system can ‘only’ fully compensate the inflation losses. On the other hand, the Finnish system appears to be more robust against inflation, thanks to the low tax rate: its accelerated depreciation combined with the relatively low corporate tax rate provides incentives until the inflation rate reaches around 4.0%. Regardless of the various corporate tax rates applied in France, Spain and Sweden, the geometric-degressive depreciation rule in these countries with an inflation rate of approximately 1.5% does not provide the investment promotion effect any more and solely functions as a sort of compensation measure of the inflation losses.

Table 1

International comparison of tax incentives measured in terms of net present value without inflation: investment in equipment with the tax-life of 10 years

Country	Statutory corporate tax rate for retained earnings (%)	Tax depreciation and investment promotion measures	Net present value (= $PV(t)_0$ with various depreciation rules – C)
Japan	30	Straight-line depreciation (10%)	– 0.6
Germany	25	Geometric-degressive depreciation (20%)	0.0
Finland	28	Accelerated depreciation (50%) + straight-line depreciation (10%)	9.8
Austria	34	Investment tax allowance (9%) + straight-line depreciation (10%)	11.9
France	33.33	Geometric-degressive depreciation (35%)	6.5
Sweden	28	Geometric-degressive depreciation (30%)	4.5
Spain	35	Geometric-degressive depreciation (30%)	5.1
Common assumptions	$C = PV_0 = 416.7$; $A_0 = 100$; $r = 4\%$; $\alpha = 20\%$; $0 < u < \infty$		

Sources: Genser and Haufler (1999), Harmonisation of Corporate Income Taxation in the EU, Mennel and Förster (2000), Steuern in Europa, Amerika und Asien; Own calculations

Table 2

International comparison of investment promotion effect of tax depreciation rules in inflationary phases measured in terms of nominal net present value

Inflation rate %	Japan	Austria	France	Finland	Sweden	Spain
	tC (FP_0^{sld})	tC (IE_0 with various depreciation rules – FP_0^{sld})				
0.5	–2.6	9.6	5.0	9.2	3.2	3.4
1.0	–5.1	6.7	2.9	7.9	1.4	1.0
1.5	–7.6	3.7	0.8	6.7	–0.4	–1.4
2.0	–10.1	0.8	–1.2	5.4	–2.1	–3.8
2.5	–12.6	–2.0	–3.3	4.2	–3.9	–6.1
3.0	–15.0	–4.9	–5.4	2.9	–5.7	–8.5
3.5	–17.4	–7.7	–7.4	1.7	–7.4	–10.8
4.0	–19.8	–10.5	–9.5	0.4	–9.1	–13.1
4.5	–22.2	–13.3	–11.6	–0.9	–10.8	–15.5
5.0	–24.5	–16.0	–13.6	–2.1	–12.5	–17.8
5.5	–26.8	–18.7	–15.6	–3.4	–14.2	–20.1
6.0	–29.1	–21.5	–17.7	–4.7	–15.9	–22.4
6.5	–31.3	–24.1	–19.7	–5.9	–17.5	–24.7
7.0	–33.6	–26.8	–21.8	–7.2	–19.2	–27.0
Specific assumptions	$t=30\%$; $\Gamma=10$ years	$t=34\%$; $\beta=9\%$	$t= 33.33\%$; $\delta=35\%$	$t=28\%$; $\sigma=50\%$	$t=28\%$; $\delta=30\%$	$t=35\%$; $\delta=30\%$
Common assumptions	$C=PV_0 = 416.7$; $A_0=100$; $r=4\%$; $\alpha=20\%$; $\Gamma=\Gamma^* =10$ years and $0 < u < \infty$					

Source: Table 1 and own calculations

VII. Conclusion

When calculating tax profits, depreciation is deducted from a gross stream of return generated from an asset. From the point of view of the competitive firm which tries to maximise profits, this study compares — on the basis of net present value models and their simulation — incentive effects of various tax depreciation methods. For the purpose of international comparison, seven OECD countries are investigated — Japan, Germany, Austria, Finland, France, Spain and Sweden.

In an specific economic situation with r = 4%, α = 20%, Japanese and German corporate tax systems remain more or less tax-neutral with the tax-life of around 10 years and δ = 20%, when there is no inflation. In such a benchmark case one can presume that the assumed 10-year tax-life largely corresponds to the critical asset life. By contrast, Austria's investment tax allowance provides — in combination with the corporate tax rate of 34% — the most favourable conditions for investors among the investigated countries, followed by Finland, France, Spain and Sweden. However, even the Austrian system loses its incentive effect when the inflation rate is slightly over 2%. The Finnish system with accelerated depreciation and the lower corporate tax rate (28%) seems to be a more appropriate one when a country has a higher inflation rate. In the countries with rather generous geometric-degressive depreciation (Spain, France and Sweden), private investors can expect tax incentives only when the inflation rate remains marginal.

Apart from the systematic comparison of the net present value approach and its major outcomes with the cost of capital or marginal effective rate methodology that is often used in the similar context (Chennells and Griffith, 1997), further research appears to be necessary to examine the sensitivity caused by the changes in selected parameters (including interest rate[10]) as well as to adequately consider other nation-specific factors like differences in local corporate income taxes in the calculation, which are quite significant in a number of countries investigated.

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[10] In Japan, for example, the (real) long-term interest rate has recently been approximately 2% points

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