

From John W. Diamond and George R. Zodrow, eds., *Fundamental Tax Reform: Issues, Choices, and Implications* (Cambridge, MA: MIT Press, 2008), 267-75

Discussion

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This chapter [John W. Diamond and George R. Zodrow, “Consumption Tax Reform: Changes in Business Equity and Housing Prices”] makes a valuable contribution to the study of the transitional effects of tax reform. The authors conclude that declines in the value of existing capital will be relatively modest, with the exact impact depending on adjustment costs. This conclusion, which rebuts common, but unfounded, claims of large value declines, is solidly based on a careful modeling of the current tax system and the economy’s response to tax reform.

Model Structure and Policy Experiment

The authors’ model has the crucial building blocks required to examine the change in the market value of existing capital and the resulting impact on the aggregate utility of different cohorts; a general equilibrium methodology, rational expectations, a careful representation of the current tax system’s key features, and separate analysis of owner-occupied housing and business capital. The last element is important because the two types of capital are affected differently by tax reform and because changes in their values have different political and distributional implications. The authors take an additional step forward by separating rental housing from other business capital, permitting recognition of the close substitutability between rental and owner-occupied housing.

Because the model is stylized, it is unavoidably restrictive along some dimensions. For example, it features perfect competition and exogenous debt-equity and payout ratios; it does not include uncertainty, heterogeneity within cohorts, or human capital. All of these simplifications seem acceptable for the purpose at hand. The closed-economy assumption is a little more troubling because it may rule out some important transitional effects. But, it is not easy to formulate an adequate alternative, given the formidable difficulties of modeling current international tax rules.

The authors examine a replacement of the current income tax system, including its non-uniform treatment of the three types of capital, with a Hall-Rabushka flat tax. This reform can be decomposed into three components:

- Consumption replaces income as the tax base. Accordingly, the tax on interest income is repealed, along with the deduction for interest expense, including mortgage interest.
- Owner-occupied housing is taxed on a prepayment basis, with no deduction for home purchases and no taxation of net imputed rental income. Accordingly, the property tax deduction is repealed.
- Progressivity is reduced by the flattening of the rate structure.

The authors study a pure textbook version of the flat tax that does not include transition relief, preferential treatment for owner-occupied housing, or limits on loss refundability. The reform is also assumed to be unanticipated. This policy experiment is a reasonable starting point, although I discuss below other experiments that also merit attention.

Results

I organize my discussion of Diamond and Zodrow's results around three key values that govern the effects of tax reform on the value of existing capital.¹ As will be seen, their model provides reasonable estimates, or ranges of estimates, for each of these values.

Three Key Values

The value of existing capital of type i in the income-tax steady state, prior to the unanticipated reform, can be written as

$$V_y(i) = 1 - d_y(i).$$

In this equation, the steady-state cost of producing and installing a unit of new capital of each type is normalized to unity. The expression $d_y(i)$ denotes the discount at which existing capital of type i is valued, under the income tax, relative to the cost of producing and installing a new unit of that capital. As discussed below, that discount reflects any deferred tax liabilities that arise from the timing features of the income tax.

The value of capital immediately after the unanticipated reform can be written as

$$V_{c,0}(i) = Q_{c,0}(i)[1 - d_c(i)].$$

The expression $Q_{c,0}(i)$ denotes the marginal cost of producing and installing a unit of new capital immediately after the reform. Although this cost returns to unity in the consumption-tax steady state, it may diverge from unity during the transition. The expression $d_c(i)$ denotes the discount at which existing capital of type i is valued, under the consumption tax, relative to the cost of producing and installing a new unit of that capital. As discussed below, that discount reflects any deferred tax liabilities that arise from the timing features of the consumption tax.

The ratio of the two values is given by

$$\frac{V_{c,0}(i)}{V_y(i)} = Q_{c,0}(i) \frac{1 - d_c(i)}{1 - d_y(i)}.$$

It can be seen that the transitional impact of reform depends upon three values: the two deferred-tax discounts and the change in the marginal cost of producing and installing a

unit of new capital. Existing capital suffers a greater loss if it faces larger deferred tax liabilities under the new consumption tax, if it has smaller deferred income tax liabilities that are forgiven by reform, and if reform initially reduces the cost of producing and installing new capital.

These expressions refer to the changes in the total value of capital. The proportional changes in the value of equity (the measures emphasized by the authors) are larger because firms and homeowners are leveraged and tax reform has little impact on the real value of their outstanding one-period-maturity debt. It should be noted that some tax reforms, such as the adoption of a retail sales tax or value added tax, might prompt an increase in the consumer price level and a corresponding reduction in the real value of outstanding nominal debt. As the authors recognize, however, the adoption of a flat tax should leave the consumer price level unchanged.²

The authors' results imply that the deferred-income-tax discounts are zero for owner-occupied housing, 0.02 for rental housing, and 0.10 for non-housing capital.³ The deferred-consumption-tax discounts are, as explained below, zero for owner-occupied housing and 0.21 for both types of business capital. The results for the intermediate-adjustment-costs specification imply that $Q_{c,0}(i)$ equals 0.97 for owner-occupied housing, 1.04 for rental housing, and 1.08 for non-housing capital.⁴ The net result is a 3 percent decline in the value of owner-occupied housing, a 17 percent decline in the value of rental housing, and a 6 percent decline in the value of non-housing capital, with corresponding equity value declines of 4 percent, 26 percent, and 10 percent.

I now consider each of the key parameters in turn.

Deferred Tax Discounts: Largely Known

The deferred-tax discounts are largely known because they depend upon the timing features of the two tax systems. If taxes are a uniform fraction of capital's net income over its lifetime, the discounts are zero, because existing capital faces the same future tax burden as the new capital against which it competes in production. If taxes are a higher fraction of net income later in capital's lifetime, however, the discounts are positive. In that case, existing capital carries a deferred tax liability, because it faces heavier future proportional tax burdens than newly produced capital. That liability depresses the value of existing capital relative to the cost of producing and installing new capital.

Because the flat tax examined by the authors is a pure textbook tax system, the relevant values of $d_c(i)$ are particularly easy to determine:

- Owner-occupied housing, which is taxed under the prepayment method, faces a zero deferred consumption tax discount. There is no deferred tax liability because no tax is levied at any time.⁵
- Both types of business capital, which receive standard consumption-tax expensing treatment, face a deferred-consumption-tax discount equal to the consumption tax rate, which is .21 in the intermediate-adjustment-costs case.⁶ Expensing imposes

the same zero present-value tax as the prepayment method over the lifetime of capital, but the timing is different. Under expensing, the tax is negative when the capital is produced and positive thereafter, creating deferred tax liabilities.

If the current tax system were a pure textbook income tax, the value of $d_y(i)$ would be equally easy to determine. As Bradford (2000, pp. 319, 329 n.15) notes, the deferred-tax discount is zero under such a tax because taxes are a uniform fraction of net income over the lifetime of the capital asset. As the authors recognize, however, the current tax treatment of business capital differs from such a textbook tax by offering accelerated depreciation. Like expensing, accelerated depreciation reduces taxes early in capital's lifetime and increases it later, giving rise to deferred tax liabilities.

While the existence and rough magnitude of the deferred income tax discounts are known, their exact magnitudes are unknown. The authors' values – discounts of 2 percent for rental housing and 10 percent for non-housing capital – depend upon various assumptions. Two of the authors' assumptions, concerning dividend taxation and intangible capital, tend to understate the income-tax discount and thereby overstate transitional losses. One assumption, concerning bonus depreciation, tends to overstate the income-tax discount and thereby understate transitional losses.

First, the authors do not model the presence of intangible capital in the business sector. Since such capital is generally expensed by firms under current law, it faces a deferred-income-tax discount equal to the firm's tax rate. As Lyon and Merrill (2001) emphasize, the omission of intangible capital from analyses of tax reform understates the deferred income tax discount and overstates transitional losses.

Second, the authors adopt the traditional view of corporate dividend taxation, under which dividends are a constant share of net income and dividend taxes do not give rise to deferred liabilities. Under the Auerbach-Bradford-King "new" view, however, dividends are reduced by initial investment and increased by subsequent cash flow, with offsetting changes in capital gains. If the dividend tax rate exceeds the effective capital gains tax rate, a deferred income tax discount equal to the tax-rate difference then arises. To the extent that the new view is valid, the authors' use of the traditional view understates the deferred income tax discount for non-housing capital.⁷ But, the importance of this point is diminished by the low dividend tax rate currently in effect and by uncertainty about the validity of the new view.

On the other hand, the authors model the tax system as including bonus depreciation (partial expensing), a source of substantial deferred tax liabilities. Although the tax system included this feature in 2003, the year that the authors take as their reference point, the provision expired at the end of 2004. Its inclusion overstates the deferred income tax discounts present in today's tax system.

Due to these and other issues, the deferred income tax discounts cannot be pinned down with precision. On balance, the authors' model seems to provide reasonable estimates of their values.

Change in Cost of Producing and Installing New Capital: Less Well Known

In a world without adjustment costs, $Q_{c,0}(i)$ would necessarily equal one. The impact of tax reform on the value of capital, in both the short and long run, would then depend solely on the deferred tax discounts. The value of owner-occupied housing would remain at 1, the value of rental housing would fall from 0.98 to 0.79, and the value of non-housing capital would fall from 0.90 to 0.79. These asset price responses would not depend on how reform altered each asset's effective tax rate or on the resulting changes in investors' demand for the assets; such demand changes would be manifested as instantaneous quantity responses rather than as price responses. Observation suggests, however, that adjustment costs of some type dampen the short-run quantity responses, causing part of the demand changes to appear in short-run price responses.⁸

The directions of the demand changes, and hence of the changes in $Q_{c,0}(i)$, are known. Because reform lowers the effective marginal tax rate on both types of business capital to zero, it increases the demand for these assets and pushes their values of $Q_{c,0}(i)$ above unity. In contrast, reform leaves the effective marginal tax rate on owner-occupied housing at its prior value of zero, diminishing its relative attractiveness and pushing its value of $Q_{c,0}(i)$ below unity.

The magnitudes of the changes in $Q_{c,0}(i)$ are, however, far from fully known. They depend on the strength of the demand changes for the different types of capital and also on the adjustment-cost mechanism that divides those demand change between price and quantity responses. The authors showcase the latter uncertainty by varying the adjustment-cost parameter in their quadratic specification. With high adjustment costs, the changes in $Q_{c,0}(i)$ from unity are about twice as large as with intermediate costs; with low adjustment costs, they are about half as large.

Additional sources of variation could be explored. It may be useful to consider other types of adjustment costs. As Cooper and Haltiwanger (2006) discuss, some adjustment costs may not have the convexity implied by the quadratic assumption; in particular, there may be an important role for investment irreversibility. Also, the demand changes are likely to be sensitive to the elasticities of substitution between the three sectors and it would be helpful to consider variations in those parameters.

Although more sensitivity analysis would be useful, the authors examine a reasonable range of adjustment behavior and their results provide some indication of the range of plausible price responses.

Modest Decline in Value of Existing Capital

In summary, the authors find that all three types of capital decline in value, but that the declines are relatively modest. Their results arise from a well-grounded model that

addresses the role of deferred tax discounts and adjustment costs and therefore offer a powerful rebuttal to claims that tax reform will cause large declines in asset values.

Some informal analyses of tax reform envision large declines in the value of owner-occupied housing, while other such analyses expect large declines in the value of business capital. Interestingly, these conclusions arise from two equally extreme, and diametrically opposed, assumptions about adjustment costs. Those who see large declines in the value of owner-occupied housing assume fixed supply, which is equivalent to infinite adjustment costs. The authors show that the decline in home values is modest with finite adjustment costs, even if those costs are relatively large. Those who see large declines in the value of business capital assume zero adjustment costs (and also often overlook the deferred income tax liabilities that would be forgiven by tax reform). The authors show that the decline in the value of business capital is modest with positive adjustment costs, even if those costs are relatively small.

Modest Impact on Transitional Cohorts' Utility

The authors find only modest impacts on the utility of the early cohorts, reflecting the relatively small declines in the value of existing capital and the gains from higher after-tax rates of return after the reform.

The authors note one limitation of their model, a discontinuity in how tax reform affects those receiving bequests. Workers who received bequests immediately before the reform are harmed because the inherited assets decline in value. In contrast, workers who receive bequests immediately after the reform are unaffected by the reduction in the value of their parents' assets, due to the assumption that the parents do not respond by reducing the bequests that they leave. This discontinuity would disappear under a more realistic assumption of wealth-sensitive bequests. Nevertheless, the authors' approach is a clear improvement over pure life-cycle models that simply ignore bequests. The proper treatment of bequests is a challenging topic that should be a focus of future work.

Profits, Rents and Risk

Diamond and Zodrow assume that there are no pure profits or rents in the economy. They suggest that this assumption may cause their model to overstate transitional losses. The argument is that reform might cause little or no reduction in the market value of future profits and rents. If so, the proportional reduction in the value of equity, which presumably includes a claim to these flows, would be even more modest than their results indicate.

This conclusion seems plausible. Profits and rents should fare better than capital during the transition and might actually rise in market value. Because these are not produced assets, they cannot be analyzed using the framework of this comment; it is instead necessary to directly compute the change in their after-tax present discounted value. Two factors would tend to increase this present value. By inducing an expansion of the capital stock, tax reform would probably increase before-tax profits and rents; with more capital,

monopoly power should be more lucrative and land and other fixed assets should be more productive. Also, firms face a lower tax rate under the flat tax than under the current system, further boosting after-tax profits and rents. An offsetting factor, though, is that future profits and rents would be discounted at a higher after-tax interest rate. In any case, the inclusion of profits and rents is a fruitful direction for further work.

Diamond and Zodrow also assume that there is no risk in the economy. In accord with their discussion of profits and rents, they suggest that omission of the returns to risk-taking may also cause their model to overstate transitional losses. Here, though, they are too apologetic. There is little reason to think that this omission biases their results.

In well-functioning capital markets, the after-tax ex ante market value of a future ex post risk premium is necessarily zero, for any level of risk aversion and any degree of uncertainty. If the income tax and the flat tax apply uniform tax rates to returns in all states of the world, the before-tax market value of the risk premium is also zero under each tax system. The omission of zero-market-value items clearly cannot distort calculations of changes in market value. Of course, the analysis must be modified if, due to limited loss refundability or other features, either or both tax systems apply different tax rates to returns in different states. Even then, though, it is hard to determine the direction or magnitude of any resulting impact on asset values.

Further Research

Because Diamond and Zodrow's model is well-suited to examine transitional questions, it should be used to study a wider range of policy experiments. It would be informative to consider tax reforms that included politically popular, perhaps inevitable, features such as transition relief, a continued preference for owner-occupied housing, and limited loss refundability.

It would also be useful to examine how other forms of consumption taxation, such as a graduated-rate Bradford X-tax, would affect the value of existing capital. The major relevant difference from the flat tax would probably be in the tax rate on business cash flow, which controls the deferred consumption tax discount. Relative to the flat tax, an equal-revenue X-tax would presumably put less of the tax burden on labor income and more of it on business cash flow. The higher business tax rate would then induce a larger decline in the value of existing business capital.

Normative Question: Unknowable

One question that is unknowable, at least from the perspective of positive economics, is whether and to what extent existing capital *ought* to be taxed in conjunction with a move to consumption taxation. How should benefits and burdens be allocated across generations? Within each generation, is it fair to single out for tax those who saved in the past? If a capital levy is desirable, could or should it be imposed without a change in the prospective treatment of saving? The authors' finding of modest declines in asset values

undercuts arguments for sweeping transition relief, but the selection of an appropriate transition policy ultimately requires a resolution of these normative questions.

Transitional effects are an important aspect of fundamental tax reform. As research like that of Diamond and Zodrow increases our knowledge of these effects, policy makers will become better equipped to address the normative issues.

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¹ As discussed below, a different framework is required to analyze profits, rents, and risk, which are not included in the Diamond-Zodrow model.

² Tax reforms alter the consumer price level only if they prompt the Federal Reserve to alter monetary policy. If the income tax were replaced by a sales tax or value added tax, the statutory incidence of the labor tax wedge would move from households to firms, necessitating an immediate reduction in real wages to restore equilibrium. With an unchanged consumer price level, nominal wages would have to decline, a process that might be slow and difficult. To avoid this problem, the Fed might accommodate the tax by letting the consumer price level rise. But, these concerns do not arise under a flat tax because the statutory incidence of the labor tax wedge remains on households. The Fed would therefore have no reason to engineer a change in the consumer price level.

³ For each type of capital, divide “firm value” by “capital,” as listed in Table 5.3, and add 0.35 (the debt parameter). The difference from 1 is the deferred-income-tax discount.

⁴ I obtained these values by multiplying the ratio of “firm value” to “capital” from Table 5.3 by 1 minus the proportional decline in Tobin’s Q (as listed in Table 5.5), adding 0.35, and dividing by 1 minus the deferred-consumption-tax discount.

⁵ Under the flat tax, consumer durables and capital held by state and local governments and nonprofit organizations would also be taxed under the prepayment method and would also face a deferred consumption tax discount of zero. These assets are not included in the Diamond-Zodrow model.

⁶ The tax rate, and hence the deferred-consumption-tax discount, differs slightly across the three adjustment-cost specifications and over time.

⁷ This point does not apply to rental housing, which is treated as being in the non-corporate sector and therefore unaffected by dividend taxation.

⁸ Of course, the long-run price response still depends only on the timing characteristics of the tax systems. The 100-year percentage changes in Tobin’s Q reported in Tables 5.3 through 5.5 match the no-adjustment-cost calculations, apart from differences due to the long-run tax rate differing slightly from 0.21.