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Income Taxes, Interest Rate Parity, and the Allocation of  
International Savings in Industrial Countries

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Abstract

The internationalization of the financial markets of the industrial countries has greatly increased the mobility of financial capital and has made the concept of interest rate parity one of more than just theoretical significance. Given interest rate parity, decisions concerning the generation, distribution, and utilization of the international pool of financial savings should all be made in relation to the international level of the rate of interest. The paper shows what happens to this idealized picture when interest incomes are taxed and interest expenses are deductible as they are in industrial countries.

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Summary

This paper shows the power of income taxes in bringing about large distortions in the allocation of savings. It takes as its starting point the tendency, in today's world, for the real interest rate to approximate parity among industrial countries. In these countries, one observes fairly similar movements of real rates, regardless of domestic policies, and levels that are not as different as one would expect from the differences in domestic policies. Given this approximate interest rate parity, one should expect that, at the margin, investment and saving decisions should be similar across countries and across income groups or sectors within the same country. These decisions should be related to the international rate of interest. In this case the international capital market would lead to a fairly optimal allocation of resources.

It is shown, however, that taxes affect these marginal equivalences significantly, especially if the taxes are high and progressive, interest payments are deductible and they are applied with different rules, and the rate of inflation is above zero. These real-life circumstances are likely to produce considerable distortions. The paper shows that individuals in different countries, facing different rates of inflation and different marginal tax rates, yet borrowing at the same international real rate of interest, may find it equally profitable to make investments that, before taxes, might have very different expected rates of return.

The paper concludes that large industrial countries should begin to pay more attention to the international implications of their tax rules and reforms. Changes in some of these rules may have as large an impact on external balances as the effect one could expect from politically feasible changes in interest rates or in fiscal deficits.



## I. Introduction

A discussion of, say, the labor or the housing market would focus on national or even on regional factors because the price of labor or houses, at least in the short run, is likely to be determined by national or even regional supply and demand schedules. Houses and, to a lesser extent, workers do not cross national frontiers. In the short run, their prices are, thus, only marginally affected by factors beyond the national border and are likely to differ substantially from place to place. Some prices, however, are essentially set in international markets. This is the case, for example, for commodity prices such as copper, coffee, oil, gold, and so forth. If there were no taxes, no trade or other restrictions, and no subsidies, the prices of these commodities would be the same in different countries, apart from differences due to transportation costs.

Money is the quintessential commodity since, given current technology, it can be moved from one financial center to another literally within seconds and at practically zero costs. <sup>1/</sup> As a consequence, if there is a commodity that should conform to the law of one price, it is money or credit. Economists have developed the concept of interest rate parity which assumes, precisely, that the interest rate should be the same in Tokyo, New York, Milan, London, or elsewhere. If interest rate parity held as hypothesized, a very small interest rate differential (in theory one approaching zero) would induce Japanese surpluses to finance U.S. deficits, Brazilian or Korean investment projects, or other countries' excess consumption.

In this ideal world, assuming that investors are risk-neutral and face no constraints, investment spending in each country would be pushed to the point where the last won or cruzeiro invested would be expected to generate a rate of return equal to the international rate of interest. Since everyone, everywhere would face the same cost of capital, investment would be optimally allocated and, of course, the consumption-saving decisions by individuals everywhere would be made on the same basis. If interest rates tended to increase in one country, money would flow in from other countries to restore the equilibrium. As an analogy, one can visualize many streams flowing into a lake and many more streams flowing out of that lake. At the point of entry or exit the level of the streams would be almost the same as that of the lake. The streams flowing in would be the saving streams; those flowing out would be the spending streams. The lake would be the international pool of savings or the international capital market.

When we move away from this theoretical world of interest rate parity and observe the real world, two observations must be made. First, many obstacles make the international credit market a fragmented one. These obstacles may be lack of information on the part of borrowers and

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<sup>1/</sup> See on this Mayer (1984).

lenders, different risks, regulation of credit markets, rates of inflation, tax regimes, subsidies to credit, restraints on capital movements, sovereign risk, differences in expected exchange rate movements, and so forth. Second, in spite of these obstacles there is some truth to the theory of interest rate parity, especially when applied to industrial countries. For example, when interest rates rose in the early 1980s they rose in all countries, regardless of their domestic economic policies. If the level of interest rates rises in the United States or in Japan, this rise soon affects the level in other countries. Thus what happens in one country always has some effect on other countries. The larger the country, the larger this effect is likely to be. Using our analogy, if one of the streams increases or decreases its flow, the level of the whole lake will change.

In this paper I shall discuss the implications for the above theoretical model of the tax treatment of interest incomes and deductions. One reason why such a discussion is needed is the still prevalent belief among tax experts that the harmonization of individual income taxes is of secondary importance, even within an international market as closely linked as the European Community. It has been reported, for example, that "the Fredersdorf Report (1978) concluded that it was not essential to harmonize the income tax [in the European Community]" (Cnossen, 1987, p. 41). The recent comprehensive book on Tax Coordination in the European Community, edited by Sijbren Cnossen, has no mention of the need to coordinate the tax treatment of interest income and expenses. Furthermore, the recent attention paid to policy coordination among industrial countries has not extended to the need to coordinate tax (as compared with fiscal) policy. Throughout the paper I shall assume that the exchange rates adjust fully for the effects of inflation, which implies that inflation does not affect the real interest rate parity. <sup>1/</sup> In the real world this assumption is not likely to prevail in the short run. However, the basic message of the paper is not affected by it.

## II. Theoretical Aspects

If countries levied only taxes on consumption, with proper border adjustments, these taxes would not affect in any direct way the interest rate parity, if this existed, and, thus, the international allocation of financial capital. Of course, to the extent that the use of, say, a value-added tax, instead of income taxes, induced individuals to save more, there would be some indirect effects on the level of interest rates, but the optimal relations between saving and investment decisions on one hand, and the rate of interest on the other would not be

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<sup>1/</sup> This paper assumes, therefore, that not only international financial markets but also international goods markets are integrated (see Frankel (1985)). Bovenberg (1987) analyzes the effects of differential tax treatment in a model with perfectly mobile financial capital but in which the purchasing power parity conditions do not necessarily hold.

disturbed. When income taxes are introduced, however, the situation changes (see Tanzi and Blejer, 1982; Ben-Zion, 1984; and Blejer, 1984). These taxes often interfere with the idealized allocation of financial capital described above and the degree of interference is a direct function of factors such as the size of the tax rate, the tax treatment of interest incomes and expenses, the rate of inflation, and the degree of progressivity of the income tax.

The discussion in this section shall be limited to personal income taxes but similar and perhaps even more complex issues arise in connection with corporate income taxes. I shall consider a few alternative situations to indicate ways in which income taxes can (a) distort the international demand and supply of credit schedules, thus affecting the international equilibrium level of interest rates; (b) distort the international allocation of credit; and (c) distort the domestic allocation of savings as well as the saving-consumption decisions, thus reducing the economic welfare of specific countries. This paper will provide a preliminary sketch of the main issues. A more detailed treatment of this rather complex and unexplored area would require far more time and space than can be allocated here. I shall outline eight alternative cases. For easy reference the assumptions used in these cases are listed in Table 1.

Case 1: Assume that in a given country X (a) there is no inflation; (b) all incomes, including interest incomes, are taxed with a proportional income tax, and that (c) interest payments are not allowed as deductions in the determination of taxable income. There is no theory I am aware of that argues that the tax on interest income is fully shifted forward, especially in the short run. The net result is that savers receive a rate of return that has been reduced by the tax. The tax, therefore, increases the cost of future consumption for those who lend money, as they will need to save more to buy a given bundle of goods and services at some future date. Whether as a consequence savers would save less is still a controversial subject both theoretically and empirically. However, for the rest of this paper I shall assume that the rate of saving is positively related to the net-of-tax real rate of return.

There are two possibilities that should not be dismissed. First, the tax rate, especially if high, may encourage the development of an underground money market (or so-called "curb market"). In this case the lender may bypass the financial intermediaries, where controls by the tax authorities are easier, and may lend directly to borrowers. Because the lender evades the payment of income taxes on the interest income that he receives, for equal risk, the borrower may end up paying an interest rate that is lower than he would have paid to a bank; and the lender may end up receiving a higher net-of-tax rate than he would have received if his lending had been channelled through a financial institution. The second possibility is that the saver might take his savings out of the country and channel them to tax havens. How these changes affect saving and investment patterns and levels is hard to

Table 1. Assumptions

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Cases	Inflation	Tax on Interest Received	Deductibility of Interest Expense
1	No	Proportional	No
2	No	Proportional	Yes
3	No	Progressive	No
4	No	Progressive	Yes
5	Yes	Proportional	No
6	Yes	Proportional	Yes
7	Yes	Progressive	No
8	Yes	Progressive	Yes

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assess. But it is clear that the marginal relationships between cost of capital and rate of return to investment will be changed. For example, those who borrow from the curb market at a lower rate may be able to engage in investments with lower rates of return, at the margin, than those who borrow from banks.

Case 2: The assumptions are the same as in Case 1 except that interest payments are now deductible expenses. In this case the situation for the borrower is different from Case 1. While the tax on the lender's interest income increases his cost of future consumption, relative to current consumption, the interest deduction for the borrower reduces the latter's cost of borrowing. Inevitably lending and borrowing flows are affected. This case could in turn be separated into cases where (a) all interest paid, regardless of uses, is a deductible expense; (b) only interest on borrowing for investment is a deductible expense; (c) only interest on home mortgages is deductible; and (d) there are limits to the size of the deductions, and so forth. These different alternatives will inevitably affect saving and investment decisions. In the presence of, at least approximate, interest rate parity, the tax treatment of interest incomes and expenses will make domestic lending in some countries less attractive than in others, and domestic borrowing in some countries or in some activities more attractive than in others. For example, if the United States allows unlimited deductibility for interest paid on home mortgages, while, say, the United Kingdom, Canada, and Japan limit that deductibility, one should expect that the allocation of investment will reflect these tax policies with the United Kingdom, Japan, and Canada showing less investment in housing than the United States. Taxes have thus brought about an international or even a domestic allocation of investment that is no longer optimal. They are also likely to have affected the international level of interest rates and international capital flows.

Case 3: The assumptions are the same as in Case 1 except that the income tax is progressive. Now the reduction in the net-of-tax rate of return to savers increases with the increase in their income level. Thus, under the assumption that the rate of saving is a positive function of the net-of-tax rate of return, those who should be affected the most are the high-income taxpayers unless they can easily shift into investments that give them returns in the form of capital gains or untaxed utility flows. For them, future consumption becomes relatively more expensive than current consumption so that they might be induced to consume more.

Case 4: The assumptions are the same as in Case 2 except that the income tax is progressive. Now the tax not only makes current consumption cheaper than future consumption for high-income savers, it also makes consumption relatively cheaper for high-income borrowers as it reduces the net-of-tax rate of interest on their borrowing. Consumers are encouraged to anticipate their purchases. This effect is likely to be important for purchases such as houses and new cars where individuals have considerable freedom as to when such a purchase is made. Not only

is the allocation of saving and investment among countries affected, but also that among income classes within the same country. If one assumes that high-income savers are also more informed about tax-free alternatives outside the country than others, the progressivity of the tax will provide a further inducement for them to take their earnings to tax havens.

Let us now introduce the possibility of inflation.

Case 5: This is Case 1 except that there is inflation. In such a situation even a relatively low rate of inflation, combined with a substantial tax rate, and a tax system that taxes nominal rather than real interest income can lead to a situation where lenders could receive negative real rates of return on their lending. For example, an annual inflation of 10 percent, combined with a nominal interest of 12 percent and a tax rate of 25 percent would leave lenders with a net-of-tax nominal rate of return of 9 percent, that is, one percentage point less than the rate of inflation. What would the lenders' options be? First, they might look for alternatives to lending by buying gold, real estate, durable goods, etc. Second, they might attempt to lend outside official channels, both within and outside the country. Third, they might reduce their rate of saving. In order to keep their lending at the same rate as in the absence of inflation, they might require an adjustment of the nominal rate of interest to compensate them for the tax effect. But if this adjustment does take place, and foreigners could lend in a tax-free fashion in the country, then they would receive a higher net-of-tax real rate than the domestic lenders. This would depend on the statutory income taxes, on the ability of tax administrators to get information on incomes from foreign sources, and on the level of interest rates and inflation abroad. Once again, investment-saving decisions, and decisions related to the domestic and the international allocation of financial savings have been affected, thus affecting also the international equilibrium rate of interest.

There have been several papers that have attempted to test for the United States a hypothesis advanced independently by Michael Darby, Martin Feldstein, and myself that maintains that interest rates should adjust for inflation (as theorized by Irving Fisher) and for the effect of taxes (see Darby, 1975; Feldstein, 1976; Tanzi, 1976). The results of those attempts are somewhat ambiguous (see Tanzi, 1980; Peek, 1982; Ayanian, 1983). Perhaps one problem with these tests is that they have assumed a closed economy. In an open economy and with the assumption of interest parity, if the nominal rate of interest in country X adjusted enough to compensate for both inflation and the effect of taxes on domestic lenders, as theorized by Darby-Feldstein-Tanzi, then that rate might become very attractive for lenders from other countries, especially if they could lend tax-free or at lower tax rates than residents, as has been the case in the United States, where saving accounts by nonresident aliens have received tax-free interest. Foreign capital would flow in and would reduce the nominal rate to a level below that suggested by the Fisher-cum-taxes hypothesis.

Case 6: Case 6 is Case 2 but with inflation. In this case there is the effect of inflation on borrowers. If borrowers are allowed to deduct the nominal interest payments made, they could easily, as shown in the example in Case 5, end up with negative costs of borrowing (see also Table 4 below). Obviously in such a situation borrowing would increase unless the nominal rate of interest rose to the Fisher-cum-taxes level. But, once again, a level of interest consistent with the Darby-Feldstein-Tanzi hypothesis would attract capital from abroad if foreigners pay less tax on their interest income than domestic residents; and a rate lower than that would discourage domestic lending and encourage domestic borrowing. In any case, saving-investment and lending-borrowing decisions would be affected and so would the international equilibrium rate of interest.

Case 7: This is Case 3 with inflation. If the income tax is progressive, the net-of-tax rate of return that lenders receive becomes an inverse function of the level of income. The higher the level of taxable income, the higher the tax rate on that income and the lower the net-of-tax rate of interest that lenders receive. Thus high-income individuals in particular would be discouraged from lending domestically. For some of them the real rate of return net of tax could be very low indeed or even negative. For example, in our previous example an individual with a marginal tax rate of 50 percent would receive a net-of-tax rate of return of 6 percent or a real net-of-tax rate of return of minus 4 percent. As individuals with high incomes have also more options on the use of their savings, and are less likely to suffer from fiscal illusion (see Tanzi, 1980a), they would have the incentive and the ability to take advantage of domestic and foreign tax-free alternatives. For example, they would buy real assets with untaxed nominal returns (gold, cars, etc.) or they would make greater efforts to take their money to foreign tax havens. They may also reduce their rate of saving in addition to reducing their rate of lending.

An interesting consideration is that if the nominal rate of interest did adjust for both the rate of inflation and the "average" income tax rate, it would end up being "too high" for low-income individuals and "too low" for high-income individuals (see Tanzi, 1980b, Chapter 10). Thus, in spite of the adjustment in the rate, the latter would be encouraged to look for tax-free opportunities.

Case 8: This is Case 4 with inflation. Here the considerations for the lenders are the same as in Case 7 but we must now consider the borrowers. Given a progressive income tax and the deductibility of nominal interest payments, the real net-of-tax interest rate becomes inversely related to the income level of borrowers. The higher the income of the borrower, the lower the cost of borrowing. For individuals facing very high marginal tax rates, the cost of borrowing can become sharply negative. In other words, the richer the borrowers the more subsidized will their borrowing be. This conclusion remains true even if the nominal interest rate adjusts for the "average" rate of taxation.

To stay with our earlier example, a taxpayer facing a 50 percent marginal tax rate and borrowing at a 12 percent rate, when inflation is 10 percent, is in fact paying a real net-of-tax rate of minus 4 percent.

When interest deductibility is unconditional, borrowing will be much encouraged and lending much discouraged by the income tax during inflation. This is likely to affect the nominal rate of interest and induce capital movements. It is also likely to induce wealthier individuals to take their financial savings out of the country. As has happened in some countries, they may possibly lend their money back to their own firms through tax havens. The inflow of capital from foreign sources would prevent the real interest rate from getting too far out of line with the international real rate.

When the interest deductibility is conditional, in the sense that it is allowed only for certain types of borrowing, then the tax treatment of interest income and deductions will inevitably affect not only the level of lending and borrowing but also the use of financial capital. For example, if interest paid on house mortgages is the only deductible expense, one would expect an expansion of the demand for housing in countries with inflation as compared with those with price stability. It is interesting to speculate whether the recent sharp increase in the price of houses in the United States is the result of some acceleration of the rate of inflation and of the Tax Reform Act of 1986 that has eliminated the deductibility of interest payment to consumer loans but not to housing loans.

### III. The Tax Treatment of Interest Received and Paid in Industrial Countries

The previous theoretical discussion has identified four major factors that are likely to distort saving-lending and investing-borrowing decisions away from what they would be in a world where interest rate parity prevailed and where there were no income taxes. These are (a) the taxation of interest received; (b) the level and progressivity of the tax rates; (c) the tax treatment of interest payments; and (d) the rate of inflation. For real life situations one should add also the differential possibilities of tax evasion and avoidance on domestic income. These possibilities are ignored here. The above four factors will be discussed in connection with industrial countries.

Let us start with the taxation of interest received. For this, in spite of several possibilities, there is a lot of similarities among industrial countries.

First, the income tax laws could exempt interest received regardless of whether it is real or purely nominal. However, Iceland is the only industrial country that has chosen this route.

Second, the income tax laws could specify that only real interest received should be taxed as income. Thus the part of interest reflecting the erosion of the principal due to inflation would be recognized, as it should be, as a return of capital rather than as an income. In our earlier example, the individual who received an interest rate of 12 percent, when the rate of inflation was 10 percent, would be taxed only on 2 percent. Although this alternative has often been discussed and recommended in industrial countries, and some high-inflation, developing countries have followed it, so far no industrial country has modified its tax laws to introduce this important distinction between real and nominal interest incomes. 1/

Third, interest incomes could be taxed with a flat, or schedular, tax rate. A few countries have done this at least for some types of interest received, and in the tax reform that Japan has proposed interest income would be taxed at a schedular and final rate of 20 percent (withheld at the source) compared with rates on other incomes ranging from 15 percent to 65 percent. Denmark has also recently introduced a new income tax that taxes interest incomes with what is de facto a schedular rate of 50 percent (or 56 percent for incomes exceeding certain levels).

For the deductibility of interest payments, one finds a greater variety of treatment among industrial countries. There is no country (except Iceland) that does not allow any deduction for interest paid. There is no industrial country that makes a distinction between real interest payments and nominal interest payments. However, once one gets over these similarities, one finds considerable differences in the way the tax laws of particular countries treat the interest payments associated with particular loans.

Until the 1986 tax reform in the United States and Denmark, the Northern European countries--Denmark, Luxembourg, the Netherlands, Norway, Sweden--plus Switzerland and the United States were the most generous in allowing almost unlimited deductibility of interest payments regardless of the purpose of the loans. This factor, together with significant rates of inflation in some of these Nordic countries and very high marginal tax rates, led to concerns that by encouraging more borrowing and consumption, the tax system was promoting external current account deficits and was leading to inequities as higher income taxpayers could considerably reduce their tax burden by borrowing. In Denmark, for example, in 1985 interest deductions by individuals were 16 percent of personal income. For many of these individuals the deductions could be taken against marginal tax rates of 73 percent (see Foighel, 1986).

To curb the high rate of consumer spending and to reduce the distortions connected with interest deductions, several countries have recently introduced changes aimed at reducing the advantages associated with the unlimited deductibility of interest payments. The United States, for

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1/ A major tax reform has recently introduced this change in Mexico.

example, has drastically limited the scope of interest deductibility and has also substantially lowered the marginal tax rates. These two changes combined should reduce somewhat the attractiveness of borrowing for individuals. <sup>1/</sup> However, as mentioned above they may have increased the relative attractiveness of borrowing for housing. Denmark has reduced the marginal tax rate at which interest incomes and deductions are taxed or rebated from 73 percent to around 50 percent. Additionally, it has introduced a 20 percent tax on net interest expenses of households, thus reducing the maximum value of interest deductions to about 30 percent. A White Paper in Norway has proposed a restriction of interest deductions to a few specific purposes. Similar changes are being discussed in Sweden.

Deductions of interest payments for loans associated with business purposes are quite general. According to available information, only Italy and Portugal do not allow such deductions for individuals although several countries impose some limits.

All countries, except Canada, Turkey, and New Zealand, allow a deduction for interest paid on mortgages associated with the principal residence of the taxpayers, although in several countries there are low ceilings or other restrictions. About half of the industrial countries allow deductions on loans obtained to buy second homes. As far as consumer loans are concerned, at the present time Austria, Denmark, Finland, Luxembourg, the Netherlands, Norway, Sweden, and Switzerland allow a deduction for interest payments associated with them. One major change in the U.S. 1986 tax reform was the abolishment of deductions for consumer loan interest charges.

It may be useful at this point to provide some estimates about the potential magnitude of the distortions away from interest rate parity brought about by income taxes. Just how large are these distortions?

Table 2 provides information on recent inflation rates (as measured by the consumer price index) and on the highest marginal tax rate for the personal income taxes for 20 industrial countries. The marginal tax rates shown refer in most cases to national income taxes only. If local income taxes had been added, the rates for some countries (the United States, Japan, and Switzerland) would be somewhat higher. On the other hand, it should be kept in mind that most taxpayers are exposed to lower rates than those shown in the table. The ranges shown in Table 2 for inflation, and for the tax rates, can be used to derive estimates showing the extent to which inflation and income taxes could bring about an enormous fragmentation of the capital market. Therefore, even if interest rate parity exists, the net-of-tax real rates of return, or the net-of-tax real cost of borrowing, can vary enormously among countries or among users in the same country.

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<sup>1/</sup> These two changes could be expected to reduce the rate of interest. See Tanzi (1984), pp. 26-30.

Table 2. Inflation Rates and Top Marginal Tax Rates  
in Industrial Countries

(In percentages)

Countries	Inflation Rates (Consumer Prices)		Top Marginal Tax Rates
	1980	1985	1985
United States	13.5	3.6	50.0
Canada	10.2	4.0	44.0
Australia	10.1	6.7	60.0
Japan	8.0	2.0	70.0
New Zealand	17.2	15.4	66.0
Austria	6.4	3.2	62.0
Belgium	6.6	4.9	72.0
Denmark	12.3	4.7	73.0
Finland	11.6	5.9	51.0
France	13.3	5.8	65.0
Germany	5.4	2.2	56.0
Ireland	18.2	5.4	60.0
Italy	21.2	9.2	65.0
Luxembourg	6.3	4.1	57.0
Netherlands	6.5	2.2	72.0
Norway	10.8	5.7	40.0
Spain	15.6	8.8	66.0
Sweden	13.7	7.4	80.0
Switzerland	4.0	3.4	13.2
United Kingdom	18.0	6.1	60.0

Source: Inflation rates come from IMF, International Financial Statistics, 1986; the marginal tax rates come from OECD, Taxation in Developed Countries (Paris, 1987).

The combination of even relatively low rates of inflation and high marginal tax rates on interest received can generate effective marginal tax rates on real interest incomes that become extremely large. Table 3 provides examples for ranges of inflation rates and marginal tax rates derived from Table 2. These effective rates, ET, are calculated solving the simple formula  $ET = \frac{RT}{r} \cdot 100$  where R is the nominal rate of interest; T is the statutory marginal tax rate expressed in decimals, and r is the real rate of interest. In the tables it is assumed that the real interest rate is 4 percent. Thus, the nominal rate R is equal to 4 percent plus the inflation rate. 1/

Depending on their rates of inflation and on their statutory marginal tax rates, particular countries can be placed in different rows and columns in Table 3. The table shows that these effective marginal tax rates can quickly exceed 100 percent on real interest income and can reach very high levels indeed. Effective marginal tax rates of this magnitude would be inconceivable for other types of income and cannot fail to bring about serious distortions in the behavior of savers and lenders with concomitant welfare costs. In fact, it is difficult to think of many other policies with the potential for distortions of these magnitudes. 2/

Focusing now on the borrowers, an exercise similar to that in Table 3 is pursued in Table 4. Here the objective is to calculate the real (as distinguished from the market) after-tax borrowing rate on the basis of various assumptions about the rate of inflation and the (statutory) marginal tax rate at which interest payments can be deducted from taxable income. The real after-tax borrowing rate (RBR) is determined as:

$$RBR = R - \pi - RT \text{ or}$$

$$RBR = r - RT$$

where the letters have the same meanings as above. Once again the real (before-tax) market rate of interest is assumed to be 4 percent.

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1/ If foreigners would be taxed on the domestic interest income they receive, the nominal interest rate would exceed the real interest rate by more than the inflation rate. However, as long as there are differential rates of inflation and as long as nominal interest receipts or expenses are taxed and deducted, part of the distortions discussed here would remain.

2/ In a closed economy King and Fullerton (1984) show that the efficiency costs of differential marginal tax rates on capital can be substantial. Bovenberg (1986) examines the role of the mobility of physical capital in determining the welfare costs of differential tax treatment of capital across countries.

Table 3. Effective Real Marginal Tax Rates  
(In percent)

Inflation Rates	Marginal Tax Rates								
	0	10	20	30	40	50	60	70	80
0	0	10	20	30	40	50	60	70	80
1	0	13	25	38	50	63	75	88	100
2	0	15	30	45	60	75	90	105	120
3	0	17	35	53	70	88	105	123	140
4	0	20	40	60	80	100	120	140	160
5	0	23	45	68	90	113	135	158	180
6	0	25	50	75	100	125	150	175	200
7	0	28	55	83	110	138	165	193	220
8	0	30	60	90	120	150	180	210	240
9	0	32	65	97	130	162	195	227	260
10	0	35	70	105	140	175	210	245	280
11	0	38	75	113	150	188	225	263	300
12	0	40	80	120	160	200	240	280	320
13	0	43	85	127	170	213	255	298	340
14	0	45	90	135	180	225	270	315	360
15	0	48	95	143	190	238	285	333	380
16	0	50	100	150	200	250	300	350	400
17	0	53	105	158	210	263	315	368	420
18	0	55	110	165	220	275	330	385	440
19	0	58	115	173	230	288	345	403	460
20	0	60	120	180	240	300	360	420	480

Source: See text.

Table 4. Real Borrowing Rates

(In percent)

Inflation Rates	Marginal Tax Rates								
	0	10	20	30	40	50	60	70	80
0	4.0	3.6	3.2	2.8	2.4	2.0	1.6	1.2	0.8
1	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	--
2	4.0	3.4	2.8	2.2	1.6	1.0	0.4	-0.2	-0.8
3	4.0	3.3	2.6	1.9	1.2	0.5	-0.2	-0.9	-1.6
4	4.0	3.2	2.4	1.6	0.8	--	-0.8	-1.6	-2.4
5	4.0	3.1	2.2	1.3	0.4	-0.5	-1.4	-2.3	-3.2
6	4.0	3.0	2.0	1.0	--	-1.0	-2.0	-3.0	-4.0
7	4.0	2.9	1.8	0.7	-0.4	-1.5	-2.6	-3.7	-4.8
8	4.0	2.8	1.6	0.4	-0.8	-2.0	-3.2	-4.4	-5.6
9	4.0	2.7	1.4	0.1	-1.2	-2.5	-3.8	-5.1	-6.4
10	4.0	2.6	1.2	-0.2	-1.6	-3.0	-4.4	-5.8	-7.2
11	4.0	2.5	1.0	-0.5	-2.0	-3.5	-5.0	-6.5	-8.0
12	4.0	2.4	0.8	-0.8	-2.4	-4.0	-5.6	-7.2	-8.8
13	4.0	2.3	0.6	-1.1	-2.8	-4.5	-6.2	-7.9	-9.6
14	4.0	2.2	0.4	-1.4	-3.2	-5.0	-6.8	-8.6	-10.4
15	4.0	2.1	0.2	-1.7	-3.6	-5.5	-7.4	-9.3	-11.2
16	4.0	2.0	--	-2.0	-4.0	-6.0	-8.0	-10.0	-12.0
17	4.0	1.9	-0.2	-2.3	-4.4	-6.5	-8.6	-10.7	-12.8
18	4.0	1.8	-0.4	-2.6	-4.8	-7.0	-9.2	-11.4	-13.6
19	4.0	1.7	-0.6	-2.9	-5.2	-7.5	-9.8	-12.1	-14.4
20	4.0	1.6	-0.8	-3.2	-5.6	-8.0	-10.4	-12.8	-15.2

Source: See text.

FIGURE 1 REAL BORROWING RATES

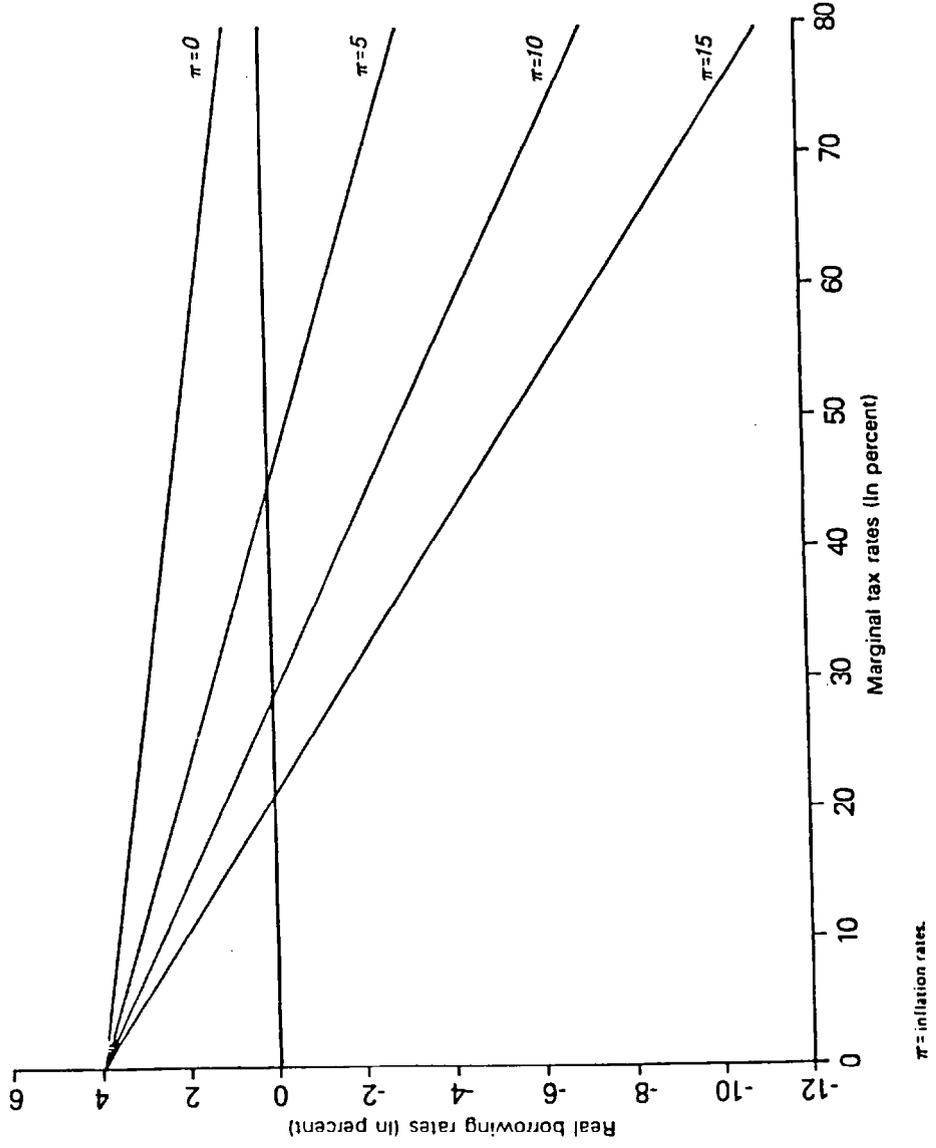




Table 4 shows once again the enormous fragmentation of the capital market. Assuming that interest rate parity prevails, so that the international real rate of interest is 4 percent, the real after-tax cost of borrowing for high-income taxpayers can range from a positive 4 percent to a negative 15 percent on the basis of relatively realistic assumptions. Thus, an investment with a potential rate of return of 4 percent could be seen as equally profitable, in an after-tax sense, as one with a rate of return of minus 15 percent, provided that the first investor lives in a country without income taxes and the second lives in a country with a 20 percent inflation rate and can deduct the interest paid at a marginal tax rate of 80 percent. Once again, there are few policies with such power to distort the allocation of resources as the tax treatment of interest payments. Figure 1 provides a visual impression of the effect of inflation and (statutory) marginal tax rates on real (after-tax) borrowing rates. It shows the behavior of the real borrowing rates when the inflation rate ( $\pi$ ) is assumed to have a few selected values ( $\pi = 0; 5; 10; \text{ and } 15$  percent) and the statutory marginal tax rate relevant for the interest deduction varies from 0 to 80 percent.

#### IV. Concluding Remarks

The objective of this paper was simply to show the power of income taxes in bringing about distortions of magnitudes that cannot possibly be considered of marginal significance. The paper has taken as its starting point the observation that in the current world, characterized by large capital movements, there is a tendency for the real interest rate to approximate parity among industrial countries. In these countries, in fact, we observe fairly similar movements of real rates and levels that are not very different among countries. Given this approximate interest rate parity, one should expect that, at the margin, investment and saving decisions should be similar across countries and across income groups or sectors within the same country. These decisions should be related to a fairly similar reference point that is the international rate of interest. In this case the international capital market would lead to a fairly optimal allocation of resources.

It was shown, however, that once taxes are introduced, these marginal equivalences will be greatly affected, especially if the taxes are high and progressive, interest payments are deductible, and the rate of inflation is above zero. Under these circumstances great distortions may result. Thus individuals in different countries facing different rates of inflation and different marginal tax rates, and borrowing at the same international rate of interest, may find it equally profitable to invest in alternative investments that, before taxes, might have very different expected rates of return.

The internationalization of financial markets has produced major changes in the world economy. Some of these changes are easier to understand than others. Some of them have major implications for the way we should look at the effects of tax systems especially under changing economic conditions. For example, most of the traditional (textbook) analyses of tax incidence still implicitly assume a closed economy. However, what is correct when the economy is closed may not be correct when financial capital, goods and services, and factors of production can easily cross frontiers. Especially difficult problems arise when financial capital is free to move but there are obstacles to the movement of goods and services and of factors of production (see Bovenberg, 1986). This paper has dealt with one area that acquires major importance in the face of large potential movements of financial capital. Different tax rules related to the treatment of interest incomes and interest expenses could be ignored when economies could be assumed to be relatively closed. In today's world, however, these differences can bring about large changes in the way the international pool of savings is generated, distributed, and used. They can, for sure, have an impact on the optimal, international allocation of savings.

Tax rules can also have powerful effects on saving-investment decisions within particular countries thus bringing about changes in their current account situations. These effects are likely to be more important in industrial countries, which depend heavily on income taxes and where financial capital as well as goods and services move more easily than in developing countries. They have been recognized by the policymakers of the countries of Northern Europe where income tax rates are very high. They have been especially concerned about the impact, on domestic demands and, thus, on the current account of the balance of payments, of the deductibility of nominal interest rates. Recently they have started taking steps to reduce tax-induced incentives to borrowing.

These different tax rules have become particularly important in the economic relations of the large industrial countries and especially those between the United States and Japan. For example, suppose that the United States and Japan inverted their respective treatment of mortgage interest payments; or, less drastically, suppose that they harmonized their rules either through Japan agreeing to the very liberal U.S. treatment of mortgage interest payments or through the United States agreeing to the much more restrictive Japanese treatment. These shifts would dramatically change the relative cost of financing housing. In the first alternative--the one where they switch rule--housing would be strongly stimulated in Japan and strongly discouraged in the United States. In the other alternatives--where they harmonize their rules--the cost of financing housing would be either strongly reduced in Japan (when the latter adopts the U.S. rule), or it would be strongly increased in the United States (when the latter adopts the Japanese rule). Given the importance of residential construction in the economy, the net impact of these changes on domestic demand and, consequently, on the external balances of countries could be considerable.

The point of the above example is that the time may have come when especially large countries (but not just them) should become conscious of the impact of their tax rules and of their tax reforms not just on themselves but also on other countries. The necessity to see the international ramifications of domestic policy has recently been recognized at the highest level with respect to changes in fiscal deficits, in interest rates, and in exchange rates. That necessity has not yet been fully recognized with respect to more structural aspects of policies, except perhaps for those directly related to trade restrictions. Yet, it is conceivable that, for example, the change in the rule related to the treatment of interest payments for housing mortgages suggested by the above example, might be more powerful in its impact on the current external imbalances than the changes normally mentioned in discussions of policy coordination.

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