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The Effect of Tax-Based Savings Incentives on Government Revenue

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Abstract

There is an unresolved debate on the effect of tax-based savings incentives on government revenue. The conventional wisdom on tax-assisted saving plans (TASPs) holds that they reduce public savings, but may raise national savings by stimulating private savings. Feldstein (1995) has challenged the view that TASPs reduce government revenue. According to Feldstein, ‘some of the increase in personal saving raises the corporate capital stock, and the return on this additional capital raises corporate tax payments’. When the additional corporate income tax revenue is taken into account, ‘the revenue loss associated with IRAs [Individual Retirement Accounts] either is much smaller than has generally been estimated or is actually a revenue gain’.

This paper extends Feldstein’s analysis to incorporate international considerations, differences in tax structures and alternative values for key parameters. We show that the result presented by Feldstein represents a special case that does not lead to broad generalisations. We also show that, under most conditions, the tenets of conventional wisdom that TASPs reduce government revenue are likely to hold, but that the magnitude of the effect may not be large. Finally, we suggest that the focus of research on the savings effects of TASPs is justifiable in a closed economy, where domestic savings affect domestic investment, but is not useful for policy development in small open economies.

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I. INTRODUCTION

In an attempt to stimulate private savings, various governments have provided preferential income tax treatment to certain saving vehicles commonly known as

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tax-assisted savings plans (TASPs). In Canada, individual contributions to Registered Retirement Saving Plans (RRSPs) up to a certain limit are tax-deductible and earnings accumulate tax-free, but both capital and accumulated earnings are taxed upon withdrawal. A similar tax treatment is accorded in the US to contributions to Individual Retirement Accounts (IRAs) and employer-sponsored saving plans, 401(k)s. These special provisions may affect the distribution of income — because individuals in different income classes differ with respect to the ability, motivation and incentive to save — and economic efficiency, because they alter the intertemporal allocation of consumption. The empirical results on the distributional effects of TASPs are unambiguous. These special provisions offer benefits only to middle- and high-income taxpayers.¹ No such consensus is found in the results on the efficiency effects of TASPs arising from changes in private and national savings.² Even the latest surveys fail to settle the issue. Gravelle (1991) concluded that ‘IRAs were not effective savings incentives’ and Engen, Gale and Scholz (1996) found that ‘little if any of the contributions to existing saving incentives have raised saving’. According to Poterba, Venti and Wise (1996), ‘the weight of the evidence ... provides strong support for the view that the bulk of IRA and 401(k) contributions are net addition to saving’. Hubbard and Skinner (1996) suggest that ‘there is good reason to believe that the truth is somewhere between the extremes of no new saving and all new saving’.

Most empirical research has focused on the effects of TASPs on private savings and little attention has been paid to their effect on government revenue. The conventional wisdom that TASPs reduce government revenue has recently been challenged by Feldstein (1995), who argues that ‘some of the increase in personal saving raises the corporate capital stock, and this additional capital raises corporate tax payments’. In Feldstein’s view, when the additional corporate income tax revenue is taken into account, ‘the revenue loss associated with IRAs either is much smaller than has generally been estimated or is actually a revenue gain’ (p. 475). Hubbard and Skinner (1996), using an approach similar to Feldstein’s, concluded that ‘saving incentives generate substantial net capital accumulation over time per dollar of forgone revenue’.

We argue in this paper that Feldstein’s approach represents a special case that is not amenable to generalisations.³ We show that, when the analysis is extended to a small open economy and incorporates differences in tax structures and different values of key parameters, TASPs are found to generate a loss in government revenue, though this loss is not very large. We also argue that the focus of research on the saving effects of TASPs is justified only in a closed economy

¹See Fougère, Ruggeri and Vincent (1997), St-Hilaire (1995) and Davies (1989).

²For studies showing opposite results, see Venti and Wise (1990) and Gale and Scholz (1994).

³A similar comment applies to part of the analysis performed by Hubbard and Skinner (1996) because they follow the general approach used by Feldstein.

without income tax integration. We suggest that, in a small open economy, it is more useful to evaluate the economic benefits of TASP's relative to other policies producing the same loss of government revenue.

II. SUMMARY OF FELDSTEIN'S APPROACH

Feldstein derived his results on the relationship between TASP's and government revenue by simulating the saving behaviour of a single taxpayer. The taxpayer in Feldstein's approach makes a contribution C_t to an IRA at the beginning of each year through age 64. These contributions generate a tax refund of qC_t , where q is the marginal personal income tax (PIT) rate during pre-retirement, and increase at the pre-tax rate of return. At retirement, these contributions accumulate to the value of A_t and are withdrawn in 15 constant annual amounts R_t until age 79. Assuming that a fraction of the IRA contribution, hereafter called the diversion rate, would otherwise have been saved, Feldstein calculates the value of the diverted capital stock B_t . This value affects the revenue impact of IRA contributions because 'the diversion of saving into the IRA reduces personal income tax revenue' (p. 481). If IRA contributions are invested totally in corporate equity, they will raise the capital stock by the amount of the contribution and will increase corporate income tax (CIT) revenue by an amount that depends on the corporate tax rate τ and the pre-tax rate of return r . The total effect of IRA contributions on government revenue T_t is then calculated as

$$(1) \quad T_t = -q[C_t - R_t + (1 + t)rB_t] + t(A_t - B_t)r,$$

which reproduces equation (4) in Feldstein's paper.

The first term on the right-hand side of (1) measures the potential loss of PIT revenue while the second term measures the potential gain in CIT revenue. Equation (1) provides an indication of how the revenue effect of a given IRA contribution C_t depends on the difference between the PIT rates in the pre- and post-retirement period, the pre-tax rate of return on equity, the share of IRA funds used to purchase equity, the marginal CIT rate and the diversion rate, which affects the value of B_t . Feldstein estimates the value of T_t for a single taxpayer who started to contribute to an IRA at the age of 45, contributed \$2,000 per year till age 65 and then withdrew the accumulated funds through a 15-year annuity. Using a variety of values for the marginal PIT and CIT rates and different values for the diversion rate, Feldstein shows that IRA contributions reduce the national debt. He then generalises the results to the aggregate in a growing economy and concludes that IRA contributions first increase and then reduce the national debt.

We will show in the next section that the results derived by Feldstein represent a special case based on the assumptions of a closed economy without income tax integration, a low diversion rate and a large difference between the pre-tax rate of return on equity and the cost of funds to the government. We also show that, when

these assumptions are relaxed, IRA contributions are found to increase the national debt, though not by much. Our calculations involve the same taxpayer used in Feldstein's examples and are based on equation (1) with the appropriate adjustments for changes in assumptions or parameter values.

III. ALTERNATIVE ESTIMATES

In our analysis, and the presentation of the results in Tables 1 and 2, we make a clear separation between a closed and a small open economy because of the fundamentally different channels through which TASP's affect government revenue. Within each of these major two cases, we evaluate the effects of different parameter values. A variety of other factors that may influence the revenue effects of TASP's, but that are not included in our examples, are discussed in Section IV.

1. Conceptual Issues associated with Our Calculations

(a) Closed Economy

Diversion Rate

The response of private savings to the tax incentive, as measured by the diversion rate, is a crucial factor in determining the impact of these programmes on government revenue. If there are no additional savings (a diversion rate of 100 per cent), there is no positive effect on investment and on PIT and CIT revenue. In this case, the government incurs a deficit in order to finance increases in private consumption. Although Feldstein provides estimates based on values of the diversion rate that vary from 20 per cent to 100 per cent, his general conclusions are based on the lower value. He shows a preference for the results of one polar set of studies that find a strong response of private savings to tax assistance (for example, Wise (1987)). Assuming that only 20 per cent of tax-sheltered savings originate from existing savings, as is done in Feldstein's base case, implies that 80 cents out of each dollar of tax-sheltered savings represents new savings. Empirical studies yield a wide range of values for the diversion rate. For example, Gale and Scholz (1994), Engen, Gale and Scholz (1994) and Thomas and Towe (1996) suggest a diversion rate close to 100 per cent, while Wise (1987) suggests a diversion rate of 20 per cent. Intermediate values are suggested by Joines and Manegold (1995).

The diversion rate can also be derived by relating it to some crucial parameters of saving behaviour. Let us consider a single taxpayer earning \$39,000 a year, an income level close to the upper limit of the IRA programme which provides a deduction on the contribution. At a saving rate of 5 per cent out of gross income,⁴

⁴See Sabelhaus (1996).

this taxpayer would save \$1,950, nearly the amount used in Feldstein's example. If contributors face a PIT rate of 25 per cent on the contributions, as assumed by Feldstein, the tax deduction and the tax-free accumulation of earnings involves an increase of 33.3 per cent on the return to contributions. If the savings elasticity is 0.25, a value at the upper end of empirical estimates (see Randolph and Rogers (1995)), savings will increase by 8.32 per cent or by \$162 in our example. Total saving in the IRA, assuming that the entire tax refund on the contribution is saved, is \$2,600, implying a diversion rate of 75 per cent.

In our simulations, we used a diversion rate of 70 per cent as an alternative to Feldstein's value of 20 per cent, a value that we consider to be more consistent with known parameters of private saving behaviour and represents a balance between the two extremes. The higher diversion rate will raise the value of B_t in (1) and will reduce the positive revenue effect of TASP's found by Feldstein.

Differences between Returns on Equity and Debt

The effect of TASP's on government revenue depends also on the spread between the rate of return to the saver and the cost of borrowing to the government. If, as assumed by Feldstein, the additional savings are used entirely to purchase equity, the above differential is roughly equal to the equity premium. Feldstein assumes a real equity premium of 8 percentage points resulting from a pre-corporate-tax rate of return on equity of 10 per cent and a real cost of funds to the government of 2 per cent. This equity premium is high because it was calculated for a period — 1948 to 1979 — that includes the high inflation years of the oil price shock. In a recent study of real rates of return for the period from 1800 to 1990, Siegel (1992) found that the real return on equity was not affected by the period used for the calculation, but the real return on debt was. For the US, Siegel found that the average real return on short-term bonds was '0.87% during 1889–1978, but 3.13% during the entire sample period from 1800 to 1990'. For long-term bonds, the corresponding figures are 1.46 per cent and 3.71 per cent, respectively.

In our view, it would be prudent to use estimates of the equity premium that either exclude the period dominated by the oil price shock or minimise it through the use of a very long period. In our calculations, we used a cost of debt to government of 3.5 per cent, but we left the before-corporate-tax real rate of return on equity at 10 per cent. Even these assumptions may overestimate the size of the equity premium. Hubbard and Skinner (1996), based on the information in Siegel (1992), used a rate of return on equity of 9.35 per cent and a return on bonds (one-half short-term and one-half long-term) of 4 per cent for a spread of 5.35 percentage points, 18 per cent less than the spread used in our calculation and one-third less than that used by Feldstein.

Use of Savings

In a closed economy, the bonds sold by the government to finance the debt generated by the deductibility of TASP contributions must be purchased by residents. Therefore only a portion of the additional savings can be used to purchase corporate equity. In Feldstein's example where the agent contributes \$2,000 per year to an IRA plan and the diversion rate is 20 per cent, \$1,600 will be available for investment (including the \$500 tax refund). However, only \$1,100 can be used to purchase corporate equity because \$500 must be used to purchase government bonds. Through time, additional debt financing by the government is required to finance the loss of revenue from the untaxed income that accumulates in the TASP. If the diversion rate is 70 per cent, only \$600 represents new savings. Of this amount, \$500 is required for the purchase of government bonds and only \$100 is left to purchase corporate stock. To the extent that CIT revenue offsets part of this debt, the amount of additional private savings used to purchase government bonds falls. Adjusting for the purchase of government bonds lowers the value of A_t in equation (1) and reduces the amount of CIT revenue. Feldstein recognises that when the TASP-induced deficit is not offset by changes in government spending and taxation, the financing of that deficit from domestic savings 'may crowd out corporate capital formation and thereby reduce future corporate tax revenue' (p. 479). This 'secondary effect' is not included in Feldstein's calculations, but is indirectly captured in our approach through the purchase of government bonds by domestic savers.

The additional savings invested in the corporate sector need not be used entirely to purchase equity. This assumption would be inconsistent with the structure of the CIT and the financing practice of firms. The CIT provides preferential treatment to debt over equity financing. The former escapes the tax, because interest payments are deductible, while the latter does not, as dividends are paid out of after-tax earnings. Since the firm has an incentive to prefer debt to equity financing, the puzzle is why there is equity financing at all (for a survey of the issue, see Sørensen (1995)).

Because neither government bonds nor corporate bonds yield CIT revenue, the revenue impact of TASP depends on the mix of equity and debt in the contributor's portfolio. Hubbard and Skinner (1996) assumed a mix of 29 per cent equity and 71 per cent debt. Feldstein accounted for the fact that not all incremental savings are added to the stock of equity corporate capital (p. 485), using in some cases a CIT rate of 17 per cent as opposed to the base-case rate of 34 per cent. In our calculation, we used three alternative scenarios. First, we used part of the additional savings to finance the TASP-induced deficit. The balance was allocated to the corporate sector under three alternative assumptions: 100 per cent equity; 60 per cent equity and 40 per cent debt; and 100 per cent debt. We also assumed that the return on corporate debt is one percentage point higher than the return on government debt.

Income Tax Integration

The amount of revenue that the government receives from the additional savings used to purchase corporate equity depends on the degree of integration between the personal and corporate income taxes. Corporate profits after tax can either be distributed as dividends or be reinvested internally as retained earnings. The latter eventually are transformed into capital gains. Therefore an investor in equities expects to receive a return through two channels: dividends and capital gains. Although dividends are distributed out of after-corporate-tax profits, they do not bear the burden of corporate taxation if the PIT and CIT are fully integrated.⁵ In filing a PIT return, the investor adds to the cash value of the dividend an amount equal to the implicit CIT paid. He pays PIT on the grossed-up value of the dividend, but receives a credit equal to the amount of the gross-up. In other words, the investor pays CIT at source, but receives a total refund through the PIT system. Since the dividend tax credit under full integration equals the CIT paid, the return on equity bears only the burden of the PIT. Therefore the government does not receive any CIT revenue from the additional savings under full income tax integration.

Retained earnings do not benefit from income tax integration; therefore they bear the burden of corporate taxation. Two factors may mitigate this burden. First, if the PIT rate is higher than the CIT rate, the withholding function of the CIT still allows some tax deferral. Second, in some countries, such as the US and Canada, capital gains are taxed at a preferential rate. The above tax preferences are lost when dividends and capital gains are received within tax-sheltered programmes. During the contribution period, dividends are not taxed at all; therefore they are not eligible for the dividend tax credit. For capital gains, the tax deferred is the lower tax rate associated with the preferential tax treatment, but the tax on the amounts withdrawn is the full rate.

The favourable treatment of dividends and capital gains under an integrated income tax system reduces the benefits of tax-sheltered saving plans. Dividends and capital gains would effectively bear the full CIT if received in tax-sheltered programmes, but for this very reason savers have little incentive to tax-shelter equities. If savers act to maximise the benefits of tax preferences, thus minimising the tax burden, they will likely shelter debt instruments and leave equities unsheltered. Outside the tax shelter, the return to equities in integrated income tax systems bears little or no corporate tax burden. However, the government will eventually receive higher PIT revenue on the interest accumulated from the higher return on corporate bonds. In terms of equation (1), full income tax integration eliminates the second term on the right-hand side because it yields no CIT revenue, and leaves the revenue loss from the PIT. We do not show the estimates of this

⁵Feldstein's implicit assumption of no income tax integration may be viewed as a reference to the US tax structure.

case in Table 1 because, in our view, it is sufficient to show that under full income tax integration, the CIT revenue effect identified by Feldstein is inoperative.

(b) Small Open Economy

For the purpose of analysing the revenue effects of TASP, two features of the small open economy are significant. First, the government is no longer constrained to selling bonds to residents, but can raise funds in the international market. Second, domestic investment is no longer constrained by domestic savings.⁶ As a result, changes in the domestic supply of savings have no direct effect on the level of domestic investment. The level of domestic investment is determined by the relationship between the expected rate of return on that investment and the fixed world rate of return after tax required by investors. In a small open economy, an increase in domestic savings reduces the need for capital imports and reduces the net external debt.

Within the framework of a small open economy, contributions to TASP do not raise CIT revenue. The entire revenue effect comes from the PIT. However, all additional savings, including the amount of the tax break on contributions, can now earn the higher return on corporate bonds and the after-corporate-tax rate of return on equity. In terms of equation (1), the second term on the right-hand side becomes zero.

It may be worth noting that, in the case of a small open economy, income tax integration has no effect on the revenue implications of TASP. Since the additional savings do not lead to increased investment, there is no additional CIT revenue. The issue of the double taxation of corporate earnings does not arise in a small open economy, since the revenue effect is confined to the PIT.

It should be noted that the assumption of perfect capital mobility may not faithfully describe the actual situation for small open economies. As argued by Feldstein, 'despite the increasing integration of world capital markets, the rates of investment in major industrial countries are closely related to their rates of saving' (p. 475). The issue of domestic asset preference and capital mobility is a controversial and unresolved one. Among the explanations for the low international capital mobility observed in some empirical studies are: productivity shocks which may affect saving and investment in a country in the same manner, thus leading to a high correlation between the two, although capital may in fact be very mobile (Tesar, 1988); the countries included in the studies are large relative to world capital markets (Murphy, 1984); some countries, such as France and Italy, imposed foreign exchange controls until a decade ago; other countries offer preferential tax treatment to domestic equity (the dividend tax credit in Canada applies to dividends from taxable Canadian corporations); and asymmetric information across countries (Gordon and Bovenberg, 1996). It should be pointed

⁶See Mintz (1994).

out that, even in the absence of perfect capital mobility, domestic savings may affect investment only if a country is a net capital importer. As pointed out by Gordon and Bovenberg (1996), in a capital-exporting country, 'investors are indifferent at the margin between investing at home or abroad'. Finally, one should acknowledge that the trend is towards more international capital mobility, a fact acknowledged by Feldstein for the European Community (see his footnote 2). It seems more appropriate to analyse the policies of a small open economy within the framework of future trends rather than on the structures of the past.

2. Illustrative Examples

In this section, we extend Feldstein's analysis for a single contributor by incorporating some of the elements identified in the above discussion. We calculate the revenue effects separately for the two polar cases of a closed and a small open economy. For both cases, we use some common parameters borrowed from Feldstein in order to provide ready comparability of results. The corporate income tax rate is 34 per cent, the personal income tax rate is 25 per cent and the before-corporate-tax real rate of return on equity is 10 per cent. Differently from Feldstein, we use a real cost of funds to government of 3.5 per cent (instead of 2 per cent), a 4.5 per cent real rate of return on corporate bonds (not applicable in Feldstein's approach) and a diversion rate of 70 per cent (instead of 20 per cent).

(a) Closed Economy

The results of our calculations are presented in Table 1. The first case reproduces the results of Feldstein's exercise and shows that, under extreme assumptions, the TASP contributor would leave at death a bequest to the nation equivalent to an increase of nearly \$65,000 in the capital stock. Cases 2–4 retain the 0.2 diversion rate but vary the equity–debt ratio for corporate financing and the cost of government debt. When the cost of government debt increases from 2 per cent to 3.5 per cent and corporations finance 40 per cent of investment through debt, the reduction in government debt associated with TASP contributions falls by \$24,000 to \$41,000 (case 3). If firms finance investment entirely through debt, the net result is a small increase in government debt (case 4). Cases 5 and 6 repeat the simulations by using a more realistic value of 0.7 for the diversion rate.

With a diversion rate of 0.7, but retaining a large equity premium and full equity financing by corporations, the bequest is reduced to about \$16,000 (case 5). This reduction in the positive effect on government revenue comes through a variety of channels. A high diversion rate reduces the net addition to the capital stock, thus lowering the CIT revenue gain and increasing the PIT loss on the interest received from the diverted saving. As a result, the government debt increases faster and requires a larger amount of the new savings for debt financing which yields only personal income tax on a much lower rate of return than equity.

TABLE 1
**Effect of IRA on Government Debt:
 Examples for a Selected Contributor, Closed Economy**

<i>Case</i>	<i>Diversion rate</i>	<i>Equity–debt financing</i>	<i>Return on government debt</i>	<i>Long-run impact on government debt</i>
<i>Feldstein's base case</i>				
1	0.2	100/0	2.0	–64,904
<i>Alternative cases</i>				
2	0.2	100/0	3.5	–71,000
3	0.2	60/40	3.5	–41,000
4	0.2	0/100	3.5	400
5	0.7	100/0	2.0	–16,000
6	0.7	100/0	3.5	–7,300
7	0.7	60/40	3.5	0
8	0.7	0/100	3.5	8,800

When the equity premium is reduced by raising the real cost of funds to the government to 3.5 per cent, the bequest to government falls to about \$7,000 (case 6). The effect of the TASP on government revenue is reduced to zero when we take into account the corporate sector's practice of financing investment with both equity and debt (case 7). The last case (case 8) assumes that the savings diverted to the corporate sector are used to purchase corporate bonds because there is no incentive to shelter equities. In this case, all the revenue effects are generated through the personal income tax because there is no CIT revenue from corporate bonds. With a diversion rate of 70 per cent, the net effect of the TASP for the selected contributor is a revenue loss to the government of nearly \$9,000.

We also repeated case 6 using the rates of return suggested by Hubbard and Skinner (1996), which involve an equity premium of 5.35 percentage points. We found that the net revenue gain fell from \$7,300 to \$900. This result implies that even in the polar case of a closed economy without income tax integration and with all the additional savings (net of the amount used to purchase government bonds) transformed into corporate equity at a diversion rate of 70 per cent, TASP will reduce government debt only if the equity premium exceeds 5 percentage points.

(b) Small Open Economy

For the purpose of evaluating the effects of TASP on government revenue, the open economy is similar to a closed economy with full income tax integration

because in both cases there is no additional CIT revenue. The only difference is that, under the small open economy, all the additional savings can earn a higher rate of return because savers are not constrained to purchase government bonds. The results for the small open economy are shown in Table 2. Cases 1–4 provide results of simulations using a diversion rate of 0.2. Case 1 reproduces Feldstein’s base case for a small open economy. The results show that the potential net reduction in government debt is substantially lower than in the case of a closed economy and suggest that, when analysing the effects of government policies, the outcomes for a closed economy cannot be automatically extended to open economies. Cases 2–4 indicate that reducing the equity–debt ratio for corporate financing and raising the cost of funds to the government reduces the net revenue gain to the government, but less than in the case of a closed economy. In general, under the small open economy assumption, a diversion rate of 0.2 would produce a small reduction in the government debt from contributions to TASP. Cases 5–8 show the effect of increasing the diversion rate to 0.7.

In the extreme case where the rate of return differential between equity and debt is 8 percentage points and corporations do not engage in debt financing (case 5), the selected TASP contributor will generate a net revenue gain to the government of about \$2,500. If the equity premium is reduced to 6.5 percentage points, as in case 6, the net result is a loss of government revenue of \$5,500. The loss increases to nearly \$7,000 when we allow corporations to engage in both debt and equity financing (40 per cent / 60 per cent). The results suggest that a diversion rate of 0.7 would generate a small loss of revenue to government from contributions to TASP.

TABLE 2
Effect of IRA on Government Debt:
Examples for a Selected Contributor, Small Open Economy

<i>Case</i>	<i>Diversion rate</i>	<i>Equity–debt financing</i>	<i>Return on government debt</i>	<i>Long-run impact on government debt</i>
1	0.2	100/0	2.0	–15,000
2	0.2	100/0	3.5	–10,500
3	0.2	60/40	3.5	–6,500
4	0.2	0/100	3.5	–700
5	0.7	100/0	2.0	–2,500
6	0.7	100/0	3.5	5,500
7	0.7	60/40	3.5	6,800
8	0.7	0/100	3.5	8,800

IV. FACTORS NOT INCLUDED IN OUR CALCULATION

1. Taxation of the Return on Equity

In Feldstein's example, as well as in our calculations for a closed economy, we assumed no income tax integration. As mentioned earlier, not only is there some form of income tax integration for dividends in many industrialised countries, but capital gains receive preferential treatment under the PIT. Adjusting for these favourable PIT treatments would reduce the net revenue gain in cases 2 and 3 and would generate a revenue loss in case 4. Analytically, full tax integration is similar to case 6 where savings are used entirely to purchase government and corporate bonds. In this case, there is no CIT revenue because those income sources are not subject to corporate taxes. Under full income tax integration, the CIT paid is returned to the investor through the PIT.

2. Structure of TASP's

Two types of TASP structures are used as savings incentives. One provides a tax deduction for contributions, tax-free accumulation of earnings and the taxation of both principal and earnings at the time of withdrawal. Examples of these programmes are Canada's RRSP and the first tier of the IRA in the US. The other type of programme does not offer a tax deduction on contributions, maintains the tax-free accumulation of earnings, but taxes only the earnings at the time of withdrawal. Examples of this type of TASP are Canada's registered education saving plans and the second tier of the IRA in the US.

Mérette and Ruggeri (1996) have shown that different programmes generate their effects on private savings through different channels. The second-tier-of-IRA-type programmes affect private savings exclusively through the change in the rate of return. The first tier of the IRA operates through both the rate of return and disposable income. Ignoring the disposable income effect, which originates from the deductibility of the contribution, the rate of return under the first-tier IRA is lower than under the second-tier IRA. Whether the overall rate of return is higher depends on what proportion of the tax refund on the contribution is saved. If the refund is treated strictly as an increase in disposable income and is saved in proportion to the marginal propensity to save, the first-tier IRA will continue to yield a lower rate of return than the second-tier IRA. In evaluating the effects of TASP's on government revenue, therefore, it is important to take into account all the parameters of the programme.

3. Consumption Taxes

If the revenue effects of TASP's are expanded beyond the PIT, it is necessary to include consumption taxes as well as corporate income taxes, especially since they

represent a much larger share of revenue in industrialised countries than corporate taxes. Even in the US, revenue from consumption taxes for all levels of government is more than double the revenue from corporate taxes.⁷ The effects of TASP on corporate and consumption taxes may operate in opposite directions and in some cases may interact. If TASP do not raise private savings, there is a shift from public spending to private consumption. CIT revenue does not increase, but consumption tax revenue does. To the extent that tax-sheltering of savings increases private savings, it reduces consumption and the associated tax revenue, thus partly offsetting the positive revenue effects from the CIT.

In our simulations, we did not include a consumption tax, in order to maintain the generality of the results and concentrate on the CIT effect stressed by Feldstein. However, in specific country studies, it would be necessary to include it in order to obtain reliable estimates of the effect of TASP on government revenue.

V. AGGREGATE EFFECTS

Feldstein extends his analysis of the individual contributor to the aggregate of all contributors in an economy with a growing population and rising income, and concludes that ‘even though the period of revenue loss after the introduction of an IRA program lasts longer in the aggregates than it does for the representative individuals ..., the total revenue change eventually becomes positive and grows over time’. This conclusion is based on a contributor’s response to a stylised TASP, namely a front-loaded plan such as the first tier of the IRA, without limits on contributions. As mentioned earlier, the rates of return on first- and second-tier-IRA-type TASP are not the same; therefore the responses of the contributors in each category must be measured separately. More importantly, when TASP have limits on contributions, the saving responses of contributors differ markedly depending on whether they are constrained by the limit. It is well known (see, for example, Ragan (1994)) that TASP that have contribution limits generate no substitution effects for marginal contributors. These contributors effectively receive an interest-free loan which unambiguously results in a reduction in private savings and government revenue.

The above discussion suggests that accurate estimates of the aggregate effects of TASP on government revenue require more complete models that take into consideration contributors in different economic circumstances. In calculating the aggregate effect of a TASP on government revenue, it is necessary to take into consideration the different components of a TASP and to add the responses of both marginal and inframarginal contributors. For the cases where there is no change in government revenue or a revenue loss from inframarginal contributors — which include cases 4, 7 and 8 of Table 1 — the aggregate effect of TASP is

⁷See OECD (1996).

to increase the government debt. Therefore Feldstein's suggestion that the changes in CIT revenue be included in the estimation of the revenue effects of TASP affects the magnitude of the revenue loss to the government, but in general does not alter the conventional wisdom that these programmes increase the government debt. The magnitude of this increase may be fairly small, but so may be the increase in private savings, according to two recent surveys.⁸ These programmes may be less harmful to public finances than generally thought, but they may also be less beneficial to economic growth than is claimed by their supporters.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

This paper addresses the issue of the revenue effect of TASP, evaluates Feldstein's approach to the measurement of this revenue effect and shows that his conclusion that TASP may reduce the national debt is based on a special case involving very restrictive assumptions. Our analysis suggests that, when analysing the revenue effects of TASP, it is essential to separate the case of a closed economy from that of a small open economy because the channels through which TASP affect government revenue differ fundamentally in the two cases.

In a closed economy, to the extent that TASP generate additional private savings and these savings are used to purchase corporate equity, the government will gain additional corporate income tax revenue. This additional revenue may, under certain conditions, offset the loss of personal income tax revenue and may lead to a reduction in the national debt. We show that this result involves a very special case and materialises only when there is no integration between the personal and corporate income taxes, private savings respond strongly to the TASP incentives and there is a large equity premium. If the income tax system is fully integrated, there is no net revenue from the corporate income tax and TASP produce an increase in the national debt. The same result occurs if the income tax is not fully integrated but the saving response to TASP is consistent with widely-accepted estimates of the savings elasticity and the equity premium is less than five percentage points.

The closed economy also contains special channels through which TASP generate economic effects. Since, in this type of economy, domestic savings must equal domestic investment as a condition of equilibrium, domestic investment can be stimulated either through changes in corporate taxes or through changes in personal income taxes that provide incentives for private savings. In a closed economy, the additional private savings from TASP lead automatically to higher domestic investment and, in the absence of full income tax integration, to higher corporate income taxes. If the additional corporate income tax is sufficiently large to offset the loss of personal income tax revenue, the additional investment is effectively self-financed and TASP provide economic benefits in the form of a

⁸See Gravelle (1991) and Engel, Gale and Scholz (1996).

higher capital stock and higher consumption. The connection between domestic saving and investment in a closed economy highlights the importance of measuring the effect of TASP's on private and national savings and underpins the focus of the research on this subject in the US. This motivation is often made explicit in papers on the saving effects of TASP's by stressing the low saving rate and the need to raise it in order to stimulate capital formation (see, for example, Feldstein (1995)).

The connection between domestic saving and investment is severed under a small open economy. In this case, TASP's have no effect on domestic investment even if they raise domestic savings and, therefore, do not generate corporate income tax revenue for the government. In a small open economy, the benefits of TASP's are limited to the welfare effects of reducing the tax distortions on the intertemporal allocation of consumption, and the revenue effects originate entirely from personal income taxes (if we ignore the effects of consumption taxes). The higher rates of return from TASP's, or from a shift to a consumption tax, generate an increase in future private consumption. This gain to consumers, however, carries a double price. First, it requires a reduction in current private consumption. Second, as shown in our examples in Table 2 for the small open economy, it generates a revenue loss for the government. The resulting budget imbalance can be corrected through either a reduction in public spending or an increase in revenue. In the former case, there is a reduction in public consumption; in the latter, there is a reduction in private consumption due to the higher taxes plus the associated dead-weight loss. The net result may well be a loss of social welfare. A numerical example of the welfare effects of TASP's through the intertemporal adjustment to consumption is provided by Hubbard and Skinner (1996). Their results show that, even with a fairly strong saving response to TASP's, the cost to society of one dollar of IRA contributions is almost three times as large as the benefit to consumers from the higher future consumption.

The above discussion suggests that the focus of research on the effect of TASP's on private and national savings is justifiable only in a closed economy where changes in domestic savings are automatically translated into domestic investment and may affect corporate income tax revenue. The economic justification for tax changes aimed at stimulating private savings in general, and for TASP's in particular, does not hold in the case of a small open economy. Given the possibility that these tax changes may reduce social welfare, it seems incumbent upon policymakers in small open economies to search for alternatives to TASP's that offer the opportunity to generate larger economic gains per dollar of revenue lost.

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