

# Recent Developments in Macroeconomics Volume II

*Edited by*

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**Why Taxes Matter.**  
**A Comment on Reagan's Tax Reforms and the U.S. Trade Deficit**

by Hans-Werner Sinn

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## Why taxes matter: Reagan's accelerated cost recovery system and the US trade deficit

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In the last three or four years there have been gigantic capital imports into the United States accompanied by a strong Dollar and a high level of the world interest rate, and, while most countries have suffered from the worst recession of the post-war period, America has enjoyed a consumption and investment boom. One explanation suggested for this development is the US business tax cut of 1981, in particular the introduction of the so-called Accelerated Cost Recovery System (ACRS) which dramatically reduced the tax depreciation periods for most industrial assets. Other suggestions include the tight monetary policy or the large government budget deficit.

It is likely that all three explanations carry some element of truth. However, if we ask whether any one of them provides a sufficient explanation for all of the qualitative features of the economic developments mentioned above, then the only candidate seems to be the ACRS. Only *it* appears compatible with both high interest rates *and* high private investment in the US. There is one problem though: the order of magnitude of the economic effects resulting from the ACRS. Various authors including Blanchard and Dornbusch (1984), Blanchard and Summers (1984) and van Wijnbergen (1985) have raised serious doubts concerning the strength of these effects and have therefore looked for different explanations.

I attempt to show that these doubts are unwarranted, and that the ACRS was a much more significant economic reform than was previously believed. The argument is primarily theoretical, and based on formal analysis in Sinn (1984, 1985). Nevertheless, I attempt to calculate the order of magnitude of the relevant effects, and show that capital flows of the size recently observed can indeed be explained by a tax reform like that carried out in the US in 1981. This analysis is especially timely since both the current Treasury I and Treasury II tax reform proposals in the US and the UK tax reform of 1984 involve the abolition or

reduction of accelerated depreciation and hence are likely to induce effects opposite to those which accompanied the introduction of accelerated depreciation.

### The traditional approach to taxation and international capital flows

In principle, international capital movements can reflect a redistribution of the world savings flow and a reallocation of an existing world capital stock. I confine my attention to the latter and ask how tax rules affect the international allocation of a given world capital stock.

With an integrated world market, traditional international trade theory assumes that capital will be reallocated across countries until net returns are equalized. Before taxes, the net return on capital is its marginal product  $f_K$  minus the depreciation rate  $\delta$ . Letting  $\tau$  be the rate of profit tax and using superscripts 1 and 2 to denote two different countries, net-of-tax rates of return on capital are equalised across countries, and investors are indifferent between investing at home and abroad, when

$$(f_K^1 - \delta^1)(1 - \tau^1) = (f_K^2 - \delta^2)(1 - \tau^2) \quad (1)$$

Those who claim that the 1981 US tax reform was unimportant seem to have this condition in mind. If  $\tau^1$  is interpreted as the *average* tax rate on profits in the US, then its change and its implication for world capital allocation through equation (1) may indeed have been insignificant. This reasoning, however, is correct only under three crucial assumptions: (a) that accelerated depreciation affects only the average business tax rate; (b) that taxation is based on the source principle; and (c) that new share issues are the marginal source of finance for private firms' real investment. Although these assumptions seem plausible at first glance, a closer scrutiny will reveal that there are strong objections to all three of them.

### A neutrality result

In order to understand the impact of tax reforms on international capital flows, it is essential to analyze firms' financial decisions. Suppose there is one uniform tax rate on all kinds of capital income and firms are indifferent between debt, retained earnings and new issues of shares as alternative sources of finance. Under these circumstances the assumption about the firms' marginal source of finance is quite irrelevant for the size of real tax distortions. However, if there is an imperfectly integrated system of personal and corporate taxation, then the various

sources of finance are no longer equivalent, and the assumption about the firms' financial decisions ceases to be innocuous.

The last word on the determinants of the firms' financial decisions has yet to be said. However, if one accepts the usual neoclassical model of a firm that wants to maximize its market value by use of its real and financial decision parameters, operates in a non-stochastic environment and faces the constraints that it cannot repurchase its shares and cannot pay dividends in excess of its profits, then it can be shown that the marginal cost of capital is determined through the cost of debt financing.

While a proof of this statement would exceed the scope of my discussion a few remarks seem appropriate.<sup>1</sup> Typically, tax laws treat personal interest income earned in the capital market more favourably than both corporate dividends and retained earnings. Under such circumstances, debt is chosen by the firm as the marginal source of finance because it is cheaper than both retained profits and new issues of shares. It should be stressed, however, that this is just one of the reasons for the result. The equality between the marginal cost of capital and the cost of debt financing requires neither that debt is really the marginal source of finance nor that it is the cheapest source of finance. For example, when there is no double taxation of dividends as in Norway, Italy or Germany, new issues of shares are equivalent to debt and thus debt determines the marginal cost of finance even though firms in fact choose new issues. Moreover, the result will hold even when debt is strictly inferior to retained profits because the marginal tax burden on the representative shareholder's interest income exceeds the marginal tax burden on retentions (corporate plus capital gains taxation).<sup>2</sup> In this case, the firm invests the excess of its profits over its real investment in the capital market and thus a marginal increase in its real investment requires either a reduction in its financial investment or an increase of its debt, or else new issues of shares. In perfect capital markets the first of these possibilities is equivalent to the second, and the third will only be chosen if it is equivalent to the second. Thus, even here, the cost of capital is the cost of debt financing.

Since debt can be taken as the marginal source of finance, the condition for equilibrium in the international bond market is crucial for determining the allocation of the world capital stock across countries. Under the source principle, the equality of after-tax interest rates would imply  $(1 - \tau_i^1)r^1 = (1 - \tau_i^2)r^2$  where  $\tau_i^1$  is country  $i$ 's tax rate on interest

<sup>1</sup> Cf. King (1977, pp. 91–108) and Sinn (1984, pp. 552–55; 1985, chs. IV and V) for a discussion of some of the issues involved.

<sup>2</sup> The argument can be attributed to Stiglitz (1973). A critique of this argument is given in Sinn (1985, pp. 121–25).

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income and  $r^1$  its interest rate. However, since the 1977 OECD double taxation agreement, the *residence principle* applies to taxation of interest income.<sup>3</sup> Since a wealth owner thus faces the same tax rate on domestic and foreign interest earnings, international asset market equilibrium must now be characterised by equality of pre-tax domestic and foreign interest rates

$$r^1 = r^2 \quad (2)$$

To relate this condition to the allocation of world capital, consider the investment decision of an individual firm. If taxation of retained and distributed profits allows full deduction for true economic depreciation and debt interest, and if debt can be taken as the marginal source of finance, obviously the marginal investment project bears no profits tax, a traditional result of the public finance literature dating back at least to Oberhauser (1963). Hence, regardless of the rates of capital income taxes, a firm drives its real investment to the point at which the pre-tax return  $f_K - \delta$  equals the interest rate  $r$ . Hence, from the equality of national interest rates in equation (2), we deduce that international capital will be allocated across countries until pre-tax returns are equal

$$f_K^1 - \delta^1 = r^1 = r^2 = f_K^2 - \delta^2 \quad (3)$$

Although derived from an extremely simple economic model that is a very crude approximation to reality, this condition implies that under true economic depreciation there is little scope for domestic rates of capital income taxes to affect the allocation of a given world capital stock. Equation (3) is independent of national tax rates. The common approach of calculating average rates of profit tax from statistical data, inserting these into an equation like equation (1), and inferring from this estimates of international capital movements seems highly misleading in the light of this analysis.

### The role of the ACRS

Although world capital allocation will be independent of profit tax *rates*, it will not be independent of the profit tax *base*, and this was affected by the introduction of the ACRS. It is difficult to model the exact form of the acceleration in US tax depreciation rules. A simple and roughly appropriate way of capturing the essence of the new system is to assume

<sup>3</sup> It is true that source countries have the right to apply a withholding tax of up to 10%. However, since this tax is deductible in the residence country and since the marginal personal tax rate of wealth owners typically exceeds 10%, this aspect irrelevant.

that the share  $\alpha$  of any real investment outlay can immediately be written off while the remainder  $1 - \alpha$  is depreciated proportionately with the true rate of economic depreciation. Suppose in country 1 a fraction  $\alpha$  of each unit of investment outlay can be set against the corporate tax rate  $\tau_R^1$  but that country 2 has no such accelerated depreciation. As before, firms in country 2 invest until the net return  $f_K^2 - \delta^2$  equals the interest rate  $r^2$ .

However in country 1 the additional tax offset reduces the unit cost of investment<sup>4</sup> to  $(1 - \alpha^1 \tau_R^1)$  and firms invest until  $f_K^1 - \delta^1 = (1 - \alpha^1 \tau_R^1) r^1$  which may be considerably below the market interest rate  $r^1$ . Recalling from condition (2) the equality of interest rates across countries, the effect of the introduction of the ACRS in the US (country 1) is thus to change the international capital market equilibrium condition from condition (3) to

$$\frac{f_K^1 - \delta^1}{1 - \alpha^1 \tau_R^1} = r^1 = r^2 = f_K^2 - \delta^2 \quad (4)$$

This condition implies that the introduction of the ACRS required a capital inflow to the US from the rest of the world (country 2) until a sufficient fall in the US rate of return ( $f_K^1 - \delta^1$ ) and sufficient rise in the rest-of-the-world rate of return ( $f_K^2 - \delta^2$ ) has been achieved.

A graphical explanation can illustrate the distortion introduced by the ACRS. On Figure 1, the distance between the two vertical axes represents the (supposedly given) world stock of capital to be split between the US and the rest of the world (ROW). The left part represents the US share, the remaining part on the right being the share of the ROW. The US net-of-depreciation marginal product of capital  $(f_K - \delta)^{US}$  declines as the US capital stock increases, which is represented by a downward sloping curve  $(f_K - \delta)^{US}$ . The equivalent curve for the ROW is upward sloping, because as we move to the right, the ROW's share of the capital stock declines, and its net-of-depreciation marginal product increases. Under true economic depreciation, the marginal products are equalized and the allocation of capital is indicated by point A, with a world rate of interest  $r_0$ . (It can be shown that the world production level is measured by the area under the two curves and has the highest possible value given the world stock of capital.)

When the US switches to accelerated depreciation, a wedge of size  $\alpha^1 \tau_R^1$  is created between the two marginal products of capital, requiring a transfer of capital from the ROW to the US of the magnitude indicated

<sup>4</sup> A more complicated formula applies for the case of growing firms and a limited loss offset, but the difference is not large when the lower of the marginal tax burden on retentions (corporate and capital gains tax) and on dividends (corporate and personal tax) is close to the marginal tax on interest income (personal tax). See Sinn (1985, pp. 131-36).



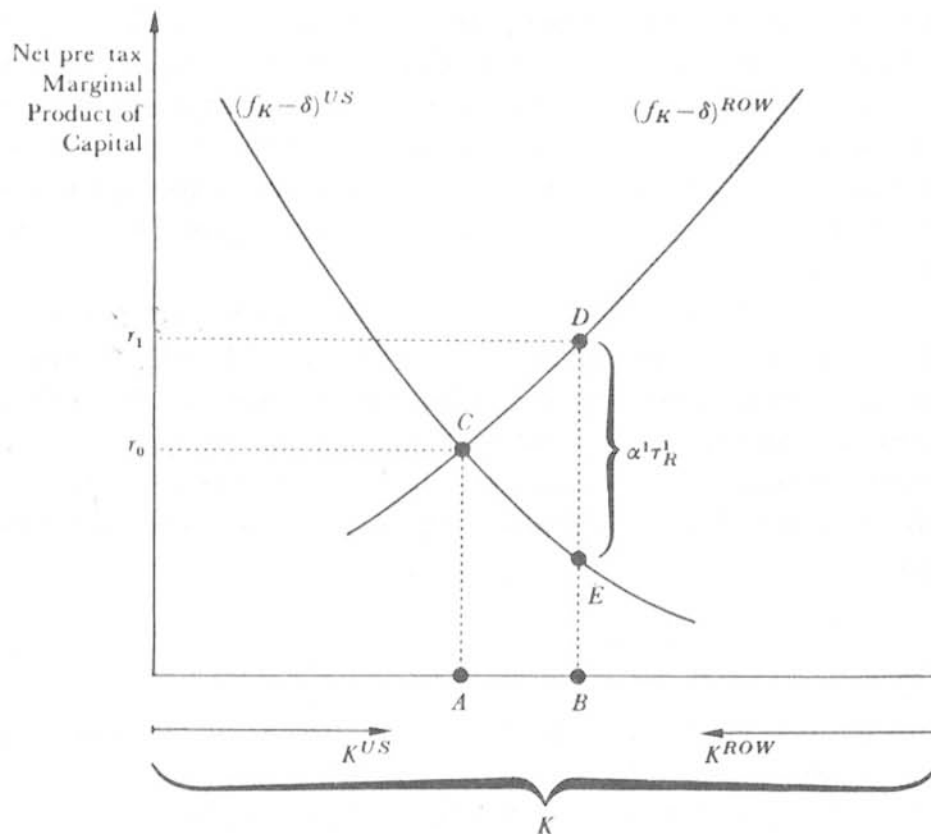


Figure 1. The tax induced distortion in the structure of the world capital stock

by  $AB$ . The interest rate in the ROW rises to  $r_1$ ; it still equals the marginal product of capital in the ROW, but it exceeds the marginal product of capital in the US. (The net product rises in the US by the amount  $ABEC$ , while it declines in the ROW by  $ABDC$ . The result is a drop in world output equal to the triangle  $CED$ . This triangle measures the Harberger type welfare loss that arises from the reform.)

It should be noted that the result implicitly refers to a long-run development and does not lend itself well to explaining the details of the adjustment process that takes place before the new equilibrium is reached. Because of significant impediments to the international mobility of *real* capital, it may take a long time for the adjustment process to be completed.

On the other hand, the result is a genuine long-run result and does not describe temporary effects that vanish after a few years. It is true the introduction of an accelerated depreciation scheme only means a postponement, not a partial elimination of the firms' tax burden; after a while, when there are sufficiently many old assets bought under the new depreciation scheme, the tax revenue must go up again.<sup>5</sup> However,

<sup>5</sup> In a stationary economy the long-run tax revenue is independent of the acceleration scheme. Only in a growing economy will the tax revenue be permanently lower than it would have been under true economic depreciation.

this will clearly not mean that the investment incentive vanishes. As long as the new depreciation scheme is in operation it pays the firms to maintain a capital stock large enough to keep the marginal product of capital an amount  $\alpha^1 \tau_R^1$  below the market rate of interest and thus below the marginal product of capital in the rest of the world.

This consideration once again invalidates the attempt to assess the economic effects of the ACRS by calculating average effective tax rates from aggregate data on taxes and profits. Instead the crucial variables turn out to be the legal corporate tax rate  $\tau_R^1$  and the depreciation parameter  $\alpha^1$ . To achieve realistic values for the latter is a difficult task. Nevertheless it seems possible to get an idea at least of the order of magnitude of this parameter and of the resulting distortions. Such a calculation is carried out in the appendix using a range of plausible or estimated parameters. A conservative conclusion is that the ACRS should induce a capital inflow into the US in the range of 0.8 to 1.1 trillion dollars. Even the record 1985 US current account deficit, which will approximate 150 billions dollars would have to persist for a total of about 5–7 years, or, subtracting the deficits that have occurred since the reform (1982–85 about \$290 billion), another 3–5 years.

### *Concluding Remarks*

The main point of my discussion is theoretical: the Accelerated Cost Recovery System does not operate through a change in the average rate of business taxation, new issues of shares are not the marginal source of finance, and the source principle is not very relevant for steering international capital flows. Tax *rates* seem much less important for the structure of the world capital stock than is commonly believed; however tax *bases* are clearly essential. The introduction of ACRS was a significant change in the business profit tax base. Among a large set of conceivable tax reforms that favour business, ACRS was one of the few that for theoretical reasons could be expected to have a strong impact on the structure of the world economy.

The empirical results reported in this note should be interpreted with caution. They are nothing other than implications of a carefully chosen example that was designed to shed some light on the order of magnitude of the capital flows induced through ACRS. A more accurate empirical analysis would definitely require better information on the size of the depreciation parameter  $\alpha$ . These reservations should not be taken to imply that there is any reason to believe my estimate overstates the effect of ACRS.

In the introduction I mentioned the current proposals for abolition or reduction of the ACRS. If these proposals are carried out, and the

international capital markets are once again guided by the 'neutrality condition' of Equation (3), then it seems likely that the world economy will experience a development pattern the reverse of that observed since 1981. Interest rates will fall, the dollar will depreciate, and there will be large capital exports from the United States to the rest of the world. Europe may then be able to enjoy a beneficent investment boom that will compensate her for all she has been forced to endure since the introduction of ACRS.

**Appendix**

Under ACRS most industrial assets can be depreciated in a period of 5 years, while the tax life of these same assets ranged from 8–12 years under the Asset Depreciation Range System (ADRS) that was in operation before 1981. Let  $a$  and  $b$  denote the present values of depreciation resulting from one dollar of real investment before and after ACRS, and assume that true economic depreciation was allowed before ACRS. Then, by construction,  $b = \alpha^1 + (1 - \alpha^1)a$  or  $\alpha^1 = (b - a)/(1 - a)$ . If one assumes linear depreciation and tax lives of 10 and 5 years under ADRS or ACRS, respectively, then, with interest

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rates between 5 and 15%, one calculates  $0.58 \leq a \leq 0.81$ ,  $0.77 \leq b \leq 0.91$  and hence  $0.46 \leq \alpha^1 \leq 0.52$ .

Suppose now both countries have Cobb–Douglas production functions of the type  $f(K, L) - \delta K = \gamma K^\beta L^{1-\beta}$ , then the equilibrium condition in Equation (4) of the text implies

$$\gamma\beta \left(\frac{L^1}{K^1}\right)^{1-\beta} = (1 - \alpha^1 \tau_R^1) \gamma\beta \left(\frac{L^2}{K^2}\right)^{1-\beta} \quad (\text{A1})$$

where  $K^i$  and  $L^i$ ,  $i = 1, 2$ , indicate the capital and employment levels of the two countries. Using  $K = K^1 + K^2$  and noting that the Cobb–Douglas specification implies  $L^1/L^2 = Y_0^1/Y_0^2$  where  $Y_0^1/Y_0^2$  is the ratio of the GDPs of the two countries before ACRS, one can derive the expression

$$\frac{K^1}{K} = (1 + (1 - \alpha^1 \tau_R^1)^{1/(1-\beta)} Y_0^2/Y_0^1)^{-1} \quad (\text{A2})$$

If the ‘world’ is the set of OECD countries, then good estimates<sup>1</sup> for the year 1981 are  $Y_0^2/Y_0^1 = 1.63$  (the American GDP was 38% of the OECD GDP) and  $1 - \beta = 0.58$  (share of wages in GDP, all OECD countries). Throughout the relevant period the US corporate tax rate was  $\tau_R^1 = 0.46$ . Assuming that at least half of the American GDP was created by firms eligible for ACRS, a cautious estimate for the ‘average’ value of the depreciation parameter<sup>2</sup> is  $\alpha^1 = 0.25$ . With this specification, (A2) implies that  $K^1/K = 0.43$ . If we compare this value with the pre-reform value  $K^1/K = 0.38$  ( $\alpha^1 = 0$ ) it follows that ACRS induces a capital import into the US that is equal to 5% of the 1981 OECD capital stock. Given the usual estimates of the capital coefficient in the range between 2 and 3, this corresponds to 10–15% of the OECD gross domestic product of 1981 (\$7.65 trillion) or about 0.8–1.1 \$trillion.

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<sup>1</sup> See OECD, *National Accounts, Main Aggregates*, Vol. 1, 1960–63, Paris 1984, pp. 22 and 30, and OECD *Main Economic Indicators*, June 1985, p. 92.

<sup>2</sup> An alternative approach would be to identify sector 1 with half of the US economy and to calculate that part of the capital inflow into this sector that stems from other countries. The numerical result is fairly insensitive to this alteration.

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