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Taxation and the Cost of Capital in Hungary and Poland:
A Comparison With Selected European Countries

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Abstract

This paper compares the effective rates of taxation faced by a representative investor located in a major capital-exporting country for investments in machinery and buildings in nine capital-importing European countries. Poland and Hungary are found to have relatively high effective tax rates on equity-financed investment. The analysis suggests that both countries would benefit from streamlining capital cost recovery allowances and possibly lowering statutory corporate tax rates--as permitted by the revenue constraint--rather than providing tax preferences for foreign investors.

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* The author is presently in the Western Hemisphere Department and an earlier version of this paper was prepared during previous assignment in the Fiscal Affairs Department. George Kopits, Leif Mutén, Edward Gardner, Per Hedfors and Mark Lutz have provided helpful comments. Any remaining errors are the author's responsibility.

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I. Introduction

Europe appears to be moving toward increased integration leading to
new investment opportunities. The opening up of markets in Central and
Eastern Europe and closer cooperation within Western Europe could result
in an unprecedent expansion of the European market. More integrated
financial markets in Europe make the allocation of resources more sen-
sitive to differences in national tax rates. Taxation of income from
business activities as well as taxation of financial flows across coun-
tries has therefore received much more attention now than it did only a
few years ago. In particular, initiatives are underway to harmonize
indirect taxation, especially value-added taxes, and capital income
taxation in the European Community, 1/ with possible extension to EFTA
member countries.

The purpose of this paper is to compare the effective rate of tax-
ation faced by a "representative" investor located in a major capital-
exporting country on a marginal investment in Hungary and Poland with an
investment in seven other European countries: Austria, Finland, Greece,
Ireland, Portugal, Spain and Turkey. 2/ The paper assesses the need for
tax reform in Poland and Hungary to achieve a more efficient allocation
of resources and a more competitive tax system. By combining several
different taxes and by incorporating tax provisions in a consistent way,
the paper develops a framework which permits evaluation of the overall
impact of taxes on the required rate of return on the last unit of fixed
capital. The paper attempts to capture the effect of the tax system
and does not incorporate the effect of other potential factors in the
investment decision, such as the availability of a suitable labor force
or the quality of infrastructure, and more important, the effect of
differential risk. However, one section of the paper illustrates the
broad interaction of the tax system and the macroeconomic environment.

The paper focuses on portfolio investment (undertaken by individu-
als or institutions) which is likely to be more sensitive to the after-
tax rate of return than direct investment. 3/ The study examines the
minimum gross rate of return necessary for an investment to yield a
given uniform after-tax rate of return, and alternatively, the after-tax
rate of return required by the investor under the actual interest rates
and expected inflation rates prevailing in each host country. The paper
also presents the corresponding tax wedges for both an equity-financed

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1/ For a discussion on the desirability of harmonizing, see Tanzi
and Bovenberg (1990). For a review of some previous tax harmonization
efforts see Burke (1981).
2/ These countries are in many respects different from Hungary and
Poland and the purpose of the study is only to compare the tax systems
and not to evaluate the overall incentives to invest in different
countries.
3/ It can be argued that decisions to undertake direct investment are
also influenced by market strategies and long term planning.

and a debt-financed investment. All calculations are performed separately for investment in machinery and buildings.

Three different scenarios or cases are discussed. The first scenario assumes that nominal interest rates and expected rates of inflation are equal across countries. The focus is thereby entirely on the countries' tax systems and not on the economic environment in which each tax system operates. In this case, the net real rate of return for the investor will vary across countries only on account of differences in the tax treatment in the host country. The second scenario retains the assumption that the expected rate of inflation is equal across countries while the nominal interest rate is endogenous, so as to accommodate effective tax rate differentials. Thus, the nominal interest rate is calculated so that investments yield the same after-tax real rate of return to the investor irrespective of the country in which he invests. This assumption enables us to highlight differences in the required gross rate of return to yield a given real net rate of return. 1/ A third scenario stresses the interaction of the economic environment and the tax system by using actual interest rates and by making an approximation of the expected rate of inflation in each country. In all scenarios, we assume that the investor receives the same after-tax real rate of return on a debt-financed investment and on an equity-financed investment, thus ignoring the presumed higher risk associated with equity financing. Furthermore, expectations about exchange rate changes are assumed to coincide with inflationary expectations.

II. Background

Corporate income taxes vary widely from country to country as does the taxation of individual and institutional investors. The general, almost worldwide trend in the 1980s has been toward broader tax bases and lower tax rates (Table 1). In the case of Hungary, major tax reform efforts have been undertaken during the last three years. The personal income tax and value added tax were introduced on January 1, 1988, followed by the enterprise profit tax, effective January 1, 1989. Poland also adopted a uniform enterprise income tax on January 1, 1989, and is currently engaged in a general tax reform effort. Major changes in the tax system are expected. Both Hungary and Poland have a statutory corporate income tax rate of 40 percent and they allow for a straight-line depreciation method for investments in machinery and buildings. Hungary provides a two-year loss carryover while Poland does not allow for any carryover of losses. Hungary and Poland were the first countries in Eastern Europe to reform their enterprise income tax systems, to be followed on January 1, 1991, by the former GDR and USSR.

1/ Real after-tax rates of return are not necessarily equalized across countries. Nevertheless, the assumption serves to illustrate the size of the tax wedges when a common requirement is made on the net rate of return.

Table 1. Selected Countries: Corporate Income Tax Rates
and Carry-Over Provisions 1/

	Statutory Tax Rates		Loss Carryover, 1990	
	1985 2/	1990 2/	Forward	Back
Hungary	...	40	2	--
Poland	...	40	--	--
Austria	55	30	7	--
Belgium 3/	45	41	5	--
Denmark	50	50	5	--
Finland 4/	57	42	5	--
France 5/	50	37	5	--
Germany 6/	56	50	no limit	2
Greece	49	40	3	--
Ireland	50	40	no limit	1
Portugal	50	40	5	--
Spain	35	35	5	--
Sweden	57	30	10	--
Turkey	49	47	5	--
United Kingdom	45	35	no limit	1
United States	51	39	15	3

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse: and various national sources.

1/ Combined national and local tax rates. Several countries have a split rate system or an imputation system, resulting in a lower tax rate on distributed profits (among others Germany, Greece, and the United Kingdom).
2/ As percent of taxable income.
3/ Tax losses reflecting depreciation charges may be carried forward without any time limit.
4/ Losses arising in the first five years of a new business are deductible until the end of the tenth year of business.
5/ Tax losses reflecting depreciation charges may be carried forward without any time limit. Companies may elect a form of carry-back system if in either the three preceding years or in the previous year the company realizes net investment in depreciable assets at least equal to the depreciation charged for those reference years.
6/ The first DM 10 million of losses must be carried back for two years. No limitation on carry-forward of losses of the year 1985 or afterwards.

The statutory tax rate is however only one component of the taxation of capital and for a comparison of the effective tax burden on investment income in different countries, it is also necessary to examine the definition of the tax base. Capital cost recovery allowances and investment grants vary substantially for different assets within a country as well as across countries. The tax treatment of financing costs, in particular the tax treatment of equity capital, also takes many forms. Furthermore, several countries have a lower effective tax rate on distributed profits in order to mitigate the double taxation of dividends. 1/

Many countries levy withholding taxes on dividend and interest remittances from the source (host) country to the resident (home) country of the investor. These withholding taxes may in some cases be credited against tax liabilities in the home country when foreign-source income is subject to further taxation at home. Several EC countries and the United States adhere to the residence principle, taxing global income, but the foreign tax credit is typically limited to the residence country's own tax rate on the same kind of income. For portfolio investment there is typically no credit for the underlying foreign corporate income tax. The final tax liability may also depend on the form in which the investment income is received. Interest income and dividend income are often taxed at an equal rate while capital gains, in particular capital gains from exchange gains and losses, may escape further taxation.

In order to promote investment, many countries have introduced special tax preferences for foreign investors. As it turns out, investment tax credit, capital expensing, and accelerated depreciation are very effective in lowering the cost of capital but, as it is well known in western European countries, they may induce windfall gains to the investor and they tend to erode the tax base. Thus, since the proliferation of tax preferences undermines the tax system's revenue collecting capacity and may lead to allocative distortions, a very careful examination is necessary before any such preferences are introduced. As they embark on tax reform, Central and East European countries have a golden opportunity to avoid the experience of West European countries that made extensive use of investment tax preferences from the 1950s through the 1970s. Instead, these countries may opt for broader tax bases with low tax rates in order to limit national as well as international distortions in the allocation of resources and to protect their revenue base.

1/ See Andersson (1990).

III. Taxation and the User Cost of Capital

A methodology has been developed to calculate effective tax rates taking into account a number of tax provisions as well as some macro economic variables like interest rates and inflation rates. 1/ For a given after-tax rate of return, the before-tax rate of return can be expressed as an explicit function of tax parameters and the resultant difference between the two rates of return can be used to calculate the effective marginal tax rate. Despite the simplicity of the concept, it does not give rise to a unique definition of the effective tax rate since the measure depends on the chosen level of after-tax rate of return. Since a number of tax parameters are included in the calculations, but more importantly because it represents the key price signal for investment decisions, the user cost of capital provides a more relevant base for comparison of the relative incentive to invest than comparing a single tax parameter (for instance the statutory corporate tax rate). The following section outlines some of the basic assumptions and relationships in the calculation of the user cost of capital.

The present study uses the methodology described above to derive effective tax rates. 2/ The essential concept used in the estimation of the tax rate on capital income is the tax wedge. The tax wedge can be explained by defining three rates of return: the required before-tax rate of return on investment, p, the market return (after corporate taxes), r, and the after-tax rate of return to the saver, s. All these returns are measured in real terms. In the case of debt finance, the market return corresponds to the real interest rate, and for equity financing, it amounts to the real return on equity (taking into account dividends and expected capital gains), before personal taxes. The total tax wedge, wt, can therefore be thought of as consisting of two parts:

$$wt = wc + wi = (p - r) + (r - s) = p - s \qquad (1)$$

where wc denotes the corporate tax wedge and wi the investor's wedge.

When cross-border investments are considered, it is more useful to separate the total tax wedge into a host country tax wedge and a home country tax wedge. The host country levies corporate taxes but often also withholding taxes on dividend and interest payments. The home country, in turn, either exempts or taxes these returns, typically subject to some form of double taxation relief.

1/ See for example King and Fullerton (1984).
2/ Earlier work in this field include Mutén (1968), Hall and Jorgenson (1971), King (1977), Kopits (1980), and many others.

From identity (1), effective tax rates can be derived:

$$e_n = wt/s \text{ and } e_g = wt/p \tag{2}$$

in terms of the after-tax rate of return and gross required rate of return, respectively.

The corporate tax wedge is derived from the neoclassical theory of investment behavior, where firms carry out investments until the before-tax rate of return, p, is at least sufficient to cover the cost of finance and the tax burden, [1]/

$$p = (1 - k - tc \cdot z)(\tau + \delta - \pi)/(1 - tc) - \delta \tag{3}$$

where tc = statutory corporate tax rate

k = investment grant

z = present value of depreciation allowances

τ = nominal discount rate

δ = economic rate of depreciation

π = expected rate of inflation

p = required before-tax real rate of return.

The company's discount rate depends on the source of financing. If an investment is debt financed, debt servicing costs are usually deductible when calculating the corporate tax liability, thereby reducing the company's financing costs. However, under the classical corporate tax system, no relief is given for investments financed by equity capital. Assuming that the tax is borne by the investor, the discount rate will therefore be higher in this case, and the present value of depreciation allowances, z, will therefore be lower and the user cost of capital correspondingly higher. The difference in financing cost between debt and equity financing will only decrease if an imputation system or some kind of a split rate system is applied. In general, the corporate tax system tends to favor debt financing while capital gains taxation at the

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[1]/ The expression for p is derived from the equality between the after-tax marginal benefit and the marginal cost of an investment project: $(1 - tc)(p + \delta) = (1 - k - tc \cdot z)(\tau - \pi + \delta)$.

investor's level often leads to a favorable tax treatment of the part of investment financed with retained earnings. The framework used in this paper allows us to incorporate these effects (including the difference in discount rate for different types of financing) and compare tax wedges for different sources of financing.

At the investor's level, the taxation of dividend and interest income can differ. Hence, we need to define two rates of return: one for equity-financed investment and the other for debt-financed investment. Assuming that movements in nominal exchange rates reflect the inflation differential, the real after-tax rate of return on debt-financed investment can be expressed as

$$s_d = (1 - m)(1 - w)\phi \ (r + \pi_{host}) + ce(\pi_{host} - \pi_{home}) - \pi_{host} \qquad (4)$$

where m = marginal tax rate on capital income at the investor's level

w = withholding tax rate

ϕ = parameter representing relief for (foreign) withholding taxes and/or corporate taxes

ce = capital gains tax rate on accrued exchange gains and losses.

For an equity-financed investment the real after tax rate of return is

$$s_e = \left\{\alpha(1 - m)(1 - w)\phi + (1 - \alpha)(1 - c)\right\}(\mu - \pi_{host}) - c\pi_{host} \qquad (5)$$

$$+ \ cd(\pi_{host} - \pi_{home})$$

where α = fraction of real earnings on equity paid as dividends (or fraction of an equity financed investment financed by new share issues)

μ = nominal return on equity before taxes at the investor's level

c = tax rate on accrued capital gains. 1/

1/ Capital gains are normally taxed upon realization and not as they accrue. The accrued capital gains tax rate has been calculated from the statutory capital gains tax rate, and by assuming a rate of realization of 10 percent of the gains per year. The accrued capital gains tax is, in present value terms, assumed equal to the capital gains tax upon realization.

By imposing an arbitrage condition at the investor's level, it is possible to calculate the tax wedges at the same after-tax rate of return on a debt-financed investment and on an equity-financed investment. Some studies include an exogenous risk premium on equity. 1/ An alternative approach is to use observed price-earnings ratios on shares. 2/ If the arbitrage condition is imposed at the corporate level, resulting in the same net cost for the firm regardless of the source of finance, the investor will typically receive a lower rate of return for an equity-financed investment than for a debt-financed investment. Clearly, the user cost of capital is affected by the applied arbitrage assumption.

From the above formulation of the user cost of capital, it is obvious that the concept of effective tax rate is limited in several respects: it considers only explicit taxes or subsidies on capital income; it ignores restrictions and nontax policies (e.g., regulations); it is based on assumptions that tend to make the calculations of cost of capital static; it often does not take into account expected future changes in interest rates and tax rates; and it often abstracts from risks. In many countries, the effective tax rate depends on the type of investment or investor. Some agents are even tax exempt or are able to influence the effective tax rate by elaborate tax avoidance schemes. Furthermore, the effectiveness of any tax system will ultimately depend on how it is administered and to what extent tax rules can be enforced. The user cost of capital therefore only gives a broad picture and its measurement--particularly across different countries--should be interpreted with some caution. In general, the more complex the tax system and the larger the number of tax brackets and provisions, the more difficult it is to summarize the effective tax rate in one indicator. By the same token, a very complex system is likely to be exploited by investors in different ways and the variance of the effective rate may be so large as to render an average summary measure meaningless. A low effective tax rate at the margin in this case does not mean that investment decisions are not heavily influenced by taxes. At the same time, a complex tax system will lead investors to base investment decisions on gross yields--incorporating a significant "tax premium"--and then minimize tax liabilities ex post. These considerations are left out in a simple cost of capital calculation.

IV. Assumptions

The minimum required rate of return after all taxes is assumed to be equal for an equity-financed investment--excluding a risk premium-- and for a debt-financed investment in a specific country. The corresponding tax wedges would be correspondingly larger, in a nonlinear way, if a risk premium had been included. Applying the "new view" of

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1/ See for example Feldstein (1986).
2/ See Boadway, et al. (1987)

dividend taxation, the fraction of new shares in an equity-financed investment is assumed to be 10 percent in all countries. 1/ This assumption means that taxes levied on dividends are relatively unimportant since 90 percent of an equity-financed investment is assumed to be in the form of retained earnings. Increasing the share financed by issuing new equity (which is equivalent to assuming a higher dividend payout ratio, if the "old view" of dividend taxation had been assumed) the overall level of taxes on equity capital would be higher. 2/

The investor is assumed to face the same home country tax liability irrespective of the country in which he invests. The tax rate on dividend income is assumed to be 20 percent, equal to the tax rate on interest income. The accrued capital gains tax rate is assumed to be 8 percent, the same as the capital gains tax rate on exchange gains and losses. These chosen tax rates are broadly in line with marginal tax rates faced by a typical European investor. In practice, an infinite number of investment channels exist, resulting in a wide range of marginal tax rates. Although each investor would have different tax rates and his particular profit or loss situation (including income from other sources) may also influence his effective tax rate, the purpose of the paper is only to present a broad view of the effects of the tax systems on investment, and not to evaluate the precise tax implications for any particular investor. 3/

It is assumed that the investor has a sufficient home country tax liability to credit foreign withholding taxes. Furthermore, integration of corporate and personal taxes have only been taken into account in those cases where such integration extends to a foreign investor. Economic depreciation is assumed to occur at a constant geometrically declining annual rate of 15 percent for machinery and 7 percent for buildings in all countries. Depreciation for tax purposes has been incorporated explicitly, including the extent to which depreciation is

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1/ For a discussion on different views on dividend taxation, see Poterba (1987) or Sinn (1987). The assumption used in this paper could alternatively be interpreted as assuming a dividend-payout ratio of 10 percent.

2/ In the United States, the fraction of an equity financed investment which is financed by issuing new shares is around 10 percent. The dividend payout ratio has been around 40 percent in the 1970s but the ratio is sensitive to the business cycle and since increasing interest payments have tended to lower corporate profits while dividends have been increasing steadily in nominal terms, the dividend payout ratio has tended to increase. In 1989, the dividend payout ratio for nonfinancial corporate businesses was 77 percent. See Andersson (1990).

3/ Given the assumption that the investor faces the same home tax country liability irrespective of in which country he invests, the chosen tax parameters are of little practical significance when evaluating relative investment incentives across countries.

allowed during the year of purchase. 1/ The generosity of investment
grants has decreased in all of the countries and only Spain among the
countries considered still allows for a general investment grant.
Almost all the countries in the sample allow for accelerated rates of
tax depreciation and/or investment grants for specific types of invest-
ments or investments in certain regions. These industry-specific and
regional provisions have not been included in the study.

In Tables 2 through 7, five tax wedges are presented: the corpor-
ate tax wedge; the withholding tax wedge; the resulting host tax wedge;
the home tax wedge; and the total tax wedge. The required pre-tax real
rate of return, which consists of the cost of finance, p, gross of the
economic rate of depreciation, δ, and the real rate of return after all
taxes, s, are also presented in the tables. The tax wedges are calcu-
lated as the difference between the before- and after-tax rate of return.
A negative number indicates a net subsidy through the tax system.

V. Results

1. Uniform interest and inflation rates

Under the assumption that the nominal interest rate is 10 percent
and the expected rate of inflation is 6 percent in all countries, dif-
ferences in tax wedges reflect only differences in the various coun-
tries' tax systems. Also, by definition, with a uniform inflation rate,
there are no exchange gains and losses.

Table 2 shows that Hungary and Poland have the largest total tax
wedge for an equity-financed investment in machinery among the countries
included in the study. Both Hungary and Poland provide relatively con-
servative depreciation rules for tax purposes and the depreciation
allowances are calculated by using the straight-line method based on
historical costs. 2/ The same method is used in Austria, Greece,
Portugal, and Spain, while the others permit declining-balance deprecia-
tion. However, Austria allows an additional 20 percent in depreciation
allowances in the initial year and Spain has an investment tax credit of
5 percent. These provisions are very important in present value terms
for the user cost of capital. Ireland has very generous depreciation
allowances, but since the corporate tax rate is only 10 percent, the
decrease in tax liability is limited. Finland and Turkey allow for

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1/ The so called first year convention may have a relatively large
impact on the cost of capital since a larger depreciation in the first
year is worth more in present value terms than a deferred depreciation
allowance.
2/ The rate of depreciation used for Hungary is 12 percent. The
average rate of depreciation for investment in machinery may be as low
as 6.5 percent. This would make the total tax wedge for Hungary con-
siderably larger.

Table 2. Selected Countries: Effective Taxation of Income from Investment in Machinery, 1990 1/

(With uniform interest and inflation rates)

	Austria Debt	Austria Equity	Finland Debt	Finland Equity	Greece Debt	Greece Equity	Hungary Debt	Hungary Equity	Ireland Debt	Ireland Equity	Poland Debt	Poland Equity	Portugal Debt	Portugal Equity	Spain Debt	Spain Equity	Turkey Debt	Turkey Equity
Required rate of return	17.18	19.34	15.87	19.59	16.55	18.75	17.12	21.16	18.33	18.05	17.43	20.25	16.77	18.74	17.22	18.38	16.91	19.?
After-tax rate of return	2.00	2.00	2.00	2.00	1.20	1.20	2.00	2.00	2.00	2.00	1.20	1.20	0.80	0.90	1.20	1.20	1.20	1.20
Total tax wedge	0.18	2.34	-1.13	2.59	0.35	2.54	0.12	4.10	1.33	1.65	1.23	4.06	0.97	2.93	1.02	2.17	-0.29	3.??
Host tax wedge	-1.82	1.62	-3.13	1.86	-1.45	1.90	-1.88	3.37	-0.67	0.32	-0.57	3.41	-0.73	3.33	-0.78	1.53	-2.09	3.??
Corporate tax wedge	-1.82	1.56	-3.13	1.82	-2.45	1.95	-1.88	3.37	-0.67	0.32	-1.57	3.38	-2.23	2.31	-1.77	1.51	-3.09	3.05
Withholding tax wedge	—	0.06	—	0.04	1.00	0.05	—	—	—	—	1.00	0.03	1.50	0.02	1.00	0.02	1.24	—
Home tax wedge	2.00	0.72	2.00	0.73	1.80	0.64	2.00	0.73	2.00	0.73	1.80	0.65	1.70	0.60	1.80	0.65	1.70	0.65
Corporate income tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate																		
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	DB	DB
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial tax deduction 5/	20.00	20.00	—	—	—	—	—	—	30.00	30.00	—	—	—	—	5.00	5.00	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nominal interest rate	10.00	10.00	10.00	10.00	10.0	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Expected rate of inflation																		
Host country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Home country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse; and various national sources.

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.
2/ Only undistributed profits are liable to the corporate tax.
3/ SL = straight-line method; DB = declining-balance method.
4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.
5/ In addition to regular first-year depreciation.

Table 3. Selected Countries: Effective Taxation of Income from Investment in Buildings, 1990 1/

(With uniform interest and inflation rates)

	Austria		Finland		Greece		Hungary		Ireland		Poland		Portugal		Spain		Turkey	
	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity
Required rate of return	9.64	12.03	8.61	13.07	8.39	10.71	9.09	13.33	10.40	10.12	9.93	13.03	8.72	10.83	9.37	11.32	8.71	13.33
After-tax rate of return	2.00	2.00	2.00	2.00	1.20	1.20	2.00	2.00	2.00	2.00	1.20	1.20	0.80	0.80	1.20	1.20	1.20	1.20
Total tax wedge	0.64	3.03	-0.39	4.07	0.19	2.51	0.09	4.33	1.40	1.11	1.73	4.83	0.92	3.03	1.17	3.13	0.51	5.13
Host tax wedge	-1.36	2.31	-2.39	3.34	-1.61	1.87	-1.91	3.60	-0.60	0.38	-0.07	4.18	-0.78	2.43	-0.63	2.48	-1.29	4.48
Corporate tax wedge	-1.36	2.25	-2.39	3.30	-2.61	1.82	-1.91	3.60	-0.60	0.38	-1.07	4.15	-2.28	2.41	-1.63	2.46	-2.29	4.48
Withholding tax wedge	—	0.06	—	0.04	1.00	0.05	—	—	—	—	1.00	0.03	1.50	0.02	1.00	0.02	1.00	—
Home tax wedge	2.00	0.72	2.00	0.73	1.80	0.64	2.00	0.73	2.00	0.73	1.80	0.65	1.70	0.60	1.80	0.65	1.80	0.65
Corporate tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate	2.40	2.40	10.00	10.00	8.00	8.00	4.50	4.50	4.00	4.00	2.50	2.50	4.00	4.00	3.00	3.00	4.00	4.00
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial deduction 5/	—	—	—	—	—	—	—	—	30.00	30.00	—	—	—	—	—	—	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	5.00	—	—
Nominal interest rate	10.00	10.00	10.00	10.00	10.0	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Expected rate of inflation																		
Host country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Home country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.

2/ Only undistributed profits are liable to the corporate tax.

3/ SL = straight-line method; DB = declining-balance method.

4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.

5/ In addition to regular first-year depreciation.

accelerated depreciation and in Turkey the value of the depreciation allowances is enhanced by indexation of the depreciable base. 1/

The results for Ireland deserve closer scrutiny. The low corporate tax rate contributes to a very small subsidy at the corporate level for a debt financed investment (the corporate tax wedge is only -0.67 compared to -1.88 in Hungary and -3.13 in Finland) and Ireland has the highest required rate of return on a debt-financed investment in machinery. Furthermore, in contrast to other countries, debt-financed investment carries a larger tax burden than equity-financed investment due to the combination of a small subsidy at the corporate level and the relatively heavy home taxation of interest income as compared with taxation of equity capital at the investor's level. 2/ The Irish case therefore clearly demonstrates the importance of the statutory corporate tax rate; the higher the tax rate, the larger is the value of interest deductions and the larger the subsidy for debt-financed investment at the corporate level.

Hungary and Turkey exhibit the highest required rate of return for investment in buildings (Table 3). Poland, with its low tax depreciation rate, has the second highest required rate of return. The overall picture is similar to the one for investment in machinery, with Ireland having the lowest required rate of return for an equity-financed investment in either machinery or buildings. Finland is the only country included in the study which allows the use of the double declining-balance depreciation of buildings and it is only in Greece that the required rate of return for a debt-financed investment in buildings is lower since buildings there may be depreciated over as short a period as twelve and a half years.

2. Uniform after-tax rate of return

Nevertheless, the real rate of return after all taxes, is not equal across countries. For a country like Poland, the ex post real rate of return was 1.2 percent and the calculated tax wedge would have been even larger if the investor would require a real rate of return of 2 percent. In Tables 4 and 5, it is assumed that the investor expects the same rate of return regardless of the country in which he invests. This may seen as a strong assumption that permits a more realistic comparison of different tax systems at a given required rate of return.

In this case, the nominal interest rate is calculated endogenously so that the real after-tax rate of return for the investor is equal to 2 percent irrespective of the country in which the investment is located.

1/ In the case of Turkey, the importance of indexation will be clearly demonstrated below.

2/ An increase in the capital gains tax rate by less than 2 percentage points would result in a larger tax wedge for an equity-financed investment than for a debt-financed investment.

Table 4. Selected Countries: Effective Taxation of Income from Investment in Machinery, 1990 1/

(With uniform inflation rate and after-tax rate of return)

	Austria		Finland		Greece		Hungary		Ireland		Poland		Portugal		Spain		Turkey	
	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity
Required rate of return	17.18	19.34	15.87	19.59	17.44	19.93	17.12	21.10	18.33	18.05	18.42	21.60	18.23	20.61	18.23	19.51	16.59	20.95
After-tax rate of return	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Total tax wedge	0.18	2.34	-1.13	2.59	0.43	2.92	0.12	4.10	1.33	1.05	1.43	4.61	1.22	3.61	1.23	2.51	-0.42	3.94
Host tax wedge	-1.82	1.62	-3.13	1.86	-1.57	2.20	-1.88	3.37	-0.67	0.32	-0.57	3.88	-0.78	2.88	-0.77	1.78	-2.42	3.21
Corporate tax wedge	-1.82	1.56	-3.13	1.82	-2.68	2.13	-1.88	3.37	-0.67	0.32	-1.68	3.84	-2.54	2.85	-1.88	1.75	-3.58	3.21
Withholding tax wedge	—	0.06	—	0.04	1.11	0.07	—	—	—	—	1.11	0.04	1.76	0.03	1.11	0.03	1.16	—
Home tax wedge	2.00	0.72	2.00	0.73	2.00	0.72	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73
Corporate tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate	10.00	10.00	30.00	30.00	16.80	16.80	12.00	12.00	10.00	10.00	10.00	10.00	12.50	12.50	10.00	10.00	20.00	20.00
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	DB	DB
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial deduction 5/	20.00	20.00	—	—	—	—	—	—	30.00	30.00	—	—	—	—	—	—	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	5.00	—	—
Nominal interest rate (endogenous)	10.00	10.00	10.00	10.00	11.11	11.11	10.00	10.00	10.00	10.00	11.11	11.11	11.77	11.77	11.11	11.11	11.11	11.11
Expected rate of inflation																		
Host country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Home country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse; and various national sources.

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.
2/ Only undistributed profits are liable to the corporate tax.
3/ SL = straight-line method; DB = declining-balance method.
4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.
5/ In addition to regular first-year depreciation.

Table 5. Selected Countries: Effective Taxation of Income from Investment in Buildings, 1990 1/

(With uniform inflation rate and after-tax rate of return)

	Austria		Finland		Greece		Hungary		Ireland		Poland		Portugal		Spain		Turkey	
	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity
Required rate of return	9.64	12.03	8.61	13.07	9.30	11.94	9.09	13.33	10.40	10.12	11.02	14.50	10.29	12.85	10.39	12.59	9.70	14.91
After-tax rate of return	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Total tax wedge	0.64	3.03	-0.39	4.07	0.31	2.94	0.09	4.33	1.40	1.11	2.03	5.51	1.28	3.85	1.40	3.60	0.71	5.92
Host tax wedge	-1.36	2.31	-2.39	3.34	-1.69	2.22	-1.91	3.60	-0.60	0.38	0.03	4.78	-0.72	3.12	-0.60	2.87	-1.29	5.19
Corporate tax wedge	-1.36	2.25	-2.39	3.30	-2.80	2.15	-1.91	3.60	-0.60	0.38	-1.08	4.74	-2.48	3.09	-1.71	2.84	-2.40	5.19
Withholding tax wedge	—	0.06	—	0.04	1.11	0.07	—	—	—	—	1.11	0.04	1.76	0.03	1.11	0.03	1.11	—
Home tax wedge	2.00	0.72	2.00	0.73	2.00	0.72	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73	2.00	0.73
Corporate tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate	2.40	2.40	10.00	10.00	8.00	8.00	4.50	4.50	4.00	4.00	2.50	2.50	4.00	4.00	3.00	3.00	4.00	4.00
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial deduction 5/	—	—	—	—	—	—	—	—	30.00	30.00	—	—	—	—	—	—	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	5.00	—	—
Nominal interest rate (endogenous)	10.00	10.00	10.00	10.00	11.10	11.10	10.00	10.00	10.00	10.00	11.10	11.10	11.76	11.76	11.10	11.10	11.10	11.10
Expected rate of inflation																		
Host country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Home country	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse; and various national sources.

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.

2/ Only undistributed profits are liable to the corporate tax.

3/ SL = straight-line method; DB = declining-balance method.

4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.

5/ In addition to regular first-year depreciation.

For an equity-financed investment, Poland has the largest total tax wedge and the highest required rate of return followed by Hungary. Poland also has the largest tax wedge for debt-financed investment despite its relatively high corporate tax rate, and the tax wedge exceeds that for similar investment in Ireland. Equity-financed investment still faces the smallest tax wedge in Ireland.

Portugal imposes relatively high withholding taxes which need to be compensated for with a higher required rate of return; thus, an equity-financed investment must yield another 1.2 percent real rate of return if the investor is to receive the assumed 2 percent after-tax real rate of return. When required to yield the same rate of return as in other countries, Portugal no longer ranks in the middle of the range of the included countries but appears to be a less favorable investment environment, than in the preceding case.

The overall picture for Poland and Hungary is about the same as above, given a comparatively heavy tax burden on investment in machinery and buildings. Since Hungary does not impose any withholding taxes on interest payments, the required rate of return on debt-financed investment compares favorably to that in many other countries. Chart 1 summarizes the results for investment in machinery.

Table 5 and Chart 2 show that Turkey has the highest required rate of return for equity-financed buildings, followed by Poland and Hungary. For a debt-financed investment, Finland has the lowest required rate of return, both on machinery and buildings, due in part to the double declining-balance depreciation method. Of all countries, Greece has the highest rate of tax depreciation for buildings and Poland has the lowest rate.

3. Actual interest and inflation rates

By using actual nominal interest and expected inflation rates in each country, we can highlight the interaction of the tax system with the economic environment. Financing costs are likely to vary according to the risk involved in the investment project and it is therefore difficult to specify a single interest rate as a "typical" rate relevant for all investment decisions. Instead of the expected rate of inflation, the actual rate of change in retail prices for the last three years has been used as a proxy for the expected rate of inflation. The chosen values for interest rates and expected rates of inflation should therefore be seen more as illustrative examples rather than representing the values for a "typical" investment in that country. This is particularly the case for Poland, which has experienced large variations in the rate of inflation, along with shortages.
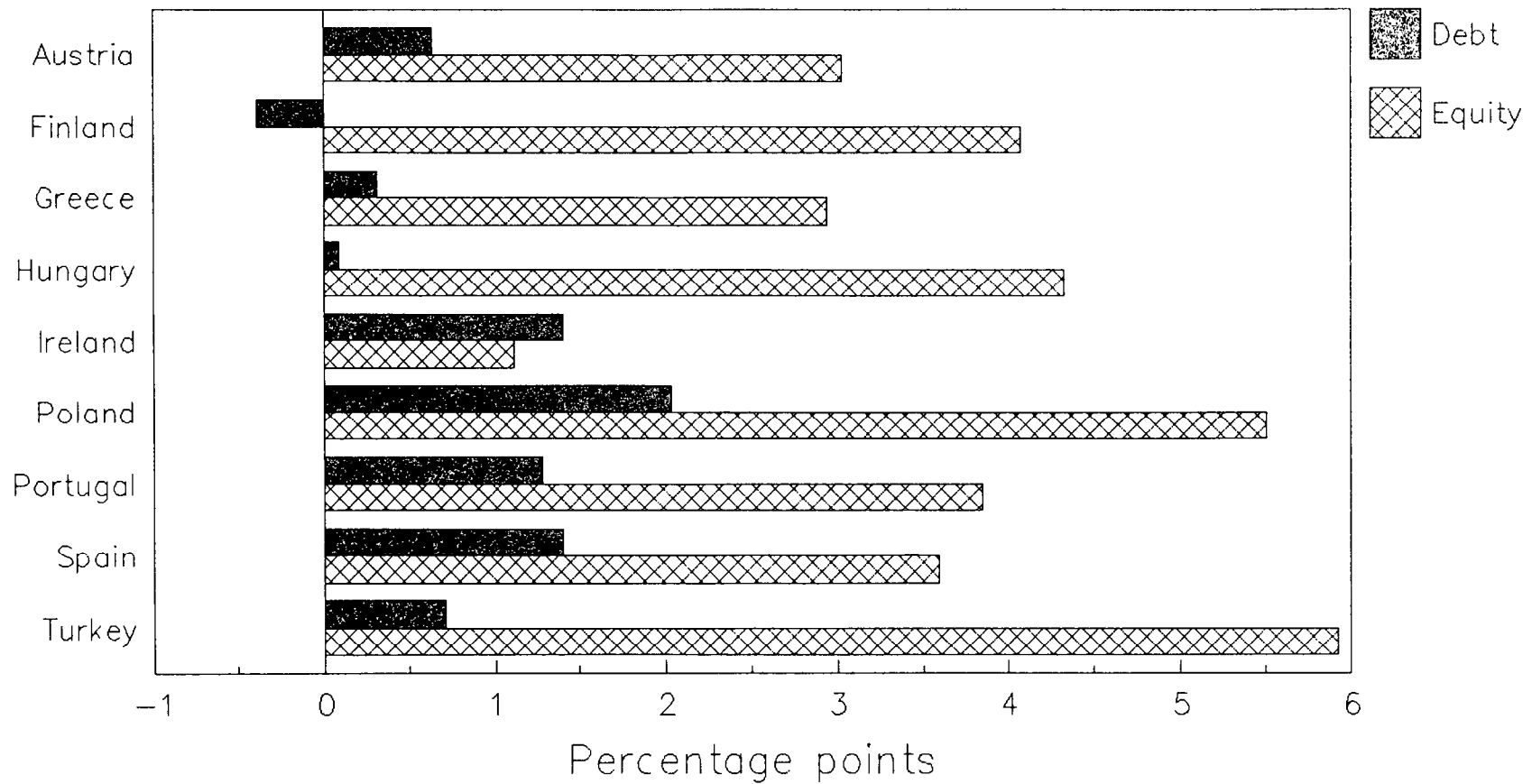
CHART 1

TOTAL TAX WEDGE ON INVESTMENT IN MACHINERY, 1990
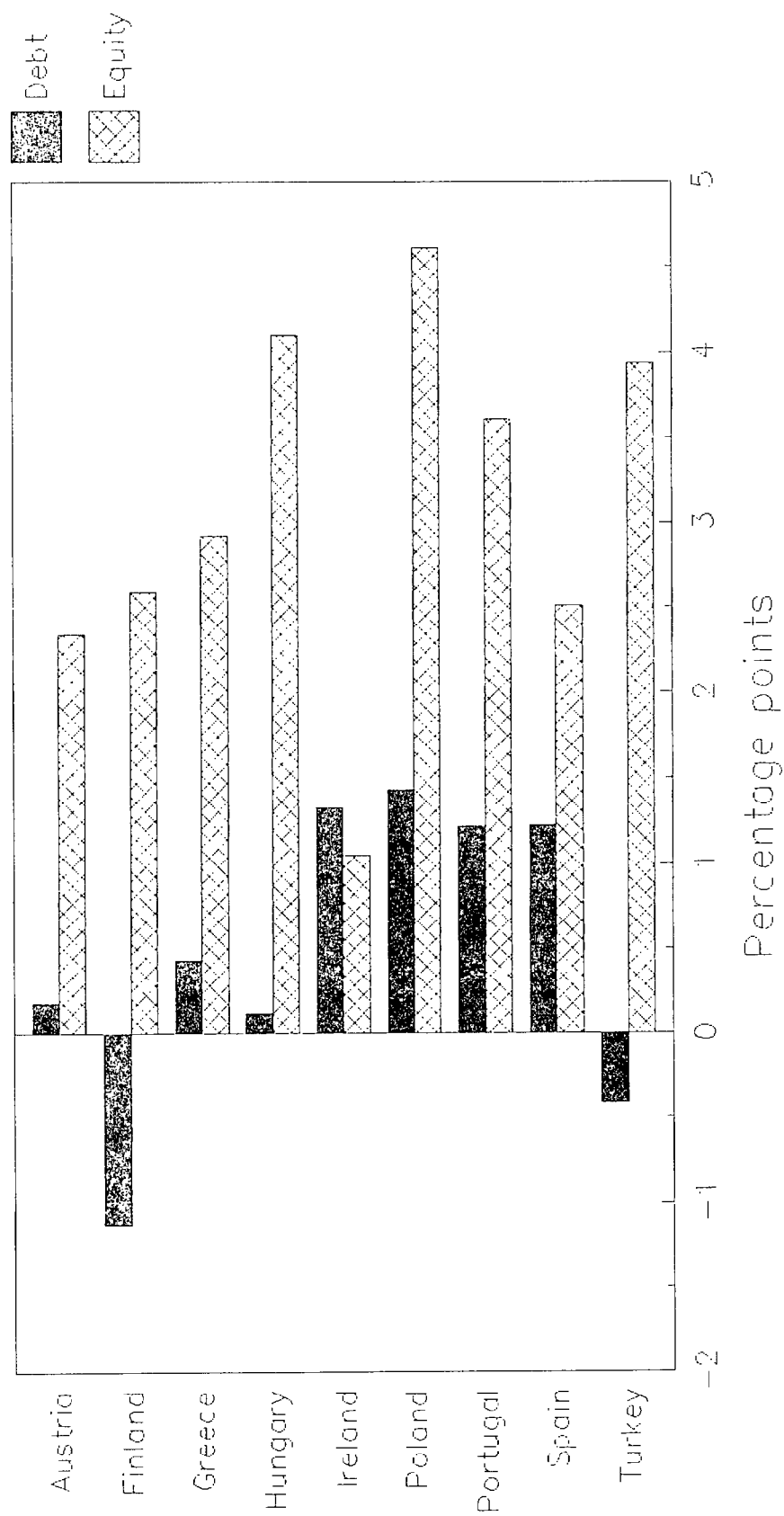
With uniform after-tax rate of return

CHART 2
TOTAL TAX WEDGE ON INVESTMENT IN BUILDINGS, 1990

With uniform after-tax rate of return

Table 6. Selected Countries: Effective Taxation of Income from Investment in Machinery, 1990 1/

(With actual interest and inflation rates)

	Austria Debt	Austria Equity	Finland Debt	Finland Equity	Greece Debt	Greece Equity	Hungary Debt	Hungary Equity	Ireland Debt	Ireland Equity	Poland Debt	Poland Equity	Portugal Debt	Portugal Equity	Spain Debt	Spain Equity	Turkey Debt	Turkey Equity
Required rate of return	19.50	18.03	17.49	22.46	18.93	24.76	12.60	20.70	20.29	20.00	4.75	24.85	15.88	19.07	23.19	25.15	-7.85	19.06
After-tax rate of return	2.83	2.83	4.26	4.26	4.59	4.59	0.54	0.54	4.04	4.04	1.08	1.08	0.57	0.57	6.,19	6.19	0.87	0.87
Total tax wedge	0.20	1.67	-1.77	3.19	-0.66	5.17	-2.94	5.16	1.25	0.97	-11.73	8.77	0.31	3.49	1.99	3.96	-23.72	3.18
Host tax wedge	-1.07	1.22	-4.01	2.59	-4.17	4.54	-5.90	4.93	-0.71	0.38	-20.05	8.49	-1.75	3.26	-0.72	3.16	-34.49	2.92
Corporate tax wedge	-1.07	1.15	-4.01	2.52	-6.67	4.41	-5.90	4.93	-0.71	0.38	-27.25	8.47	-4.22	3.25	-2.42	3.09	-43.85	2.92
Withholding tax wedge	—	0.07	—	0.07	2.50	0.13	—	—	—	—	7.20	0.02	2.47	0.01	1.70	0.07	9.36	—
Home tax wedge	1.27	0.45	2.24	0.60	3.51	0.63	2.96	0.23	1.96	0.59	8.32	0.28	2.06	0.23	2.71	0.80	10.77	0.26
Corporate tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate	10.00	10.00	30.00	30.00	16.80	16.80	12.00	12.00	10.00	10.00	10.00	10.00	12.50	12.50	10.00	10.00	20.00	20.00
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	DB 6/	DB 6/
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial deduction 5/	20.00	20.00	—	—	—	—	—	—	30.00	30.00	—	—	—	—	—	—	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	5.00	—	—
Nominal interest rate	6.50	6.50	13.00	13.00	25.00	25.00	21.00	21.00	11.00	11.00	72.00	72.00	16.50	16.50	17.00	17.00	90.00	90.00
Expected rate of inflation																		
Host country	2.40	2.40	6.50	6.50	14.40	14.40	17.50	17.50	5.00	5.00	55.00	55.00	11.40	11.40	6.40	6.40	69.00	69.00
Home country	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse; and various national sources.

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.
2/ Only undistributed profits are liable to the corporate tax.
3/ SL = straight-line method; DB = declining-balance method.
4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.
5/ In addition to regular first-year depreciation.
6/ In Turkey, assets are revalued for depreciation purposes. This has been taken into account in the calculations.

Table 7. Selected Countries: Effective Taxation of Income from Investment in Buildings, 1990 1/

(With actual interest and inflation rates)

	Austria Debt	Austria Equity	Finland Debt	Finland Equity	Greece Debt	Greece Equity	Hungary Debt	Hungary Equity	Ireland Debt	Ireland Equity	Poland Debt	Poland Equity	Portugal Debt	Portugal Equity	Spain Debt	Spain Equity	Turkey Debt	Turkey Equity
Required rate of return	10.54	12.23	10.54	16.54	10.32	16.60	3.02	11.64	12.40	12.11	-7.82	13.73	7.37	10.75	15.39	18.88	-27.29	15.57
After-tax rate of return	2.83	2.83	4.26	4.26	4.59	4.59	0.54	0.54	4.04	4.04	1.08	1.08	0.57	0.57	6.19	6.19	1.16	1.16
Total tax wedge	0.71	2.40	-0.72	5.28	-1.27	5.01	-4.52	4.09	1.36	1.07	-15.90	5.65	-0.20	3.17	2.20	5.69	-35.45	7.41
Host tax wedge	-0.56	1.95	-2.96	4.68	-4.78	4.38	-7.48	3.86	-0.60	0.48	-24.62	5.37	-2.25	2.94	-0.51	4.89	-46.29	7.12
Corporate tax wedge	-0.56	1.88	-2.96	4.61	-7.28	4.25	-7.48	3.86	-0.60	0.48	-31.82	5.35	-4.73	2.93	-2.21	4.82	-55.29	7.12
Withholding tax wedge	—	0.07	—	0.07	2.50	0.13	—	—	—	—	7.20	0.02	2.48	0.01	1.70	0.07	9.00	—
Home tax wedge	1.27	0.45	2.24	0.60	3.51	0.63	2.96	0.23	1.96	0.59	8.72	0.28	2.05	0.23	2.71	0.80	10.84	0.29
Corporate tax rate	30.00	30.00	42.00	42.00	40.00	36.00 2/	40.00	40.00	10.00	10.00	40.00	40.00	40.00	40.00	35.00	35.00	47.80	47.80
Host withholding tax rate																		
Dividends	20.00	20.00	15.00	15.00	25.00	25.00	—	—	—	—	15.00	15.00	12.00	12.00	10.00	10.00	—	—
Interest	—	—	—	—	10.00	10.00	—	—	—	—	10.00	10.00	15.00	15.00	10.00	10.00	10.00	10.00
Tax depreciation rate	2.40	2.40	10.00	10.00	8.00	8.00	4.50	4.50	4.00	4.00	2.50	2.50	4.00	4.00	3.00	3.00	4.00	4.00
Method 3/	SL	SL	DB	DB	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL	SL
First year convention 4/	0.75	0.75	1.00	1.00	0.50	0.50	0.40	0.40	1.00	1.00	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00
Initial deduction 5/	—	—	—	—	—	—	—	—	30.00	30.00	—	—	—	—	—	—	—	—
Investment tax credit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.00	5.00	—	—
Nominal interest rate	6.50	6.50	13.00	13.00	25.00	25.00	21.00	21.00	11.00	11.00	72.00	72.00	16.50	16.50	17.00	17.00	90.00	90.00
Expected rate of inflation																		
Host country	2.40	2.40	6.50	6.50	14.40	14.40	17.50	17.50	5.00	5.00	55.00	55.00	11.40	11.40	6.40	6.40	69.00	69.00
Home country	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Sources: International Bureau of Fiscal Documentation; OECD; Coopers and Lybrand; Price Waterhouse; and various national sources.

1/ Rates of return, tax wedges, tax depreciation rate, initial deduction, and investment credit, are expressed in percent of asset value; corporate tax rate as a percent of taxable income; and withholding tax rate is in percent of taxable remittance. Interest and inflation rates are shown in annual percentage changes.
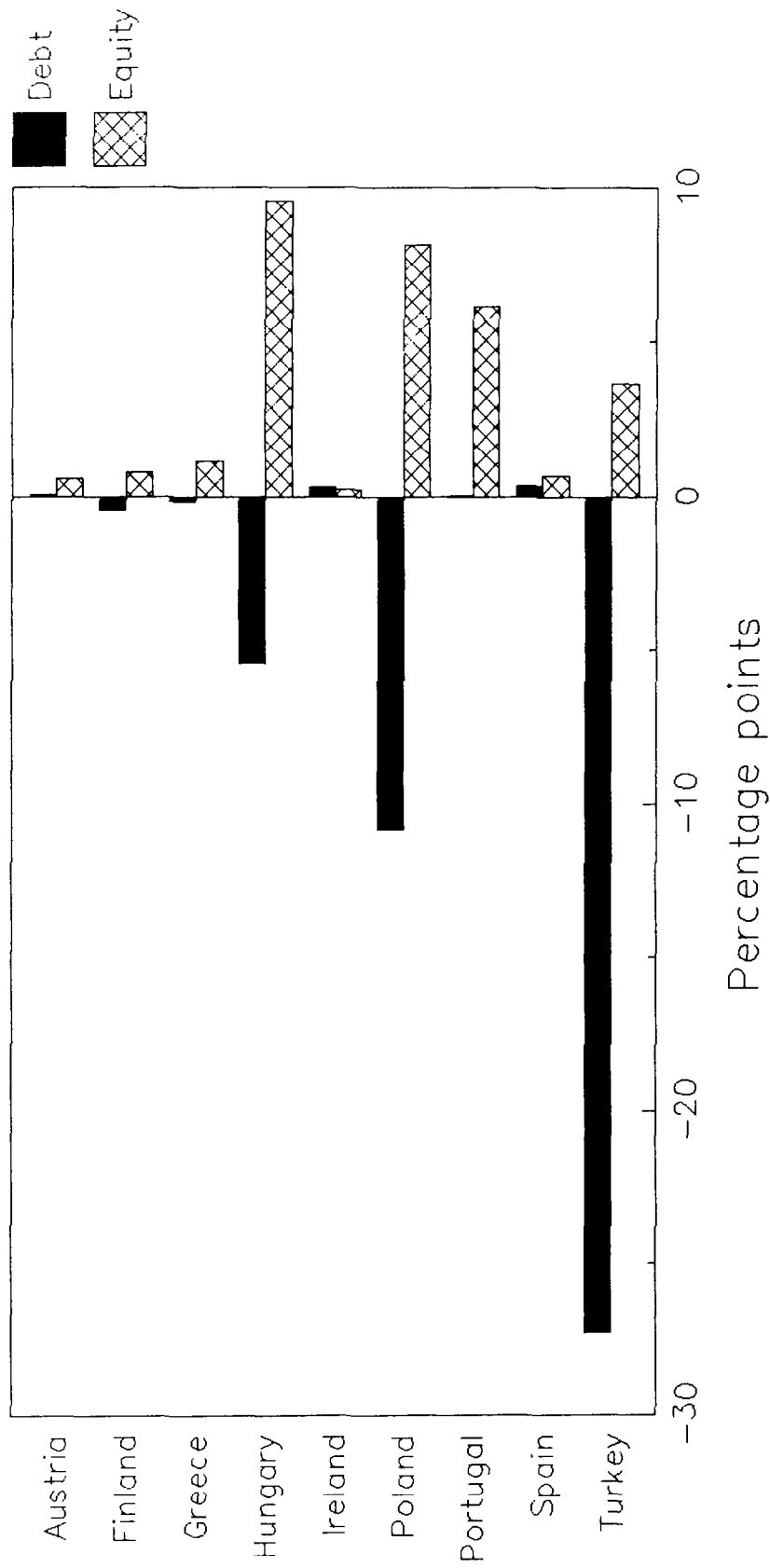2/ Only undistributed profits are liable to the corporate tax.
3/ SL = straight-line method; DB = declining-balance method.
4/ Determines to what extent an acquired asset is depreciable when acquired. A value of 1 indicates that a whole year's depreciation is allowed whenever purchased. A value of 0.5 indicates that the purchases are prorated, with on average half a years deduction.
5/ In addition to regular first-year depreciation.

CHART 3
EFFECTIVE TAX RATE ON MACHINERY*, 1990

Debt ■   Equity ▨

Percentage points

Austria
Finland
Greece
Hungary
Ireland
Poland
Portugal
Spain
Turkey

-30   -20   -10   0   10

* Calculated as the ratio of total tax wedge to
after-tax rate of return, with actual interest
and inflation rates.

CHART 4
EFFECTIVE TAX RATE ON BUILDINGS*, 1990
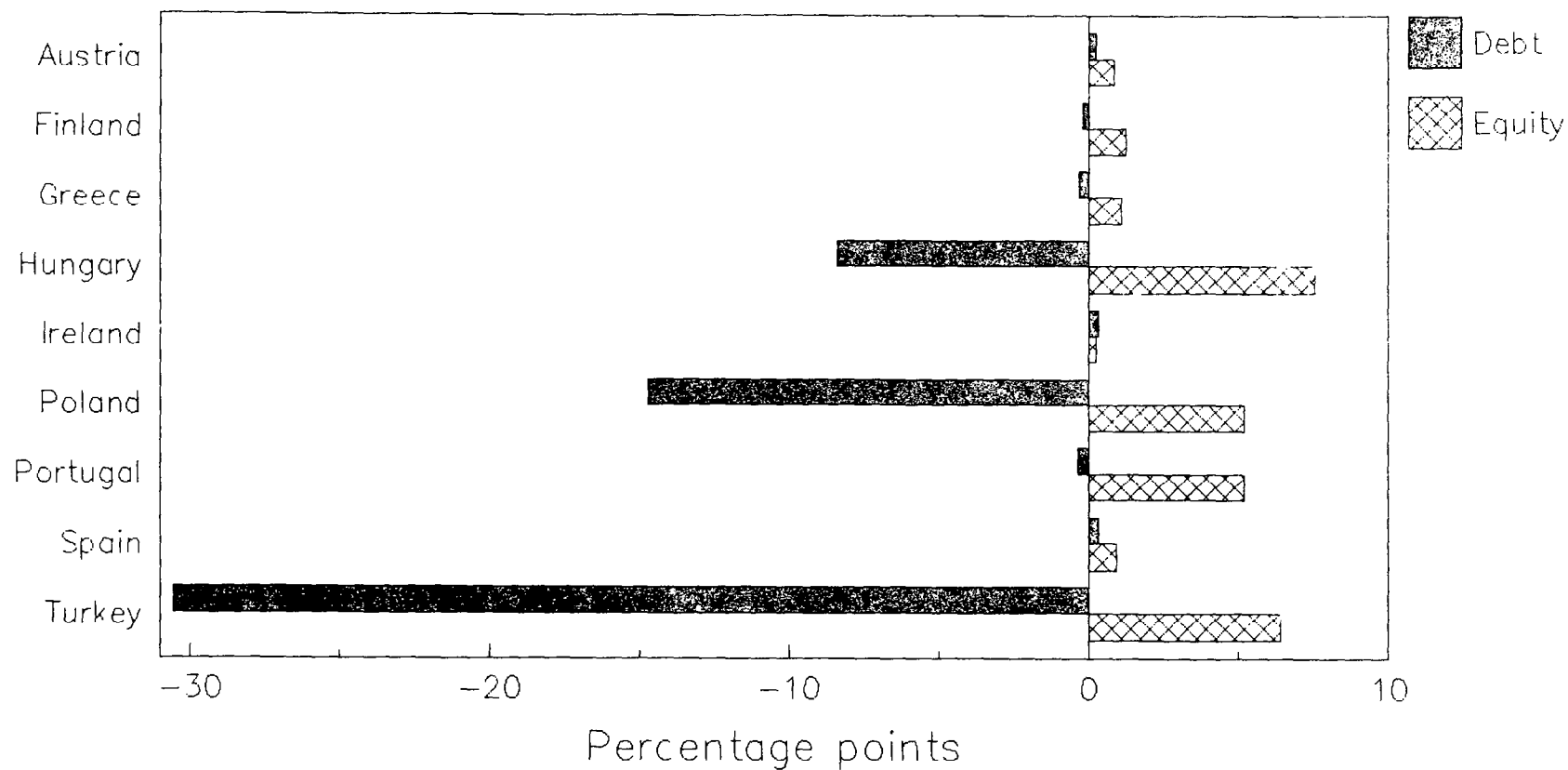
Percentage points

* Calculated as the ratio of total tax wedge to
after—tax rate of return, with actual interest
and inflation rates.

Differences in inflation rates and real rates of return have a major impact on the corporate tax wedge as well as on the host tax wedge. At the investor's level, it is assumed that differences in inflation rates translate into changes in exchange rates, and that the resulting exchange gains and losses are realized and taxed at the 8 percent capital gains tax rate.

With wide differences in real rates of return across countries, the after-tax real rate of return varies between over 6 percent and less than 1 percent (Tables 6 and 7). Although both the observed nominal interest rate and the expected rate of inflation are subject to a large degree of uncertainty, it is useful to focus on how the tax system and the economic environment interact. Spain has the highest required rate of return on equity-financed machinery, followed by Poland and Greece. Yet the before-tax required rate in Spain is only slightly higher than in Poland despite the fact that an investment in Spain yielded the highest after-tax rate of return for the investor, over 6 percent, while the rate of return in Poland was only 1 percent. Likewise, whereas an equity-financed investment in machinery in Hungary yields the lowest after-tax rate of return, the required rate is higher than in Austria, Turkey, Portugal and Ireland. If the real after-tax rates of return are taken into account, it appears that machinery in both Hungary and Poland is subject to a relatively heavy tax burden. The effective tax rate, calculated in terms of the total tax wedge in relation to the after-tax rate of return, is shown for machinery and buildings in Charts 3 and 4.

The interaction between high rates of inflation and the corporate tax system is particularly evident in the calculations for both machinery and buildings in Turkey. While the statutory corporate tax rate is the highest among all included countries, the combination of automatic revaluation of assets for tax depreciation with no indexation for nominal interest payments confers a generous subsidy for debt-financed investment as illustrated by the negative tax wedge and required real rate of return. Poland has the second largest subsidy at the corporate level for debt-financed investment, given deductibility of nominal interest payments, followed by Greece and Hungary. As the inflation rate accelerates, the distortion between debt and equity financed investments increases; the ensuing rise in the debt-equity ratio leads to a decline in corporate tax revenue. The investment decision also tends to be biased in favor of assets with a shorter life since the depreciation allowances usually are based on historical values. In brief, a classical corporate tax system without indexation is eroded and creates allocative distortions in an inflationary environment. 1/

1/ As a rule of thumb, when the inflation rate exceeds 20 percent, a classical corporate tax system will create increasingly large distortions.

VI. Other Aspects of the Tax System

Although the cost of capital calculations capture key aspects of the tax system, a number of important features have been left out. One such feature is the treatment of losses. Most countries allow for carry-forward of losses to future years and some allow for carry-back to previous tax years (see Table 1). Restrictions usually apply to the time period during which losses may be carried-over and sometimes also to the amounts which may be claimed. The provision of carry-forward of losses is especially important for countries like Poland and Hungary, where new areas of economic activity are opening up and private enterprises may incur initial losses in an uncertain investment climate.

In contrast to other countries, Hungary allows for a two-year carry-forward of losses while Poland has no such rule. Besides the absence of loss carry-over provisions, Poland also requires foreign investors to set aside 8 percent of their earnings in a reserve fund. If these aspects of the tax code were taken into account, the total tax wedge for investment in Poland, and to a lesser extent for Hungary, would increase even further relative to that in western countries. 1/

As if to offset the restrictive treatment of tax losses and depreciation, both Hungary and Poland have granted tax preferences to foreign-owned enterprises. In Hungary, tax concessions range from a 20 percent reduction in the corporate tax rate to a complete five-year tax holiday. In addition, accelerated depreciation has been increased to 30 percent (from 20 percent earlier) and the eligible asset categories have been broadened to include most advanced industrial equipment. Hungary also provides to foreign-owned companies a rebate equal to the underlying tax on the reinvested profits of the foreign shareholder. Poland has extended its three-year tax holiday to four years, effective January 1990. As mentioned before, special provisions for foreign investors create distortions based on ownership and may indirectly exacerbate the tax situation for domestic investors since the revenue loss from the provisions could lead to an increase in other taxes. 2/

Both Hungary and Poland have numerous depreciation schedules for different categories of assets, which, if taken into account, would result in a wide range of tax wedges. Poland has recently reduced the number of depreciation schedules from 464 to 60 (as of January 1, 1990) and a similar development is taking place in Hungary.

1/ Another important aspect of the tax system is the tax treatment of inventory. Some countries allow LIFO valuation, for instance Austria (if not contradicted by the facts), Belgium, Germany, Greece, Portugal, and the United States. In a period of rising prices, the cost of supplies is higher, and therefore net income lower, under LIFO than under FIFO and hence LIFO results in lower taxes.
2/ In addition, the discrimination in favor of foreign investment gives an incentive to domestic enterprises to invest locally via a foreign location and thus evade local taxation.

Perhaps the most important factors for the investment environment in Hungary and Poland are, however, overall macroeconomic conditions and the stability and transparency of rules and regulations. The tax system can contribute to this by allowing general rather than specific provisions thereby ensuring that the revenue base is not eroded, which inevitably leads to destabilizing tax changes in the future. Also, the tax system, as well as other regulatory provisions, should be transparent in the eyes of the investor, with no scope for a negotiated settlement of tax liabilities, as was the practice in former centrally planned economies.

However, at an initial stage of a major reform process, other areas like market clearing prices and well-functioning financial markets may be more important. Once the institutions are established and markets are integrated, however, the tax system may play an increasing role in the ability of Central and Eastern European countries to attract capital and to promote adequate domestic levels of saving and investment. If domestic savers bear a relatively heavy tax burden, more investment is financed abroad and a larger share of the capital stock is owned by foreigners. Furthermore, if saving/investment decisions are influenced to a large extent by tax considerations, the resulting low level of savings reflects an inefficient allocation of resources. 1/

VII. Conclusions

The opening up of markets in Central and Eastern Europe could result in increased worldwide competition for capital. A central question is to what extent the tax system should contribute to a favorable investment climate in this region. Some countries have chosen to offer a variety of tax concessions for foreign investors while maintaining a relatively large tax burden for domestic investors. From the points of view of revenue and efficiency, it would be better to introduce a uniform, stable, and transparent tax treatment of all investors. Several steps have already been taken in this direction. However, the cost of capital calculations undertaken in this study serve to illustrate the need for further tax reform in Poland and Hungary to achieve a more efficient allocation of resources and a more competitive tax system. Both countries should phase out tax preferences to foreign investors 2/ and to certain activities (notably agriculture and food processing) while reducing the general effective income tax rate, insofar as permitted by revenue considerations.

1/ This analysis is by no means only applicable to the countries of Central and Eastern Europe but to industrial countries as well. For example, the large U.S. capital inflows during the 1980s may have been encouraged by investment incentives in combination with disincentives to saving. See Bovenberg et al. (1990).

2/ Tax holidays already granted should, of course, be grandfathered until fully utilized.

Specifically, the high effective taxation on ordinary corporate investment income should be lowered through the adoption of more realistic and simpler capital cost recovery allowances (in line with economic depreciation) and liberalization of loss carryover provisions. Further, consideration could be given to lower statutory tax rates as permitted by revenue constraints, and to indexation of both assets and liabilities for tax purposes, so as to reduce the distortionary bias of high rates of inflation in favor of debt-financed investment in short-lived assets (including inventories) and against equity-financed longer-lived fixed assets. As regards foreign investment, any concessions in the form of exceptions from withholding taxes on dividend and interest remittances should be granted only to the extent the foreign investment income is eligible for tax exemption in the home country. Without the latter provisions, provided unilaterally or through bilateral tax treaties, the host country's tax concessions are tantamount to a revenue transfer from the host to home country's budget, without any impact on the foreign investment decision. The alternative approach, followed in certain host countries of lowering investment costs by providing up-front investment grants or additional depreciation allowances, just like the reliance on tax holidays, is to be avoided. As international experience shows, such provisions can easily proliferate, are very difficult to target, and result in revenue erosion.

On the whole, the relatively high required rate of return and effective tax rates in Hungary and Poland are probably underestimated. A higher required rate of return--reflecting a risk premium not applicable to the comparator countries--would have resulted in relatively larger tax wedges for both countries. Further, to the extent inflation were to accelerate further, Hungary's tax wedge on equity-financed investment could be higher, and on debt-financed lower, than calculated above. By contrast, continued deceleration of inflation in Poland would lead to a convergence in that country's corresponding tax wedges. Therefore, not only from the standpoint of the tax system, but also as an overall incentive to foreign investment, Central and East European countries should endeavor primarily to achieve macroeconomic stability. An equally critical element for a favorable investment environment is the creation of an adequate infrastructure, including a reliable and open institutional and legal framework.

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