Notes on taxation and risk taking

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Abstract

In recent years, the literature on taxation and risk taking has focused on the argument that the distortions and incidence of capital income taxes are associated with the tax on the risk–free rate of return, and that the taxation of excess returns to risk taking may be of less economic consequence that had been thought. I review this argument and its underlying assumptions in detail and discuss the implications of different violations of the assumptions in the context of a variety of recent tax policy issues where the impact of taxation on risk and risk taking is of central importance to the analysis.

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I. Introduction

The literature on taxation and risk taking dates from the seminal paper by Domar and Musgrave (1944), with several important related contributions in the years that followed, including those of Tobin (1958) and Stiglitz (1969). The original Domar-Musgrave paper emphasised the risk-sharing impact of income taxes and the discouraging impact on investment of a limited loss offset, which lowers expected after-tax returns while reducing government risk sharing. Subsequent literature has expanded and drawn corollaries on this point about limited loss offset, as in the paper by Bulow and Summers (1984) showing that deterministic depreciation allowances discouraged investment in assets subject to uncertain depreciation.

In recent years, perhaps the most significant application relating to taxation and risk taking has been on the question of whether capital income should be taxed as all, in the context of the debate about whether income taxes should be replaced by consumption taxes. A series of contributions, including Gordon (1985), Kaplow (1994), Warren (1996), and Weisbach (2004), have suggested that the distortions of capital income taxation are associated with the tax on the risk-free rate of return, and that the taxation of excess returns to risk taking may be of less economic consequence that had been thought. These papers suggest, in particular, that under certain assumptions the taxation of excess returns imposes no burden on taxpayers and has no impact on risk taking. Hence, if the safe rate of return is close to zero, then perhaps the decision of whether to tax capital income is not particularly important.

This conclusion about the “non-taxation” of risk has met with reactions varying from skepticism to acceptance, and indeed it is often simply ignored in the continuing debate about the appropriate taxation of capital income. But if the conclusion rests on firm assumptions, then it is simply wrong to ignore it, and even if the assumptions are questionable, the implications depend on which assumptions are violated. Thus, there is really no argument for ignoring the result, any more than for it being blindly accepted without a full understanding of the assumptions on which it depends. In ss II and III of this paper, I review the result and its underlying assumptions in more detail and discuss the implications of different violations of the assumptions. I discuss a variety of recent tax policy issues, other than the debate over consumption taxes, where the impact of taxation on risk and risk taking is of central importance to the analysis.

II. Taxation of excess returns: theory

The argument that taxation of excess returns has no economic impact rests on several important assumptions. To illustrate where these assumptions come in, let us first go through the intuition for the argument itself.

Suppose that there are two assets available to each investor, one safe and one risky. To compensate the risk-averse investor for holding the risky asset, that asset must yield an expected return that is higher than the certain rate of return on the safe asset.
The difference between the risky asset's return and the safe asset's return is the risky asset's excess return. The excess return is positive on average, but must sometimes be negative; otherwise, the risky asset would dominate the safe asset. We can think of the tax system as being applied separately to the safe rate of return and the excess return. For the safe asset, only the tax on the safe rate of return applies; for the risky asset, both taxes apply. To focus on the impact of taxation on risk taking, we can ignore the uniform tax on the safe rate of return and consider the impact of the tax on the risky asset's excess return.

Suppose that the risky asset's excess return is taxed at rate $t$. Then, by scaling up his risky asset position by a factor $1/(1-t)$ and reducing his position in safe asset by the same amount, the investor can undo the direct effects of the tax on his portfolio's risk and expected return. This is a result that has been understood for some time. But now, consider the general equilibrium consequences of the tax collection: what happens to the government's revenue?

If the government does not change its spending pattern, then it must give the revenue back to the investor, and once the investor gets the revenue, he no longer wishes to undertake additional risk, because the revenue the government has provided in the form of a rebate precisely undoes the impact of the original tax on the investor's excess returns. Note that this experiment differs from the standard one familiar from deadweight loss and incidence analysis, in which we impose a distortionary tax and then hypothetically rebate the revenue in order to study the impact of pure substitution effects. Here, once the revenue has been rebated, there is no incidence or efficiency impact to study because the policy is completely neutral. In simple terms, the government has taken away from the investor something that the investor values precisely at zero. Giving it back to the investor therefore has no income effects, but simply relieves the investor of the need to engage in an offsetting portfolio shift. It would be as if the government forced an individual to trade apples for oranges at the going market price. The individual would respond by selling the added oranges to recover the apples taken away, but this would not be necessary if the government took its revenue (of positive apples and negative oranges) and delivered them back to the individual.

In this example, I assumed that the government rebated the revenue to the individual being taxed, but the same logic would hold if it rebated the revenue to a different investor, or for that matter if it invested the revenue and rebated it in the future, as long as all current and future investors are investing in the same safe and risky assets. The total amount of risk in the economy remains the same and the total amount of private risk-bearing does as well. This does not mean that each individual's portfolio is unaffected, simply his exposure to risk. For example, if the government allocates a substantial amount of risk to a particular individual, that individual would choose a safer portfolio in response. But then there would be other investors being allocated less risk than would be required to offset the risk-sharing effects of their tax payments, and they would shift to riskier portfolios.
Now, let us consider the assumptions that were necessary to make this process work:

1. Portfolio positions must be "scalable". The investor must be able to move back to the desired risk-return trade-off by buying or selling the risky asset in response to the government's tax and transfer policy. This is a reasonable assumption for liquid assets traded in established markets, but it may not be as reasonable for family businesses, for example.

2. The tax system must be symmetric, imposing at the same tax rate when the excess return is low and high. If the tax rate is higher when the excess return is high than when the excess return is low, then the investor cannot undo the impact of government policy simply by altering holdings of the risky and safe assets. Now, the revenue the government collects has positive value to the investor, making the investor worse off when it is collected. This outcome would arise not only with limited loss offset (when the excess return is sufficiently negative that the total return is negative) but also with a progressive marginal tax rate schedule.

3. There must be complete market participation. When the government takes risk from one individual and gives it to another, this is of no consequence when the second individual can engage in a market transaction to offset the risk. But not all individuals in an economy are investors, and members of future generations, even those who will be investors, cannot offset risks assigned to them prior to their birth except to whatever limited extent that this offset occurs through the bequest behavior of their ancestors.

4. Private markets must pool risk efficiently. The example given above assumes that the government takes in risk through the tax system and then redistributes it. This would be an appropriate assumption if there is complete participation in all markets and scalable asset positions (assumptions 1 and 3 above), for the private sector would already have produced all possible diversification through the process of individual portfolio choices. But if there is limited trading of assets, then the government could potentially improve diversification through its system of tax collection, just as insurance companies reduce the risks otherwise borne individually by the insured.

5. Government spending must not be affected by the riskiness of its revenue stream. In particular, the government's spending on particular goods and services does not become more volatile if its revenue stream becomes more so. Were this not the case, then individuals could not perfectly offset the government's behavior through portfolio adjustments. For example, if an investor's excess returns were taxed and the tax revenue spent on road construction, then there is no transaction in which the investor could engage to offset the volatility of infrastructure spending.

Before discussing these assumptions further, it is also worth mentioning some assumptions that are not required for the neutrality proposition to hold. First, one does not have to be assessing the situation from an ex ante perspective. It is not simply
that each individual has the same options or the same expected utility; each individual will end up in the same position *ex post* whether or not there is a tax on excess returns. Second, different individuals do not have to face the same tax rate, as long as tax rates are symmetric. Thus, we could have a flat rate tax system in which some investors, pension funds for example, are tax exempt. Third, it is not necessary that individuals have the same attitudes toward risk or the same evaluations of the prospects of risky assets. More risk-averse individuals will hold safer portfolios and more optimistic individuals will hold more risky assets, but neither of these outcomes will be affected by the government's tax on excess returns – risk is risk, and an investment's before-tax prospects will not be affected by whether the government taxes its returns. Fourth, the tax rate on excess returns is of no consequence. If there are two risky assets, one whose excess returns are taxed at 30 per cent and another whose excess returns are taxed at 50 per cent, this simply affects the size of the necessary offsetting portfolio adjustments. Only the tax on an asset's safe rate of return is relevant to considering economic distortions and incidence.

As to the key assumptions themselves, it is clear that they cannot all hold, because there are implications of the neutrality proposition that are clearly violated. For example, government tax revenue on excess returns can have zero value only if it is sometimes negative, and at least some components of capital income taxes, notably corporate income taxes, are always more positive than can be explained by taxes on very low safe rates of returns.¹ This could be explained by the lack of symmetric taxation or by government risk pooling. I explore the potential significance of each factor below.

### III. Violation of assumptions: evidence and implications

#### A. Loss offset

In the United States, corporate taxes are essentially proportional but the lack of loss offset violates the assumption of symmetric taxation. However, US law also allows firms to carry losses back for two years and forward for 20, so it is not clear how far from a system with complete loss offset the United States actually is. If most firms with current losses either can carry losses back or can quickly use up losses carried forward, then the system would closely approximate one with a full loss offset. The evidence, however, suggests otherwise, particularly in recent years.

Table 1, taken from Auerbach (2007), shows in its first column the income subject to tax for non-financial C corporations (those non-financial corporations that are subject to the corporate income tax) for the years 1996-2003. This is the aggregate income of companies with positive taxable income and shows the expected cyclical pattern, peaking in 2000 and falling in nominal terms in the recession year 2001 and again in 2002 before recovering in 2003. The next column shows the negative current income

¹ It is less clear how much revenue is raised by capital income taxes overall, because of the existence of negative as well as positive components. For further discussion, see R Gordon et al. (2004).
for remaining firms. Under a tax system with full loss offset, these losses would be fully netted against the positive income in the first column in computing aggregate taxable income. Note that negative income grew sharply between 1996 and 2002 to the point that net income (income subject to tax plus negative income) was barely positive in 2002. As to the proximity to a system with full loss offset, only a small portion of this negative income was carried back against the income on previous years' tax returns, as the next column of the table shows, and net operating deductions for previous losses offset only a small portion of these non-deductible current losses. As a result, non-deductible current losses net of NOL deductions rose from about 11 per cent of income subject to tax in 1996-7 to around 44 per cent in 2001-3, suggesting that the system is not close to one with full loss offset, at least in recent years.

B. Incomplete market participation

Even in the United States, where share ownership is more widespread than in many other developed countries, a significant minority of the population does not participate in the equity market, owning no shares directly or through mutual funds or defined-contribution retirement accounts. This is of central importance to understanding the logic of a recent social security privatisation proposal put forward by President Bush in 2005. Under the plan, payroll taxes in an amount up to four per cent of payroll (out of the employee's payroll taxes of 6.2 per cent of payroll) would have been made available to workers for the purpose of investing in private accounts. Workers taking this option would then have had their future public pension benefits reduced by the amounts redirected into private accounts, compounded at the roughly three per cent real rate of return on government bonds typically assumed in actuarial calculations for the social security system. The government, in turn, would have issued government bonds to cover the short-term loss of payroll tax revenue, using savings from the future benefit reductions to service the new debt.

What impact should this program have had on the economy and social security system participants? With complete equity market participation, the impact should have been minimal. The government would have been exchanging implicit debt (to future pension beneficiaries) for explicit debt of roughly the same magnitude, leaving its comprehensive fiscal position unchanged. Current retirees would have seen no change in their benefits. Future retirees participating in the system of private accounts would have been accepting loans from the government to be repaid through a future benefit reduction. The optimal portfolio response for such investors would have been to invest these loans in assets with similar risk characteristics, eg the newly issued government bonds, thereby giving them the same total (private plus public) benefits as before upon retirement. With the newly issued bonds being demanded by those participating in the system of private accounts, there would have been no excess supply of these bonds in the capital market, and so no realignment in rates of return would have been required.

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Because carrybacks are expressed as tax refunds rather than as deductions, I divide them by the effective tax rate on taxable income to estimate the value of current losses carried back.
There are, of course, many complications to this story, not the least of which involves the politics of implicit commitments. Some argued that making implicit commitments explicit would solidify their legal status, while others suggested that making the magnitude of commitments more explicit would strengthen calls for benefit reductions. Others saw a political benefit in reducing the scope of the federal government. But even without such political complications, the system of private accounts was understood to have potentially significant real effects precisely because many public pension beneficiaries do not participate in equity markets. For those entering retirement with little wealth outside of housing and social security, the ability to purchase equity would have been enhanced by an infusion of cash into the newly created private accounts.

C. **Private risk pooling and the riskiness of government revenues**

At one extreme is the assumption laid out above, that the private sector pools risks efficiently and that government revenue is therefore just as risky when aggregated. At the other extreme would be the case of all private risks being idiosyncratic and hence government revenue being completely safe. While it is difficult to measure private risks and so to know what share of private risk is pooled through the process of revenue collection, it is possible to estimate how risky aggregate government revenue is. The answer, it turns out, is that government revenue is quite risky.

In Auerbach (2004), I posed a simple question: how sensitive is the government’s present-value revenue stream to movements in the stock market, holding tax rules fixed? Put another way, how much equity would the government have to hold in order for the sensitivity of its equity position to the stock market to equal the actual sensitivity of its revenue stream to the stock market? I calculated the actual sensitivity using a regression of changes in revenues (holding tax policy fixed) to lagged changes in revenue and current and lagged changes in the aggregate stock market index. Using the projections from this regression, I computed the change in current and future revenues resulting from a one-time shock to the stock market, and then computed a present value of these revenue changes. The estimates varied, but a central estimate was that the US government implicitly holds an equity position roughly equal to 1.8 times the entire stock market. How can this be so? The intuition is straightforward.

Suppose that all corporate income were taxed at the current US rate of 35 per cent. Then the government’s right to this fraction of all corporate income would give it $0.35/(1-0.35)$, or over half, of the stream received by private owners of corporate stock – as if the government’s share of equity were more than half of that held by the private sector. But this calculation understates the government’s implicit claim, because much of the government’s tax revenue comes from taxes on labour income, corporate income at the shareholder level, or capital income outside the publicly-traded sector; and each of these revenue streams should be positively correlated with corporate taxes. Thus, the government’s claim could be several times the size of the stock market, given that corporate taxes account for only about 10 per cent of federal revenues.
In relation to the question of whether taxation serves to pool private risks, this finding certainly implies that there is considerable risk remaining after the government has pooled all sources of tax revenue. It also is relevant when the question of direct government equity ownership arises, for it suggests that the investment of government trust funds in equity markets is likely to represent a small change in the government’s equity position, measured comprehensively.

D. Portfolio responses and the design of tax policy

The taxation of capital gains on realisation rather than on accrual introduces distortions and complications to the tax system. But taxation on accrual poses problems when accruing income cannot be measured until an asset is sold. When a sale occurs, the total gain can be measured, but the pattern of this gain’s accrual over time may still be unobservable to the government. If taxpayers possess more information than the government about the timing of such accruing gains, then the lock-in effect and other distortions will still remain, even if the government seeks to offset the deferral advantage of realisation taxation by imposing an interest charge based on an assumed (but presumably incorrect) pattern of accrual.

It turns out, however, that if the assumptions laid out above are satisfied, then the government can impose a realisation-based tax that effectively taxes gains on accrual even though the government cannot observe these gains. Recall that, under these assumptions, it does not matter what the tax rate is on the excess returns of risky assets. Regardless of the tax rate, if it is proportional with full loss offset and individuals can scale their portfolios in response, there will be no impact on their underlying behaviour. Once one allows the government access to a class of tax systems that tax the safe rate of return at some desired rate, say $t$, and taxes the excess returns at a possibly different rate, $t^*$, which also may change over time, then there exists one tax system that leaves individuals in the same after-tax position as they would be under accrual taxation, even though taxes occur only on realisation and the government does not use any information on the pattern over which gains accrued. As shown in Auerbach (1991), such a tax system, which imposes a tax equal to $(1-e^{-st})$ per dollar of assets sold after a holding period of $s$ years, is equivalent to a tax at rate $t$ on the accruing asset income.

How useful is this result, if at least some of the various assumptions are violated? The question is whether the violations impinge on this particular policy. For example, the assets in question may be scalable, even if not all assets in the economy as a whole are. And, by construction, the system can be implemented with a constant tax rate and full loss offset, even if the rest of the system of capital income taxation does not have this property. The main point of this discussion, though, is to illustrate that, if they are satisfied, the assumptions that make the taxation of excess returns neutral also expand the scope for income taxation by making equivalent systems that differ only with respect to the taxation of excess returns.³

³ In a related paper, Auerbach and Bradford (2004) show that the same approach can be used to implement an income tax entirely on a cash-flow basis, i.e. without any actual income measurement.
IV. Conclusions

As the preceding examples illustrate, the framework that leads to the result that taxation of risk is neutral involves many assumptions that do not hold exactly. Thus, it is an empirical question how relevant the result is. But the framework is still useful for understanding and analysing different policies and proposals, with attention paid to violations of assumptions and their implications.

References


Table 1: Elements of tax law asymmetries, US non-financial C Corporations 1996-2003 ($US billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Income Subject to Tax</th>
<th>Negative Taxable Income</th>
<th>NTI Net of Carrybacks</th>
<th>NTI Net of CBs and Net Operating Loss Deductions (NOLs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>478.6</td>
<td>-110.1</td>
<td>-95.7</td>
<td>-51.2</td>
</tr>
<tr>
<td>1997</td>
<td>508.9</td>
<td>-128.2</td>
<td>-109.2</td>
<td>-60.0</td>
</tr>
<tr>
<td>1998</td>
<td>550.2</td>
<td>-178.8</td>
<td>-152.0</td>
<td>-106.6</td>
</tr>
<tr>
<td>1999</td>
<td>580.9</td>
<td>-223.6</td>
<td>-193.9</td>
<td>-139.0</td>
</tr>
<tr>
<td>2000</td>
<td>638.7</td>
<td>-312.2</td>
<td>-270.9</td>
<td>-202.5</td>
</tr>
<tr>
<td>2001</td>
<td>528.1</td>
<td>-391.0</td>
<td>-293.1</td>
<td>-241.4</td>
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<tr>
<td>2002</td>
<td>486.5</td>
<td>-370.8</td>
<td>-264.2</td>
<td>-207.6</td>
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<tr>
<td>2003</td>
<td>554.3</td>
<td>-353.3</td>
<td>-301.1</td>
<td>-245.2</td>
</tr>
</tbody>
</table>

Source: Auerbach (2007).